Super Power Series Book

Explore
Discover
Learn
Grow

CURIOSITY

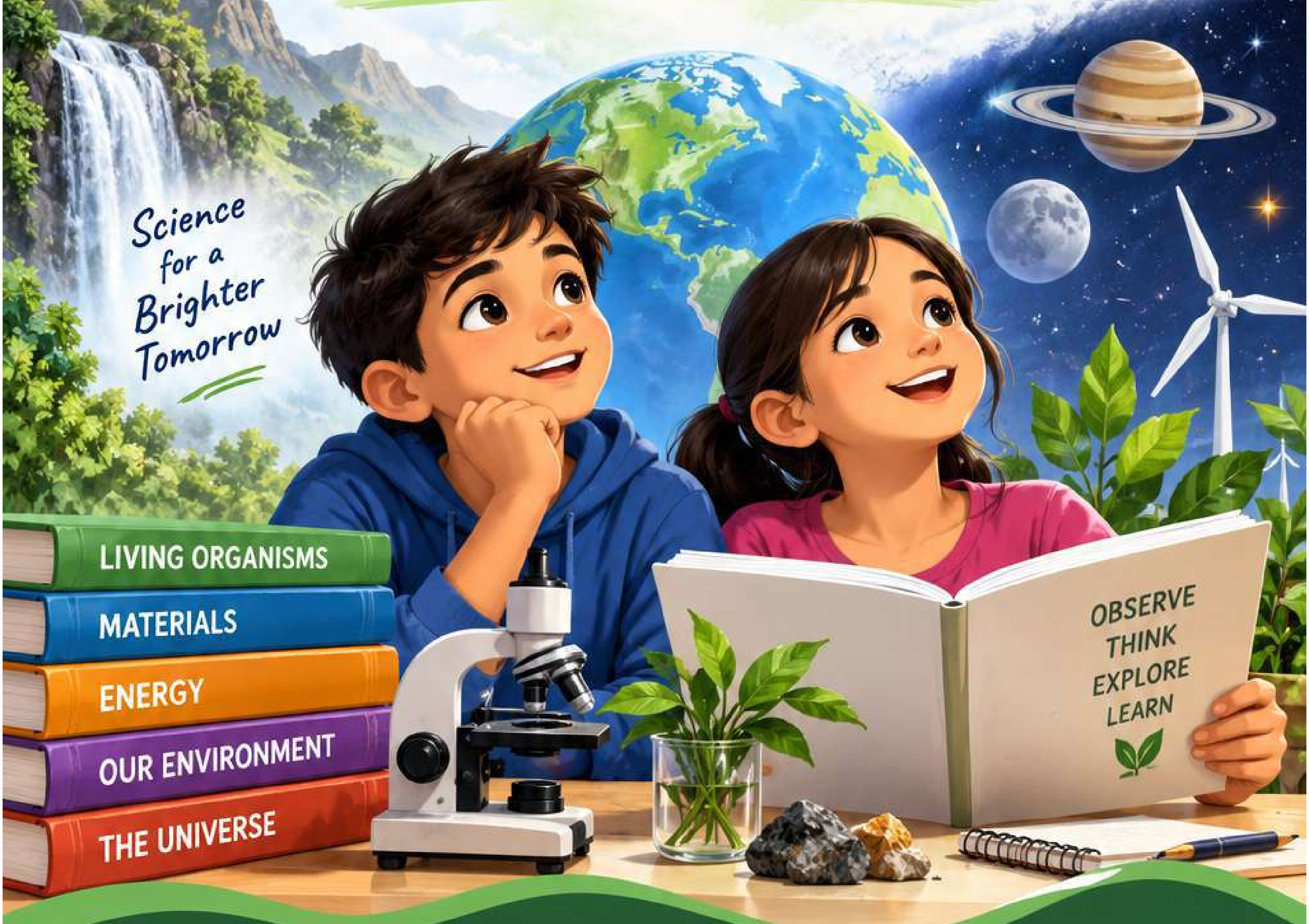
FOR YOUNG LEARNERS

Study Material BOOK for

6th Standard Science Subject

Small Questions Lead to Big Discoveries

Based on NCERT/CBSE Curriculum



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Knowledge Builds a Better World

Super Power Series Book

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CURIOSITY FOR YOUNG LEARNERS

Study Material BOOK for 6th Standard Science Subject

(Prepared as per Poornaprajna Integrated Student Support Model)

CONTENTS

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PREFACE

Curiosity for Young Learners – Study Material Book for 6th Standard Science has been developed based on the **NCERT/CBSE Curriculum** to provide students with a structured and comprehensive resource for learning Science. The book is prepared with the help of AI-driven GPTs, seeks to make learning meaningful and enjoyable by encouraging **curiosity, observation, questioning, scientific thinking, and problem-solving**, helping young learners understand science beyond mere memorisation.

The book is prepared in accordance with the **Poornaprajna Integrated Student Service Model**, which adopts a systematic approach through **chapter summaries, fill-in-the-blanks, one-mark, two-mark, three-mark, five-mark, and applied questions**, along with experiential learning opportunities. It also incorporates **Multiple Choice Questions for Olympiad examinations**, thereby connecting classroom learning with competitive-examination preparation.

This book is designed to support **6th Grade students in both CBSE school examinations and competitive examinations such as Olympiads**. Through a thoughtful blend of concept-based, application-oriented, **LOTS and HOTS** questions, it aims to strengthen understanding, reasoning, application, and confidence. Above all, *Curiosity for Young Learners* encourages every student to **explore, discover, learn, and grow** while developing a lasting interest in Science.

Dr. P. S. Aithal
(www.psaithal.in)

6th Standard Science Book Chapter 1

Chapter 1: The Wonderful World of Science

1.1 Summary of the Chapter:

Chapter 1: The Wonderful World of Science — Summary:

(1) **Science begins with curiosity.** Human beings naturally observe their surroundings, ask questions, and try to understand how things work. Science is a way of **thinking, observing and doing things** to understand the world and uncover the mysteries of the universe.

(2) **Science is present everywhere around us.** From tiny grains of sand and plants to mountains, oceans, stars and galaxies, everything provides opportunities for scientific exploration and discovery.

(3) **Scientific knowledge keeps growing and changing.** Science is compared to a giant, unending **jigsaw puzzle** in which every new discovery adds knowledge, raises new questions and may sometimes change our earlier understanding.

(4) **Earth and living organisms provide many areas for exploration.** Earth supports an amazing variety of plants and animals. Observing processes such as a seed growing into a plant or a caterpillar becoming a butterfly encourages us to investigate how living things grow and survive.

(5) **Science helps us understand everyday necessities such as food and water.** It encourages us to investigate different foods, their ingredients, rainfall, and changes in water such as **freezing into ice and boiling into steam**.

(6) **Materials around us can also be scientifically investigated.** Everyday objects such as paper, keys, rulers, erasers, clothes and cups are made from different materials, leading us to ask about their properties and how different materials can be separated.

(7) **The scientific method is a systematic way of finding answers.** It involves **observing something, asking a question, guessing a possible answer, testing the guess through experiments or further observations, and analysing the results**.

(8) **We use the scientific method in everyday life.** Finding out why a pen has stopped writing, why a bicycle tyre is flat, why food spills from a cooker, or why a bulb does not work involves observation, questioning and testing possible explanations.

(9) **Anyone can think and work like a scientist.** Science is not merely about memorising facts or performing experiments; it develops our ability to ask **"how?" and "why?"**, observe carefully and find solutions to problems.

(10) **Science is a joyful and collaborative journey of discovery.** Scientists often work together, and students are encouraged to explore with others, remain curious, keep asking questions and continue discovering the mysteries of the universe.

1.2 Important Formulas:

The most important sequence to remember can be represented as:

Scientific Method:

Observation → Question → Possible Answer/Guess → Experiment/Testing → Analysis of Results → Conclusion

The chapter explicitly describes observing something interesting, developing a question, guessing a possible answer, testing it through experiments or further observations, and analysing the results.

Quantitative Concepts Mentioned

Although **no formulas are given**, the chapter introduces ideas that will later involve measurement and numerical calculations:

Concept introduced	Quantitative aspect	Formula in this chapter
Hot and cold	Measurement of temperature	**No formula given**
Water changing to ice	Temperature/change of state	**No formula given**
Water changing to steam	Temperature/change of state	**No formula given**
Movement of objects	Motion and measurement	**No formula given**
Experiments	Observation and comparison of results	**No formula given**

For example, the chapter discusses water freezing on cooling and boiling into steam on heating and highlights the importance of determining how hot something is.

Formula requirement for Chapter 1: NIL.
Students should concentrate on understanding the **scientific method, observation, curiosity, questioning, experimentation, analysis and logical problem-solving** rather than memorising formulas. The chapter itself emphasises that science is not simply about memorising facts but about following a systematic process to find answers.

1.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

LOTS – Fill in the Blanks with Answers:
The following questions are based directly on the key facts, terms, and ideas presented in the uploaded chapter.

1. Science is a way of thinking, __________ and doing things to understand the world.
   Answer: observing
2. The most important quality needed to explore science is __________.
   Answer: curiosity
3. Science helps us uncover the secrets of the __________.
   Answer: universe
4. Science is compared to a giant and unending __________ puzzle.
   Answer: jigsaw
5. Every new scientific __________ adds another piece to our knowledge.
   Answer: discovery
6. New discoveries can change our __________ of the world.
   Answer: understanding
7. Our home planet is called __________.
   Answer: Earth
8. Earth is the only planet we know that supports __________.
   Answer: life
9. The environment of Earth must be __________.
   Answer: protected
10. A caterpillar transforms into a beautiful __________.
    Answer: butterfly
11. Along with food, we need __________ to survive.
    Answer: water
12. Water freezes and becomes __________ when it is cooled.
    Answer: ice
13. Water boils and becomes __________ when it is heated.
    Answer: steam
14. The process used to find answers systematically is called the __________ method.
    Answer: scientific

15. In the example given in the chapter, a pen may stop writing because its __________ has finished.
    Answer: ink
16. To test the guess about the pen, we can check its ink __________.
    Answer: refill
17. The first step in the scientific method is to __________ something that we find interesting or do not understand.
    Answer: observe
18. After observing something, we may think of a __________ about it.
    Answer: question
19. We then guess a possible __________ to the question.
    Answer: answer
20. We test our guess through experiments or further __________.
    Answer: observations
21. After testing a guess, we __________ the results to see whether they answer our question.
    Answer: analyse
22. People who follow the scientific method to solve problems or discover new things are called __________.
    Answer: scientists
23. A bicycle repair person may investigate where the __________ has leaked from a flat tyre.
    Answer: air
24. An electrician may check whether a problem is with the bulb or the __________.
    Answer: switch
25. Anyone who follows the scientific method is working like a __________.
    Answer: scientist
26. Learning science develops our capabilities for finding __________ to bigger problems.
    Answer: solutions
27. To learn science well, we should observe our __________ keenly.
    Answer: surroundings
28. Curiosity encourages us to ask questions such as "how" and "__________".
    Answer: why
29. Scientists across the world often work together in large __________.
    Answer: teams
30. Science is all about joyful __________.
    Answer: exploration

1.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS – Fill in the Blanks with Answers:

1. Riya notices that a plant near the window grows better than one kept in a dark corner. Her noticing this difference is an example of scientific __________.
   Answer: observation
2. A student wonders why a flower opens during a particular time of the day. This question demonstrates scientific __________.
   Answer: curiosity
3. If a new discovery proves that an earlier scientific idea was incorrect, our scientific __________ should change accordingly.
   Answer: understanding

4. Every new scientific discovery may lead to many more __________ that need investigation.
   Answer: questions
5. If a student wants to know why a seed is not growing, the first useful step would be to carefully __________ the seed and its surroundings.
   Answer: observe
6. A student thinks that a plant is not growing because it receives too little water. This possible explanation is a scientific __________.
   Answer: guess
7. To determine whether the amount of water affects plant growth, the student's guess should be __________ through observation or experiment.
   Answer: tested
8. If the experimental results do not support a student's original guess, the student should consider another possible __________.
   Answer: answer
9. When observations disagree with our original idea, we should rely on the __________ rather than simply keeping our original idea.
   Answer: results
10. Arun's pen stops writing, but he finds that the refill still contains ink. He should make another __________ about the cause of the problem.
    Answer: guess
11. If the ink in a pen has dried up, checking and testing the pen helps determine whether the guess is __________.
    Answer: correct
12. A bicycle tyre becomes flat repeatedly. Looking carefully for the place from which air escapes is an example of scientific __________.
    Answer: investigation
13. An electrician checks both the bulb and switch to determine why a light is not working. This is an example of applying the __________ method.
    Answer: scientific
14. If dal repeatedly spills from a pressure cooker, checking whether too much water was added is a way of __________ a possible explanation.
    Answer: testing
15. If two students obtain different results from the same investigation, they should carefully __________ their observations and results.
    Answer: analyse
16. A student who asks “Why does water change into ice when cooled?” is showing a spirit of scientific __________.
    Answer: inquiry
17. If water changes into steam after heating, the change can be understood by carefully observing the effect of __________.
    Answer: heating
18. A child who examines objects made of paper, metal, plastic and rubber is investigating different __________.
    Answer: materials
19. If you cannot find the answer to a scientific question yourself, working with your friends demonstrates scientific __________.
    Answer: collaboration

20. Scientists often work in large teams because scientific investigation can benefit from __________.
    Answer: teamwork
21. A learner who accepts a new explanation after evidence disproves an earlier one demonstrates scientific __________.
    Answer: thinking
22. Carefully studying one's surroundings before asking "how?" or "why?" helps generate meaningful scientific __________.
    Answer: questions
23. When an experiment does not give the expected result, a scientific learner should investigate further instead of immediately giving __________.
    Answer: up
24. A person who systematically asks questions, tests possible answers and analyses results is working like a __________.
    Answer: scientist
25. Learning science helps us develop the ability to find __________ to bigger problems.
    Answer: solutions
26. Observing a caterpillar changing into a butterfly may encourage a learner to investigate how living organisms __________.
    Answer: grow
27. A student compares objects to determine what they are made of. Such comparison helps the student understand different __________.
    Answer: materials
28. If an observation produces an unexpected result, it may lead to a new scientific __________.
    Answer: question
29. The scientific method is useful in daily life because it provides a __________ process for finding answers to problems.
    Answer: step-by-step
30. A learner who continuously explores, wonders and asks questions is developing a scientific attitude based on __________.
    Answer: curiosity

1.5 One-mark questions with Answers of LOTS Type: (35 Questions)

LOTS – One-Mark Descriptive Questions with Answers

The following questions test **remembering and basic understanding (LOTS)** and are based on the uploaded chapter.

1. **What is Science?**
   Answer: Science is a way of thinking, observing and doing things to understand the world and uncover the secrets of the universe.
2. **What is the most important quality needed to learn science?**
   Answer: Curiosity is the most important quality needed to learn science.
3. **Why do we ask questions in science?**
   Answer: We ask questions to explore the world and understand how things work.
4. **Where can science be found?**
   Answer: Science can be found everywhere, from the depths of the ocean to the vastness of outer space.
5. **What is science compared to in the chapter?**
   Answer: Science is compared to a giant and unending jigsaw puzzle.

6. **What does every new scientific discovery add to our knowledge?**
Answer: Every new scientific discovery adds another piece to the jigsaw puzzle of knowledge.
7. **How can new discoveries affect our understanding of the world?**
Answer: New discoveries can change our existing understanding of the world.
8. **Which is the only planet known to support life?**
Answer: Earth is the only planet known to support life.
9. **What must we do to Earth's environment?**
Answer: We must protect Earth's environment.
10. **What are the two broad groups of living things mentioned in the chapter?**
Answer: Plants and animals are the two broad groups of living things mentioned in the chapter.
11. **What happens to water when it is cooled sufficiently?**
Answer: Water freezes and becomes ice when it is cooled.
12. **What happens to water when it boils?**
Answer: Water changes into steam when it boils.
13. **Why is it important to find out how hot something is?**
Answer: Knowing how hot something is helps us understand temperature-related situations such as hot water or fever.
14. **Name any two materials mentioned in the chapter.**
Answer: Metal and plastic are two materials mentioned in the chapter.
15. **What method helps us find answers to questions systematically?**
Answer: The scientific method helps us find answers to questions systematically.
16. **What is the first step in the scientific method?**
Answer: The first step is to observe something that we find interesting or do not understand.
17. **What do we do after thinking of a scientific question?**
Answer: We guess a possible answer to the question.
18. **How do we test a possible answer?**
Answer: We test a possible answer through experiments or further observations.
19. **What do we do after testing our guess?**
Answer: We analyse the results to see whether they answer our question.
20. **Who are scientists?**
Answer: Scientists are people who follow the scientific method to solve problems or discover new things.
21. **Why might a pen stop writing according to the example in the chapter?**
Answer: A pen may stop writing because its ink has finished or dried up.
22. **What may cause dal to spill out of a cooker according to the chapter?**
Answer: Too much water in the cooker may cause the dal to spill out.
23. **What does a bicycle repair person try to find when a tyre is flat?**
Answer: A bicycle repair person tries to find where the air has leaked out.
24. **What might an electrician check when a light bulb does not work?**
Answer: An electrician might check whether the problem is with the bulb or the switch.
25. **How can learning science help us?**
Answer: Learning science develops our ability to find solutions to bigger problems and solve mysteries.
26. **What should we do to learn science well?**
Answer: We should be curious and observe our surroundings keenly.

27. **What kinds of questions arise when we become curious?**
    Answer: Curiosity makes us ask questions such as "how?" and "why?"
28. **Do scientists always work alone?**
    Answer: No, scientists often work together in large teams.
29. **What should we do if we cannot find an answer ourselves?**
    Answer: We can ask our friends to help us investigate and find the answer.
30. **What does the chapter say science is all about?**
    Answer: The chapter says that science is all about joyful exploration.

1.6 One-mark questions with Answers of HOTS Type: (30 Questions)

1. **A plant near a window grows faster than one kept in a dark place; what should you do first to investigate why?**
   Answer: I should carefully observe both plants and their surroundings to identify possible differences.
2. **Why can a new scientific discovery change what we previously believed?**
   Answer: A new discovery may provide evidence that improves or changes our earlier understanding.
3. **Why is science compared to an unending jigsaw puzzle?**
   Answer: Science is like an unending jigsaw puzzle because every discovery adds knowledge and leads to new questions.
4. **What should a scientist do if new evidence does not support an earlier idea?**
   Answer: The scientist should reconsider or modify the earlier idea according to the new evidence.
5. **A student sees a seed growing into a plant and asks how it grows; which scientific quality is the student showing?**
   Answer: The student is showing curiosity and a spirit of scientific inquiry.
6. **Why can observing a caterpillar changing into a butterfly lead to scientific investigation?**
   Answer: The observation can raise questions about how living organisms grow and change.
7. **Why should we study the materials used to make everyday objects?**
   Answer: Studying them helps us understand the differences among materials and how they can be identified or separated.
8. **If water kept in a freezer becomes ice, what can you infer about the effect of cooling?**
   Answer: We can infer that cooling can change liquid water into solid ice.
9. **If heated water produces steam, what does this observation suggest?**
   Answer: It suggests that heating can change water from its liquid state into steam.
10. **Your pen stops writing, but its refill still contains ink; what should you do next?**
    Answer: I should make another possible guess, such as the ink having dried up, and test it.
11. **Why is checking the ink refill an example of scientific thinking?**
    Answer: Checking the refill tests whether the suggested cause of the pen not writing is correct.
12. **What should you do if your first guess about a problem proves incorrect?**
    Answer: I should form another possible explanation and test it systematically.
13. **Why is observation important before forming a scientific question?**
    Answer: Careful observation helps us identify something interesting or unexplained that needs investigation.

14. **Why must a possible answer to a scientific question be tested?**
Answer: It must be tested to determine whether observations or experiments support it.
15. **Why do we analyse the results of an experiment?**
Answer: We analyse the results to determine whether they answer the original question.
16. **Dal spills out of a cooker; how could scientific thinking help identify the cause?**
Answer: We could suggest a possible cause, such as excess water, and check whether that explanation is correct.
17. **A bicycle tyre repeatedly becomes flat; how would a repair person act like a scientist?**
Answer: The repair person would investigate the tyre systematically to locate where the air is leaking.
18. **A bulb does not glow even after being replaced; what should be investigated next?**
Answer: The switch or another possible source of the problem should be investigated next.
19. **Why can an ordinary person be said to work like a scientist?**
Answer: Anyone who asks questions and systematically tests possible answers is working like a scientist.
20. **How does curiosity contribute to scientific learning?**
Answer: Curiosity encourages us to observe carefully and ask “how” and “why” about the world around us.
21. **Why is asking “why?” important in science?**
Answer: Asking “why?” encourages us to investigate the causes and explanations behind our observations.
22. **How can studying science improve our problem-solving ability?**
Answer: Studying science develops our ability to investigate systematically and find solutions to bigger problems.
23. **Why should students observe their surroundings keenly?**
Answer: Keen observation helps students notice unexplained things that can lead to meaningful scientific questions.
24. **Why can teamwork be useful in scientific investigation?**
Answer: Teamwork allows people to help one another in finding answers that may be difficult to discover alone.
25. **What should you do if you cannot answer a scientific question by yourself?**
Answer: I should seek help from others and investigate the question together.
26. **What can you infer from the fact that scientists across the world often work in teams?**
Answer: We can infer that collaboration is valuable in solving scientific problems and making discoveries.
27. **A student gets an unexpected result in an experiment; should the result be ignored? Why?**
Answer: No, the unexpected result should be analysed because it may lead to a new question or understanding.
28. **Why does gaining scientific knowledge often create more questions?**
Answer: Each new piece of knowledge reveals additional things that remain unexplained and need exploration.
29. **How would you know whether your possible explanation for an observation is reasonable?**

Answer: I would test the explanation through experiments or further observations and analyse the results.

30. **Why should a learner never stop wondering about the world?**
Answer: Continuous wondering encourages joyful exploration, questioning, and further scientific discovery.

1.7 Two-mark questions with Answers of LOTS Type: (28 Questions)

1. What is science? Mention one important quality needed to learn science.
Answer:
1. Science is a way of thinking, observing and doing things to understand the world and uncover the secrets of the universe.
2. Curiosity is the most important quality needed to explore and learn science.

2. Why is science described as an adventure?
Answer:
1. In science, we ask questions and explore the world around us.
2. We try to understand how different things work.

3. Why is science compared to a giant and unending jigsaw puzzle?
Answer:
1. Every new discovery adds another piece to our scientific knowledge.
2. Every new piece of knowledge leads to more questions and things to discover.

4. How can new scientific discoveries affect our understanding of the world?
Answer:
1. New discoveries add new information to our existing knowledge.
2. They may also change our earlier understanding of the world.

5. What does the chapter tell us about planet Earth and its environment?
Answer:
1. Earth is the only planet we know that supports life.
2. Its environment supports a great variety of life and must be protected.

6. Give two examples of growth or transformation in living things mentioned in the chapter.
Answer:
1. A seed grows into a plant.
2. A caterpillar transforms into a butterfly.

7. Mention any four materials or objects discussed in the chapter.
Answer:
1. The chapter mentions paper, a metal key, a plastic ruler and a rubber eraser.
2. It also refers to magnets, clothes and cups as examples of things around us.

8. What happens to water when it is cooled and heated?
Answer:
1. Water freezes and becomes ice when it is cooled.
2. Water boils and becomes steam when it is heated.

9. What questions about water are raised in the chapter?
Answer:
1. The chapter asks why and how it rains and why water changes into ice or steam.
2. It also encourages us to understand hot and cold and determine how hot something is.

10. What is the scientific method?
Answer:
1. The scientific method is a step-by-step process used to find answers to questions.

2. It involves observation, questioning, guessing a possible answer, testing it and analysing the results.

11. What are the first two steps of the scientific method?
Answer:
1. First, we observe something that we find interesting or do not understand.
2. The observation makes us wonder and think of a question about it.

12. How is a possible answer tested in the scientific method?
Answer:
1. We first guess a possible answer to the question.
2. We then test the guess through experiments or further observations.

13. How does the example of a pen explain the scientific method?
Answer:
1. When a pen stops writing, we may guess that its ink has finished and check the refill to test the guess.
2. If ink is still present, we make another guess, such as the ink having dried up, and test it.

14. Who are scientists, and what do they do?
Answer:
1. Scientists are people who follow the scientific method.
2. They use it to solve problems or discover new things.

15. How can a bicycle repair person work like a scientist?
Answer:
1. A bicycle repair person may investigate why a tyre has become flat.
2. The person tries to find the place from which the air has leaked.

16. How can an electrician use the scientific method in daily life?
Answer:
1. An electrician may investigate why a light bulb is not working.
2. The electrician may check whether the problem is with the bulb or the switch.

17. Give an example from cooking that illustrates scientific thinking.
Answer:
1. A person cooking food may wonder why dal has spilled out of the cooker.
2. The person may investigate whether too much water was added.

18. Why are curiosity and observation important for learning science?
Answer:
1. Curiosity encourages us to ask questions such as "how?" and "why?".
2. Keen observation helps us notice things around us that are waiting to be explored.

19. How does learning science help us solve problems?
Answer:
1. Learning science develops our capability to find solutions to bigger problems.
2. It also helps us explore and solve more mysteries of the universe.

20. Why is teamwork important in science?
Answer:
1. Scientists across the world often work together in large teams.
2. Working with others can help us find answers that may be difficult to discover alone.

21. Why does the chapter encourage students to ask questions?
Answer:
1. Asking questions develops curiosity and the spirit of inquiry.
2. Questions encourage students to explore unknown things and search for answers.

22. Is science only about memorising facts and doing experiments? Explain.
Answer:

1. No, science is not merely about memorising facts and figures or performing experiments.
2. It involves following a step-by-step process to find answers to our questions.

23. How do we unknowingly use the scientific method in daily life?
Answer:
1. We observe everyday problems and think of possible reasons for them.
2. We test those possibilities to find the correct solution.

24. What message does the chapter give about scientific exploration?
Answer:
1. Science is described as a joyful journey of exploration.
2. Students are encouraged to keep exploring, wondering and asking questions about the mysteries of the universe.

25. Explain the statement, "To be a wise person, you must be a 'whys' person."
Answer:
1. A curious learner should continuously ask why things happen.
2. Asking questions encourages exploration and helps us develop scientific understanding.

1.8. Two-mark questions with Answers of HOTS Type: (15 Questions)

1. A plant kept near a window grows better than a plant kept in a dark corner. How would you investigate the reason scientifically?
Answer:
1. I would observe the conditions in which both plants are growing and identify possible differences.
2. I would test a possible explanation through further observations and analyse the results.

2. Why should scientists be willing to change their earlier explanations?
Answer:
1. New discoveries may provide evidence that does not agree with an earlier explanation.
2. Therefore, scientific understanding should change when better evidence becomes available.

3. Why does every scientific discovery have the potential to create new questions?
Answer:
1. Every discovery adds a new piece to our existing knowledge.
2. The new knowledge may reveal more things that we still need to understand.

4. A student observes a caterpillar changing into a butterfly. How can this observation develop scientific thinking?
Answer:
1. The observation may make the student curious about how and why the transformation occurs.
2. This curiosity can lead to questions and further investigation of living things.

5. You are given objects made of paper, metal, plastic and rubber. How could you begin a scientific investigation of them?
Answer:
1. I would carefully observe and compare the objects and the materials from which they are made.
2. I would then ask questions about their differences and how the materials could be separated.

6. Water kept in a freezer changes into ice, while heated water changes into steam. What can you infer?
Answer:
1. Cooling can change water into ice.
2. Heating can change water into steam.

7. Your pen stops writing, and you guess that the ink has finished. How would you test your guess?
Answer:
1. I would open the pen and check whether there is ink in the refill.
2. If the refill is empty, the observation would support my guess.

8. Suppose the pen still contains ink but does not write. What should you do next scientifically?
Answer:
1. I should reject or reconsider my first guess and think of another possible explanation, such as dried ink.
2. I should then test the new explanation instead of assuming it is correct.

9. Why is observation considered an important starting point in the scientific method?
Answer:
1. Observation helps us notice something interesting or something that we do not understand.
2. This makes us wonder and leads us to formulate a question for investigation.

10. Why is it not enough merely to guess an answer to a scientific question?
Answer:
1. A guess alone does not show whether the proposed answer is correct.
2. It must be tested through experiments or further observations and the results analysed.

11. A student's experiment does not support the original guess. What should the student do?
Answer:
1. The student should analyse the result rather than ignore it.
2. The student can then consider another possible answer and test it.

12. Dal spills out of a cooker while cooking. How could you investigate the problem using scientific thinking?
Answer:
1. I could guess that too much water in the cooker caused the dal to spill.
2. I could check or test this possibility to determine whether my explanation is reasonable.

13. A bicycle tyre becomes flat soon after being filled with air. How would a repair person work like a scientist?
Answer:
1. The repair person would ask where the air is leaking from and carefully inspect the tyre.
2. By locating the leak, the person would use observation and investigation to solve the problem.

14. A new bulb does not glow after being fitted. What should an electrician investigate next?
Answer:
1. The electrician should consider whether the problem might be with the switch rather than the bulb.
2. Testing different possible causes helps identify the actual source of the problem.

15. How can an ordinary person behave like a scientist in everyday life?
Answer:
1. An ordinary person can observe a problem, ask questions and think of possible answers.
2. By testing those answers and analysing the results, the person follows the scientific method.

16. Why is curiosity essential for developing scientific thinking?
Answer:
1. Curiosity encourages us to observe our surroundings keenly and notice things we do not understand.
2. It motivates us to ask "how?" and "why?" and search for explanations.

17. Two groups perform the same investigation but obtain different results. What should they do?
Answer:
1. They should compare their observations and examine why their results are different.
2. They can repeat or extend their investigation to obtain better evidence.

18. Why can teamwork make a scientific investigation more effective?
Answer:
1. Team members can help one another when an answer is difficult to find individually.
2. Working together allows them to share observations and ideas during exploration.

19. A child asks, "Why does it rain?" How could this question become the beginning of scientific learning?
Answer:
1. The question arises from curiosity and observation of the surroundings.
2. The child can seek a possible explanation and investigate it through further observations.

20. Why is memorising scientific facts alone insufficient for learning science?
Answer:
1. Science involves more than remembering facts and performing experiments.
2. It requires a step-by-step process of questioning, testing and finding answers.

21. How can studying science improve a student's ability to solve bigger problems?
Answer:
1. Science develops the habit of examining problems systematically instead of relying only on assumptions.
2. This strengthens the learner's ability to search for solutions to bigger problems and mysteries.

22. Why should an unexpected experimental result not be considered useless?
Answer:
1. An unexpected result may show that the original guess needs to be reconsidered.
2. It may also lead to another question or a new line of investigation.

23. A student cannot find the answer to a scientific question alone. What should the student do and why?
Answer:
1. The student can seek help from friends and investigate the question together.
2. Scientific exploration often benefits from collaboration because scientists themselves frequently work in teams.

24. How does asking "why?" help a learner become scientifically minded?
Answer:
1. Asking "why?" encourages the learner to look beyond simple observations and search for explanations.

2. It develops curiosity and motivates further exploration of unknown things.

25. Explain why science can be considered a continuous journey rather than a collection of final answers.

Answer:

1. Every new discovery can lead to further questions and may even change our existing understanding.
2. Therefore, science involves continuous exploration, wondering and questioning about the mysteries of the universe.

1.9. Three-mark questions with Answers of LOTS Type: (18 Questions)

1. What is Science? Explain its importance.

Answer:

1. Science is a way of thinking, observing and doing things to understand the world around us.
2. It helps us explore the world and understand how different things work.
3. It also helps us uncover the secrets and mysteries of the universe.

2. Why is curiosity important in learning science?

Answer:

1. Curiosity encourages us to observe our surroundings carefully.
2. It makes us ask questions about things that we do not understand.
3. Questions such as “how?” and “why?” encourage us to explore and find answers.

3. Explain why science is compared to a giant and unending jigsaw puzzle.

Answer:

1. Every new scientific discovery adds another piece to our knowledge.
2. Each new piece of knowledge leads to more questions and more things to discover.
3. New discoveries can sometimes change our earlier understanding of the world.

4. What does the chapter tell us about Earth and the living things found on it?

Answer:

1. Earth is the only planet we know that supports life.
2. It has an amazing variety of plants and animals living in different regions.
3. Earth's environment supports this life and therefore needs to be protected.

5. What examples of growth and change in living organisms are given in the chapter?

Answer:

1. The chapter gives the example of a seed growing into a plant.
2. It also mentions a caterpillar transforming into a beautiful butterfly.
3. Such observations encourage us to ask how plants and animals grow.

6. What does the chapter explain about the different materials around us?

Answer:

1. Objects around us are made from different materials such as paper, metal, plastic and rubber.
2. Examples include a metal key, plastic ruler and rubber eraser.
3. Science encourages us to investigate what objects are made of and how different materials can be separated.

7. Describe the changes that occur in water when it is heated or cooled.

Answer:

1. Water freezes and becomes ice when it is cooled.
2. Water boils and becomes steam when it is heated.
3. Observing such changes helps us explore ideas related to hot and cold.

8. Explain the main steps of the scientific method.

Answer:

1. First, we observe something, wonder about it and think of a question.
2. Next, we guess a possible answer and test the guess through experiments or further observations.
3. Finally, we analyse the results to see whether they answer our question.

9. Explain the example of the pen used to introduce the scientific method.

Answer:

1. When a pen stops writing, we may first guess that its ink has finished.
2. We test this guess by opening the pen and checking its ink refill.
3. If ink is still present, we make another guess, such as the ink having dried up, and test it.

10. Who are scientists? How can an ordinary person work like a scientist?

Answer:

1. Scientists are people who follow the scientific method to solve problems or discover new things.
2. Anyone who follows the scientific method can work like a scientist.
3. When we ask questions and systematically try to find answers, we are working like scientists.

11. Give three examples of the use of scientific thinking in daily life.

Answer:

1. A person cooking food may investigate why dal has spilled out of a cooker.
2. A bicycle repair person may try to find where air is leaking from a flat tyre.
3. An electrician may check whether a non-working light is caused by the bulb or the switch.

12. How does the scientific method help us find answers to our questions?

Answer:

1. We begin by observing something that interests us or that we do not understand.
2. We think of a possible answer and test it through experiments or further observations.
3. We then analyse the results to determine whether they answer our question.

13. Why is science more than simply memorising facts and figures?

Answer:

1. Science is not just about memorising facts and figures or performing experiments.
2. It involves following a step-by-step process to find answers to questions.
3. This process helps us investigate and understand the things we observe around us.

14. How does learning science help us in our daily lives?

Answer:

1. We knowingly or unknowingly apply the scientific method in many daily-life situations.
2. Learning science develops our capability to find solutions to bigger problems.
3. It also helps us explore and solve more mysteries of the universe.

15. Explain the importance of teamwork in science.

Answer:

1. Science is rarely done alone, and scientists across the world often work in large teams.
2. When we cannot find an answer ourselves, we can seek help from our friends.
3. Working together can make scientific discovery more enjoyable.

16. What attitude does the chapter encourage students to develop towards science?

Answer:

1. Students are encouraged to remain curious and observe their surroundings keenly.
2. They should keep asking questions and exploring things that they do not understand.
3. They should enjoy science as a joyful and continuing journey of exploration.

17. What does the chapter say about the scope of scientific exploration?
Answer:
1. Scientific questions are not limited to things found on Earth.
2. We can also ask questions about the Sun, Moon and millions of stars in the sky.
3. Science therefore encourages us to explore both our immediate surroundings and the universe beyond Earth.

18. What message is conveyed at the end of the chapter?
Answer:
1. Science is described as a joyful journey of exploration.
2. Learners are encouraged to keep exploring and never stop wondering about the mysteries of the universe.
3. They are also encouraged to continue asking questions throughout their scientific journey.

1.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

1. A student notices that one plant grows faster than another. How can the student use the scientific method to find the reason?
Answer:
1. The student should carefully observe both plants and ask why their growth is different.
2. The student should suggest a possible reason and test it through further observations or an experiment.
3. The results should then be analysed to determine whether the suggested explanation is supported.

2. Why should scientific ideas be open to change when new discoveries are made?
Answer:
1. Scientific knowledge develops continuously as new discoveries are made.
2. New evidence may show that an earlier understanding is incomplete or incorrect.
3. Therefore, scientific explanations should be revised when better evidence becomes available.

3. Your pen suddenly stops writing, but you find that the refill contains ink. How would you proceed scientifically?
Answer:
1. Since the first guess that the ink has finished is incorrect, I would consider another possible explanation.
2. I might guess that the ink has dried up and test this possibility.
3. I would use the result of the test to decide whether my new explanation is correct.

4. A bicycle tyre becomes flat soon after being filled with air. Explain how a repair person can solve the problem scientifically.
Answer:
1. The repair person can observe the flat tyre and ask where the air is escaping.
2. The person can inspect different parts of the tyre to locate the possible leak.
3. By testing the possible source of leakage, the repair person is working like a scientist.

5. A light bulb does not glow even after it has been fitted properly. How can scientific thinking help identify the problem?
Answer:
1. We should first observe the situation and identify possible causes of the problem.
2. We can check whether the fault is with the bulb or the switch.
3. Testing the possible causes systematically can help us identify the actual problem.

6. A student observes water turning into ice in a freezer and steam when heated. What scientific understanding can be developed from these observations?

Answer:

1. The student can infer that cooling causes water to freeze and become ice.
2. The student can also observe that heating causes water to boil and become steam.
3. These observations can encourage further questions about the effects of heating and cooling on water.

7. An experiment gives a result different from what a student expected. What should the student do?

Answer:

1. The student should carefully analyse the unexpected result instead of ignoring it.
2. The original guess should be reconsidered if the observations do not support it.
3. A new possible answer can then be proposed and tested through further investigation.

8. Why can curiosity be considered the starting point of scientific discovery?

Answer:

1. Curiosity makes us observe things around us that we find interesting or do not understand.
2. It encourages us to ask questions such as "how?" and "why?".
3. These questions motivate us to investigate and search for possible answers.

9. A student observes a caterpillar changing into a butterfly. How can this simple observation lead to scientific inquiry?

Answer:

1. The observation may make the student wonder how such a transformation takes place.
2. The student can frame questions about the growth and changes occurring in the organism.
3. These questions can lead to further observation and investigation of living things.

10. Why is science compared to an unending jigsaw puzzle? Explain using scientific reasoning.

Answer:

1. Every new discovery adds another piece to our understanding of the world.
2. Each new piece of knowledge can produce additional questions that require investigation.
3. Some discoveries may even require us to change our earlier understanding, making scientific exploration continuous.

11. A student wants to find out why dal spills from a cooker. How can the scientific method be applied?

Answer:

1. The student can observe the situation and ask why the dal is spilling out.
2. A possible explanation, such as too much water in the cooker, can be proposed and tested.
3. The observations can then be analysed to determine whether the proposed reason is correct.

12. Why is memorising facts alone not enough to become good at science?

Answer:

1. Science is not merely about memorising facts and figures or performing experiments.
2. It requires a step-by-step process of observing, questioning, testing possible answers and analysing results.
3. Therefore, understanding how to investigate questions is an important part of learning science.

13. Two students obtain different results while investigating the same question. What should they do?
Answer:
1. They should compare their observations and carefully analyse why their results differ.
2. They can repeat their observations or tests instead of immediately accepting either result.
3. Further investigation can provide better evidence for answering their original question.

14. How can studying ordinary objects such as a key, ruler and eraser develop scientific thinking?
Answer:
1. Students can observe that these everyday objects are made from different materials.
2. They can ask questions about what the materials are made of and how they differ.
3. Such questions can lead to investigations about materials and their separation.

15. Why is teamwork useful when solving a difficult scientific problem?
Answer:
1. A person may not always be able to find the answer to a scientific question alone.
2. Working with others allows people to help one another during exploration and investigation.
3. Scientists themselves often work in large teams, showing that scientific discovery can be collaborative.

16. How can asking "Why?" make a student a better scientific thinker?
Answer:
1. Asking "Why?" encourages the student to look for explanations rather than simply accepting an observation.
2. It develops curiosity and encourages careful observation of the surroundings.
3. It can lead to further questions, investigations and solutions to problems.

17. Why should a failed guess not be considered a failure in scientific investigation?
Answer:
1. Testing a guess helps us determine whether it is supported by observations.
2. If the guess is not supported, we can develop another possible explanation.
3. Thus, an incorrect guess can still help move the investigation towards a better answer.

18. How can science help students become better problem-solvers in everyday life?
Answer:
1. Science encourages students to observe problems carefully and ask meaningful questions.
2. It teaches them to test possible answers instead of relying only on assumptions.
3. This systematic approach develops their capability to find solutions to bigger problems.

19. Why should scientific exploration extend beyond things found on Earth?
Answer:
1. Science encourages curiosity about everything around us, including objects beyond Earth.
2. We can ask questions about the Sun, Moon and millions of stars visible in the sky.
3. Exploring such questions expands our understanding of the universe.

20. Explain how the message "keep exploring and never stop wondering" promotes scientific thinking.
Answer:
1. Continuous exploration encourages learners to observe new things and experiences.
2. Wondering about them leads to new questions and further investigation.
3. Thus, curiosity and questioning make science a continuous and joyful journey of discovery.

1.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

1. Explain the meaning of science and the role of curiosity in learning science.
Answer:
1. Science is a way of thinking, observing and doing things to understand the world around us.
2. It helps us uncover the secrets of the universe through exploration and questioning.
3. Science encourages us to ask questions about how and why different things happen.
4. Curiosity is one of the most important qualities required for learning science.
5. Being curious encourages us to observe, explore and seek answers to our questions.

2. Explain why science is compared to a giant and unending jigsaw puzzle.
Answer:
1. Science can be compared to a giant and unending jigsaw puzzle.
2. Every new scientific discovery adds another piece to this puzzle.
3. As our knowledge increases, we understand more about the world around us.
4. At the same time, new knowledge leads to more questions and more things to discover.
5. New discoveries may even change our earlier understanding of the world.

3. Describe the main steps involved in the scientific method.
Answer:
1. The first step is to observe something interesting or something that we do not understand.
2. The observation makes us wonder and think of a question about it.
3. We then guess a possible answer to the question.
4. The possible answer is tested through experiments or further observations.
5. Finally, we analyse the results to find out whether they answer our question.

4. Explain the example of the pen used in the chapter to understand the scientific method.
Answer:
1. When a pen stops writing, we first ask why it is not working.
2. We may guess that the ink in the pen has finished.
3. We test this guess by opening the pen and checking its refill.
4. If the refill still contains ink, we make another guess, such as the ink having dried up.
5. Thus, making possible explanations and testing them demonstrates the scientific method in everyday life.

5. Explain how the scientific method is used in everyday life with suitable examples.
Answer:
1. We knowingly or unknowingly use the scientific method while solving many everyday problems.
2. If dal spills out of a cooker, we may investigate whether too much water was added.
3. If a bicycle tyre becomes flat, a repair person tries to find where the air is leaking.
4. If a light bulb does not work, an electrician may check whether the problem is with the bulb or the switch.
5. These examples show that asking questions and systematically finding answers is a form of scientific thinking.

6. Describe what the chapter teaches us about Earth and living organisms.
Answer:
1. Earth is the only planet we know that supports life.
2. It has an environment that allows different kinds of living organisms to survive.
3. A great variety of plants and animals live in different regions of Earth.

4. We can observe changes such as a seed growing into a plant and a caterpillar becoming a butterfly.
5. Since Earth's environment supports life, the chapter reminds us that it must be protected.

7. Explain what the chapter teaches about water and the effects of heating and cooling.
Answer:
1. Water is necessary for our survival and is an important part of our surroundings.
2. The chapter encourages us to ask questions about water, including how and why it rains.
3. When water is cooled sufficiently, it freezes and changes into ice.
4. When water is heated and boils, it changes into steam.
5. Understanding hot and cold and finding out how hot something is can also be useful in situations such as checking for fever.

8. Explain how curiosity and observation help us become better learners of science.
Answer:
1. To learn science well, we should remain curious about the world around us.
2. We should keenly observe the things and events occurring in our surroundings.
3. Curiosity encourages us to ask questions such as “how?” and “why?”.
4. These questions encourage us to explore unknown things and search for answers.
5. By developing curiosity and observation, we improve our ability to solve problems and explore mysteries.

9. Explain why science is not merely about memorising facts and performing experiments.
Answer:
1. Science is not simply about memorising facts and figures.
2. It is also not limited to performing experiments in a laboratory.
3. Science involves observing things and asking questions about what we do not understand.
4. It requires us to think of possible answers and test them through experiments or further observations.
5. Therefore, science is a step-by-step process of finding answers to our questions.

10. Describe the importance of cooperation and teamwork in scientific learning.
Answer:
1. Science is rarely done completely alone.
2. Scientists across the world often work together, sometimes in large teams.
3. When we cannot find an answer ourselves, we can ask our friends for help.
4. Working together can help us investigate questions and discover answers.
5. The chapter also emphasises that discovering things together can make scientific exploration enjoyable.

11. Describe the variety of things that can be explored through science.
Answer:
1. Science helps us study things ranging from tiny grains of sand to large mountains.
2. It allows us to explore grass, forests, plants and animals around us.
3. It encourages us to ask questions such as why stars shine and how flowers bloom.
4. Scientific questions can also extend beyond Earth to the Sun, Moon and millions of stars.
5. Thus, science provides opportunities to explore both our immediate surroundings and the wider universe.

12. What message does the chapter give students about learning and exploring science?
Answer:
1. Science is presented as a joyful journey of exploration and discovery.
2. Students are encouraged to remain curious and observe their surroundings carefully.

3. They should continue asking questions and searching for answers.
4. Scientific learning can help them develop the ability to solve bigger problems and explore mysteries.
5. The chapter encourages learners to keep exploring, wondering and asking "why?" throughout their journey.

1.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

1. A student notices that a pen has suddenly stopped writing. Explain how the student can use the scientific method to identify the problem.

Answer:

1. The student should first observe that the pen has stopped writing and ask why it has happened.
2. The student may guess that the ink in the refill has finished.
3. This guess can be tested by opening the pen and checking the refill.
4. If ink is still present, another possible explanation, such as the ink having dried up, should be considered and tested.
5. This process of questioning, guessing, testing, and analysing demonstrates scientific thinking in everyday life.

2. An experiment gives results that do not support a student's original guess. How should the student respond scientifically?

Answer:

1. The student should carefully examine the results instead of ignoring them.
2. The student should recognise that the original guess may not correctly explain the observation.
3. A different possible answer can then be suggested based on the available observations.
4. The new possibility should be tested through another experiment or further observations.
5. The results should again be analysed to determine whether they provide a satisfactory answer to the original question.

3. Dal repeatedly spills out of a pressure cooker while cooking. Explain how you could investigate the problem scientifically.

Answer:

1. I would first observe when and how the dal spills from the cooker.
2. I would ask what might be causing the spilling and suggest a possible reason, such as too much water.
3. I would test this possibility by observing what happens when the amount of water is changed.
4. I would compare and analyse the observations to see whether they support my suggested explanation.
5. In this way, an ordinary household problem can be investigated using scientific thinking.

4. A bicycle tyre becomes flat again soon after being filled with air. How can the problem be solved using scientific thinking?

Answer:

1. The first observation is that the tyre loses air after it has been filled.
2. A possible explanation is that air is escaping through a leak somewhere in the tyre.
3. The repair person can carefully inspect and test different parts of the tyre to locate the leak.
4. The observations can then be used to identify the actual source of the problem.

5. This shows how observation, questioning and testing can be used to solve everyday problems scientifically.

5. A bulb does not glow when the switch is turned on. Explain how you would investigate the problem using the scientific method.

Answer:

1. I would begin by observing that the bulb does not glow when the switch is turned on.
2. I would consider possible causes, such as a faulty bulb or a problem with the switch.
3. I would test the possible causes one by one rather than immediately accepting one explanation.
4. I would analyse the results of these checks to identify the source of the problem.
5. This systematic process shows how the scientific method can help solve problems in daily life.

6. Why can a new scientific discovery sometimes change our earlier understanding? Explain with reasoning.

Answer:

1. Scientific knowledge develops as people continue to observe, investigate, and make discoveries.
2. Every new discovery adds another piece to the large puzzle of scientific knowledge.
3. New evidence may provide information that was not available when an earlier explanation was formed.
4. Therefore, some earlier ideas may need to be modified when new discoveries provide better understanding.
5. This is why science is described as a giant and unending jigsaw puzzle rather than a collection of final answers.

7. A student observes that water becomes ice when cooled and steam when heated. How can these observations encourage further scientific inquiry?

Answer:

1. The student can observe that cooling water causes it to freeze into ice.
2. The student can also observe that heating water until it boils produces steam.
3. These observations may encourage questions about why water changes when heated or cooled.
4. The student can make possible explanations and investigate them through further observations or experiments.
5. Thus, even familiar changes in water can become starting points for scientific exploration.

8. A child observes a seed growing into a plant and a caterpillar becoming a butterfly. How can these observations develop scientific thinking?

Answer:

1. These changes can make the child curious about how living things grow and transform.
2. The child may begin asking questions about what causes these changes.
3. Careful and repeated observation can help the child notice different stages of growth and transformation.
4. The observations may lead to further questions and investigations about plants and animals.
5. Therefore, observing living organisms can develop curiosity and a spirit of scientific inquiry.

9. Why is curiosity more useful in science than simply memorising facts? Explain.

Answer:

1. Memorising facts alone does not teach a learner how to investigate an unexplained observation.

2. Curiosity encourages the learner to ask questions such as “how?” and “why?”.
3. These questions lead to possible explanations that can be explored and tested.
4. The scientific method then helps the learner find answers systematically.
5. Thus, curiosity turns scientific learning into an active process of exploration rather than only remembering information.

10. A student cannot solve a scientific problem alone. Explain how teamwork could help in finding an answer.

Answer:

1. The student can discuss the question with friends and seek their help in investigating it.
2. Different students may contribute observations and ideas during the exploration.
3. Working together can make it easier to examine the problem from different viewpoints.
4. Scientists themselves often work together, sometimes in large teams, while making discoveries.
5. Therefore, collaboration can make scientific investigation both useful and enjoyable.

11. Explain how asking “how?” and “why?” can help a student become a better problem-solver.

Answer:

1. Asking “how?” and “why?” encourages a student to think beyond what is immediately visible.
2. Such questions motivate the student to examine the possible reasons behind an observation.
3. The student can then suggest possible answers and test them systematically.
4. Analysing the results helps the student decide which explanation is supported by observations.
5. This habit of questioning and investigation develops the ability to solve bigger problems and explore mysteries.

12. “Anyone can work like a scientist.” Justify this statement using examples from everyday life.

Answer:

1. Working like a scientist involves asking questions and systematically trying to find their answers.
2. A person cooking food may investigate whether excess water caused dal to spill from a cooker.
3. A bicycle repair person may search for the place from which air is leaking from a tyre.
4. An electrician may investigate whether a non-working light is caused by the bulb or the switch.
5. These examples show that scientific thinking can be applied by ordinary people while solving everyday problems.

1.13 Five-mark questions with Answers of Applied Type: (10 Questions)

1. Riya’s pen suddenly stops writing during class. Apply the scientific method to help her find the cause.

Answer:

1. Riya should first observe the problem carefully and ask why the pen has stopped writing.
2. She may guess that the ink in the refill has finished.
3. She should test this guess by opening the pen and checking the refill.
4. If ink is still present, she can make another guess, such as the ink having dried up, and test it.

5. By analysing the results of her tests, she can identify the likely cause and solve the problem scientifically.

2. While cooking, dal repeatedly spills out of a pressure cooker. How would you apply scientific thinking to investigate the problem?

Answer:

1. First, I would carefully observe when the dal spills from the cooker.
2. I would ask why it is spilling and suggest a possible cause, such as too much water.
3. I would test this possibility by changing the amount of water during another cooking attempt.
4. I would compare the observations to determine whether reducing the water affects the spilling.
5. I would use the results to decide whether my suggested explanation was supported.

3. Your bicycle tyre becomes flat every morning even after being filled with air. Apply the scientific method to solve the problem.

Answer:

1. I would observe that the tyre repeatedly loses air and frame the question, "Where is the air leaking from?"
2. I would guess that there may be a leak somewhere in the tyre.
3. I would carefully inspect or test different parts of the tyre to locate the possible leak.
4. I would analyse my observations to determine whether the suspected place is actually allowing air to escape.
5. After identifying the leak, the problem could be corrected, showing the practical use of scientific investigation.

4. A light bulb in your room does not glow when you turn on the switch. How would you use the scientific method to identify the problem?

Answer:

1. I would begin by observing that the bulb does not glow when the switch is turned on.
2. I would think of possible causes, such as a faulty bulb or a problem with the switch.
3. I would test the possible causes one at a time rather than making an immediate conclusion.
4. I would analyse the results of these checks to determine which possibility explains the problem.
5. This step-by-step approach applies the scientific method to an everyday situation.

5. Meera wants to study what happens to water when it is heated and cooled. Suggest how she can use observations from the chapter.

Answer:

1. Meera can begin by observing water under different heating and cooling conditions.
2. On cooling water sufficiently, she can observe that it freezes and changes into ice.
3. On heating water until it boils, she can observe that it changes into steam.
4. She can record these observations and compare the changes produced by heating and cooling.
5. The activity demonstrates how everyday observations can encourage scientific questions about changes in water.

6. Aman observes a seed growing into a plant over several days. How can he turn this everyday observation into a scientific investigation?

Answer:

1. Aman can carefully observe the seed and the changes that occur as it grows.
2. He can ask questions about how the seed changes into a plant.
3. He can make a possible explanation for something he observes during its growth.
4. He can test his idea through further observations and record what happens over time.

5. He can analyse his observations to see whether they answer his question about the growing plant.

7. During a science activity, your group gets an unexpected result that does not match your original guess. What should you do?

Answer:

1. We should carefully observe and record the unexpected result instead of ignoring it.
2. We should analyse whether the result supports our original possible answer.
3. If it does not, we should reconsider our first guess and think of another possible explanation.
4. We should test the new explanation through another experiment or further observations.
5. This approach reflects the chapter's idea that scientific understanding develops through questioning, testing and new discoveries.

8. Suppose you find an unfamiliar object made of several materials. How would you apply the ideas of the chapter to study it?

Answer:

1. I would first observe the object carefully and identify its different visible parts.
2. I would ask what materials the different parts might be made from.
3. I would compare them with familiar materials such as paper, metal, plastic and rubber mentioned in the chapter.
4. I would ask further questions about the materials and how they might be separated.
5. Thus, an ordinary object can become the starting point for scientific observation and inquiry.

9. You see a caterpillar on a plant and later notice changes in it. How can you apply scientific thinking to study this transformation?

Answer:

1. I would observe the caterpillar carefully over a period of time.
2. I would record the changes that I notice during its transformation.
3. I would ask questions about how and why these changes take place.
4. I could make a possible explanation and use further observations to test it.
5. Finally, I would analyse my observations to develop a better understanding of the transformation.

10. Your class is unable to find an answer to a difficult science question. How can you apply the chapter's idea of teamwork to solve it?

Answer:

1. We should discuss the question together instead of depending on only one student.
2. Different students can contribute their observations and possible answers.
3. We can work together to test the possible answers through observations or experiments.
4. We can compare and analyse our findings to arrive at a better understanding.
5. This approach reflects the chapter's message that scientists often collaborate and that discovering things together can be enjoyable.

1.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

The following **30 MCQs** are designed at a competitive/Olympiad level, with a mix of conceptual understanding, application, reasoning, scientific-method sequencing, and situation-based questions, while remaining grounded in the uploaded chapter.

1. **Which statement best describes science according to the chapter?**
   A) A collection of facts that must be memorised
   B) A way of thinking, observing and doing things to understand the world

C) A subject concerned only with laboratory experiments
D) A method of studying only living organisms
Answer: B

2. **Which quality is most essential for beginning scientific exploration?**
A) Speed
B) Memory
C) Curiosity
D) Competition
Answer: C
3. **Science is compared to an "unending jigsaw puzzle" mainly because:**
A) scientific problems are impossible to solve.
B) scientists always work with puzzles.
C) every discovery adds knowledge and often leads to new questions.
D) scientific knowledge never changes.
Answer: C
4. **Which of the following best illustrates curiosity?**
A) Memorising the names of planets
B) Copying an answer from a textbook
C) Asking why stars shine
D) Repeating an experiment without knowing its purpose
Answer: C
5. **A student observes a seed growing into a plant and asks how the change occurs. This is an example of:**
A) scientific curiosity.
B) mathematical calculation.
C) memorisation.
D) classification only.
Answer: A
6. **Which pair correctly represents changes in water described in the chapter?**
A) Cooling → steam; Heating → ice
B) Cooling → ice; Heating → steam
C) Heating → ice; Freezing → steam
D) Cooling → vapour; Heating → ice
Answer: B
7. **Which of the following is the correct sequence of the scientific method presented in the chapter?**
A) Guess → Analyse → Observe → Question → Test
B) Observe → Question → Guess → Test → Analyse
C) Question → Test → Observe → Analyse → Guess
D) Test → Guess → Question → Observe → Analyse
Answer: B
8. **A pen stops writing. What is the most scientific first response?**
A) Throw the pen away immediately
B) Conclude that the pen is defective
C) Observe the problem and ask why it stopped writing
D) Replace the refill without checking it
Answer: C
9. **A student guesses that a pen stopped writing because its ink is finished. Which action best tests the guess?**
A) Shake the pen

B) Check whether the refill contains ink
C) Buy another pen
D) Ask a friend for a pen
Answer: B

10. **The refill of a non-writing pen still contains ink. What should be done next?**
A) Continue believing that the ink is finished
B) Stop investigating
C) Make another possible explanation and test it
D) Conclude that science cannot explain the problem
Answer: C

11. **Which step determines whether observations support a possible answer?**
A) Wondering
B) Analysing the results
C) Memorising
D) Asking a friend
Answer: B

12. **Which statement about scientific guesses is most appropriate?**
A) Every guess must be accepted as correct.
B) A guess should never be changed.
C) A possible answer should be tested using experiments or further observations.
D) A guess is more reliable than observation.
Answer: C

13. **Dal spills out of a cooker. Which approach is most scientific?**
A) Assume that the cooker is always defective
B) Guess a possible cause, such as too much water, and investigate it
C) Stop cooking dal
D) Accept the event without questioning it
Answer: B

14. **A bicycle tyre repeatedly becomes flat. Which question would best begin a scientific investigation?**
A) Who owns the bicycle?
B) What colour is the bicycle?
C) Where is the air leaking from?
D) How expensive is the bicycle?
Answer: C

15. **A light does not work. Which pair of possible causes is specifically suggested in the chapter?**
A) Bulb and switch
B) Wire and battery
C) Fan and motor
D) Plug and generator
Answer: A

16. **Which person is working most like a scientist?**
A) Ravi accepts every explanation without questioning it.
B) Neha observes a problem, proposes an explanation and tests it.
C) Amit memorises an answer without understanding it.
D) Tina ignores unexpected observations.
Answer: B

17. **Suppose an experiment does not support the original guess. What is the best scientific response?**

A) Change the observations
B) Ignore the result
C) Consider another possible explanation and investigate further
D) Declare the experiment useless
Answer: C

18. **Which of the following statements is FALSE according to the chapter?**
A) Science involves asking questions.
B) Scientific understanding may change with new discoveries.
C) Science is only about memorising facts and figures.
D) Scientific methods can be used in daily life.
Answer: C

19. **Consider the following sequence:**
Observation → Question → ? → Test → Analysis
What should replace the question mark?
A) Conclusion without evidence
B) Possible answer or guess
C) Memorisation
D) Measurement only
Answer: B

20. **Which activity demonstrates both observation and curiosity?**
A) Seeing a butterfly and ignoring it
B) Seeing a caterpillar transform and wondering how it happens
C) Memorising the word "caterpillar"
D) Drawing a butterfly without asking questions
Answer: B

21. **A student notices that two objects are made of different materials. Which question best extends this observation scientifically?**
A) Which object looks prettier?
B) Who purchased the objects?
C) What are the objects made of and how can the materials be separated?
D) Which object has the shortest name?
Answer: C

22. **Earth is particularly important in the chapter because it is:**
A) the largest planet known.
B) the only planet we know that supports life.
C) the closest planet to the Sun.
D) the only planet with mountains.
Answer: B

23. **Which conclusion best follows from the variety of plants and animals found on Earth?**
A) Only one type of environment can support life.
B) Different living organisms survive in different regions.
C) All living organisms require exactly the same surroundings.
D) Plants can survive only where animals cannot.
Answer: B

24. **Which statement best explains why observation is important in science?**
A) It removes the need to ask questions.
B) It helps us notice interesting or unexplained things that can lead to questions.
C) It guarantees that every guess is correct.

D) It eliminates the need for testing.
Answer: B

25. **Three students are investigating why an object behaves unexpectedly. Student P observes it carefully, Student Q suggests possible explanations, and Student R tests the explanations. Together, their actions show:**
A) random guessing.
B) scientific investigation and teamwork.
C) memorisation.
D) competition without investigation.
Answer: B
26. **Why can teamwork be useful in science?**
A) It eliminates the need for evidence.
B) It ensures that every guess becomes correct.
C) People can help one another investigate questions and find answers.
D) It prevents new questions from arising.
Answer: C
27. **Which student demonstrates the strongest scientific attitude?**
A) "The textbook says it, so I will never question it."
B) "My first guess must always be correct."
C) "I will observe carefully, ask why, test my idea and examine the result."
D) "Unexpected results should be ignored."
Answer: C
28. **If a new discovery changes an earlier scientific understanding, this indicates that:**
A) science is unreliable.
B) scientific knowledge can develop as new evidence becomes available.
C) previous observations have no value.
D) discoveries should be avoided.
Answer: B
29. **Which of the following best represents the chapter's message about learning science?**
A) Remember every fact without questioning it.
B) Perform experiments only in laboratories.
C) Remain curious, observe keenly and keep asking "how?" and "why?".
D) Avoid questions whose answers are not immediately known.
Answer: C
30. **The statement "To be a wise person, you must be a 'whys' person!" mainly encourages students to:**
A) accept everything they observe without questioning.
B) continuously ask questions and explore possible explanations.
C) restrict learning to classroom activities.
D) memorise scientific definitions.
Answer: B

1.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
The following best practices align with the chapter's central ideas of **curiosity, observation, questioning, scientific method, everyday problem-solving, and collaborative learning**.

(1) "Why?" Question Wall:

Create a classroom *Curiosity/Why Wall* where students post questions arising from everyday observations, such as "Why does it rain?", "Why does water become ice?", or "Why does a pen stop writing?" Select a few questions regularly for classroom discussion and investigation.

(2) Scientific Method through Everyday Problems:
Give students simple situations such as a pen that does not write, a flat bicycle tyre, dal spilling from a cooker, or a bulb that does not glow. Ask them to follow the sequence **Observe → Question → Guess → Test → Analyse** to identify possible causes.

(3) Observe–Wonder–Question Activity:
Display familiar objects, plants, pictures, or natural materials and ask students to record three things they **observe**, two things they **wonder about**, and one scientific **question** they would like to investigate. This develops careful observation and curiosity rather than simple memorisation.

(4) Hands-on Exploration of Water:
Demonstrate safe examples of water changing into ice through cooling and producing steam through heating. Encourage students to observe the changes, frame questions, and connect their observations with familiar experiences.

(5) Think–Guess–Test–Explain Strategy:
Before demonstrating an activity, ask students to suggest a possible explanation or outcome. After observation, let them compare the result with their initial guess and explain whether their thinking needs to change, reinforcing the chapter's idea that scientific understanding develops through evidence.

(6) Science in My Daily Life Diary:
Ask students to maintain a small weekly diary recording one interesting observation from home, school, or nature, followed by a "How?" or "Why?" question. A few entries can be discussed each week to show that science exists everywhere.

(7) Collaborative Young Scientist Groups:
Divide students into small "Young Scientist" teams and give each group a simple question or observation to investigate. Encourage members to discuss possible answers, share observations, and present their findings together, reflecting the chapter's emphasis on scientific collaboration.

(8) Object and Material Exploration Corner:
Create a classroom exploration corner containing safe everyday objects made of paper, metal, plastic, rubber, cloth, and other familiar materials. Students can observe, compare, classify, and frame questions about what the objects are made of.

(9) Nature Observation Assignment:
Ask students to observe a plant, seed, insect, weather event, Moon, or another natural phenomenon over several days and maintain an observation record. They should conclude the activity by writing questions generated by their observations, encouraging the spirit of inquiry highlighted throughout the chapter.

(10) End Every Lesson with a "Wonder Question":
Instead of ending the lesson only with factual recall, invite every student to write one unanswered question beginning with **Why, How, What if, or How can we find out?** This reinforces the chapter's concluding message that science is a continuing journey of exploration and that learners should never stop wondering.

1.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for 6th Standard Students:

The chapter strongly emphasizes **curiosity, observation, questioning, experimentation, analysis, teamwork, and science in everyday life**. The following innovative activities can make these ideas more experiential and student-centred.

(1) Mystery Box – "Think Like a Scientist":
Place an unfamiliar safe object inside a closed box and allow students to investigate it without immediately seeing it. They can shake, listen, observe clues, frame questions, make guesses, and finally test their predictions. This turns the scientific method into an engaging mystery-solving activity.

(2) Digital "Why Bank":
Create a classroom digital repository where students submit interesting "Why?" and "How?" questions arising from their surroundings—for example, why it rains, why water freezes, or how a seed grows. Students can vote each week for one question to investigate as a class, supporting the chapter's emphasis on curiosity.

(3) Science Detective Challenge:
Present teams with everyday "cases," such as a pen that will not write, a repeatedly flat bicycle tyre, or a bulb that does not work. Students act as science detectives and document **Observation** → **Question** → **Possible Answer** → **Test** → **Analysis** before presenting their solution.

(4) QR-Code Science Exploration Trail:
Set up QR codes at different classroom stations containing pictures, clues, questions, or short teacher-created videos related to water, plants, materials, stars, and everyday phenomena discussed in the chapter. At each station, students record one observation and formulate one scientific question.

(5) Student-Generated Mini Experiments:
Instead of always giving students a ready-made experiment, provide a simple observation and ask groups to design a way to investigate it. Students can formulate a question, suggest a possible answer, decide how to test it, and explain what their observations indicate, following the scientific method described in the chapter.

(6) "Science Around Me" Photo Hunt:
Students can photograph safe examples of science in their surroundings—plants growing, rain, different materials, water changing state, or the night sky—and create a digital collage. Each photograph should be accompanied by an **"I observe…"** and an **"I wonder why…"** statement.

(7) Human Scientific-Method Flowchart:
Assign students the roles of **Observation, Question, Guess, Test, and Analysis**. Give the class a problem and have the students physically arrange themselves in the correct sequence, explaining what happens at each stage.

(8) Young Scientist Video Journal:
Students can create a one-minute weekly video titled *"My Scientific Question of the Week."* They briefly show an everyday observation, state their question, offer a possible explanation, and describe how they could test it.

(9) Collaborative Science Puzzle Board:
Based on the chapter's comparison of science to an unending jigsaw puzzle, create a large classroom puzzle board. Whenever students discover or understand something new, they add a "knowledge piece" along with a new question generated by that discovery, visually demonstrating how new knowledge leads to further inquiry.

(10) Peer Scientist Lab Teams:
Form small research teams in which students rotate through roles such as **Observer, Questioner, Idea Generator, Tester, Recorder, and Presenter**. This reflects the

chapter's message that science is rarely done alone and that scientists often collaborate in teams.

(11) "What If?" Scientific Thinking Cards:
Prepare cards with situations such as *"What if water is continuously cooled?"*, *"What if your first guess is wrong?"*, or *"What if two groups obtain different observations?"* Students discuss possible responses and explain how they would investigate rather than simply guess.

(12) Curiosity Exhibition – "We Are Scientists":
Conclude the chapter with a mini classroom exhibition where groups display their observations, questions, possible explanations, tests, and findings using charts, models, photographs, or short demonstrations. This reinforces the chapter's concluding message that science is a joyful, collaborative and continuing journey of wondering and exploration.

1.17: Practicing Questions/Question Bank

A. Fill in the Blanks – 1 Mark Each:

1. Science is a way of thinking, __________ and doing things to understand the world.
   Answer: observing
2. The most important quality for exploring science is __________.
   Answer: curiosity
3. Science can be compared to a giant, unending __________ puzzle.
   Answer: jigsaw
4. Every new scientific __________ adds another piece to our knowledge.
   Answer: discovery
5. Earth is the only planet we know that supports __________.
   Answer: life
6. A seed grows into a __________.
   Answer: plant
7. A caterpillar transforms into a __________.
   Answer: butterfly
8. When water is cooled sufficiently, it changes into __________.
   Answer: ice
9. When water boils, it changes into __________.
   Answer: steam
10. The first stage of scientific investigation involves careful __________.
    Answer: observation
11. After asking a question, we may __________ a possible answer.
    Answer: guess
12. A possible answer can be tested through experiments or further __________.
    Answer: observations
13. After testing a possible answer, we __________ the results.
    Answer: analyse

14. Scientists use the scientific method to solve problems and make new __________.
    Answer: discoveries

15. Scientists across the world often work together in large __________.
    Answer: teams

16. Curiosity encourages us to ask "how" and "__________".
    Answer: why

17. A flat bicycle tyre may be caused by a leakage of __________.
    Answer: air

18. If a pen stops writing, one possible reason is that its __________ has finished.
    Answer: ink

19. Science is not just about memorising facts and __________.
    Answer: figures

20. To be a wise person, you must be a "__________" person.
    Answer: whys

B. One-Mark Descriptive Questions:

1. **What is science?**
   Answer: Science is a way of thinking, observing and doing things to understand the world and uncover the secrets of the universe.

2. **Which quality is most important for exploring science?**
   Answer: Curiosity is the most important quality for exploring science.

3. **Why is science compared to an unending jigsaw puzzle?**
   Answer: Every discovery adds new knowledge and often leads to further questions.

4. **Which planet is known to support life?**
   Answer: Earth is the only planet we know that supports life.

5. **What happens to water when it is cooled sufficiently?**
   Answer: Water freezes and changes into ice.

6. **What happens to water when it boils?**
   Answer: Water changes into steam.

7. **What is the first step in a scientific investigation?**
   Answer: The first step is to observe something interesting or something we do not understand.

8. **How can we test a possible answer?**
   Answer: We can test it through experiments or further observations.

9. **Why do we analyse the results of an investigation?**
   Answer: We analyse the results to see whether they answer our question.

10. **Why might a pen stop writing even when it contains ink?**
    Answer: One possible reason is that the ink may have dried up.

11. **What might cause dal to spill from a cooker?**
    Answer: One possible cause suggested in the chapter is too much water.

12. **What does a bicycle repair person look for in a flat tyre?**
    Answer: The repair person looks for the place from which air is leaking.

13. **What might an electrician check when a light does not work?**
    Answer: The electrician may check whether the problem is with the bulb or the switch.

14. **Why should students ask "why?" and "how?" questions?**
    Answer: Such questions encourage curiosity, exploration and scientific thinking.

15. **Why is teamwork useful in science?**
    Answer: Teamwork allows people to help one another in investigating questions and finding answers.

C. Two-Mark Descriptive Questions:

1. **Why is curiosity important in science?**
   Answer:
   - Curiosity encourages us to observe our surroundings carefully.
   - It makes us ask "how?" and "why?" and search for answers.

2. **How can new discoveries affect scientific knowledge?**
   Answer:
   - Every new discovery adds to our existing knowledge.
   - New discoveries may also change our earlier understanding.

3. **Give two examples of changes in living things mentioned in the chapter.**
   Answer:
   - A seed grows into a plant.
   - A caterpillar transforms into a butterfly.

4. **What happens to water when it is heated and cooled?**
   Answer:
   - Water freezes into ice when cooled sufficiently.
   - Water boils and changes into steam when heated.

5. **What are the first two stages of scientific investigation?**
   Answer:
   - We first observe something interesting or unexplained.
   - We then wonder about it and frame a question.

6. **What should we do after guessing a possible answer?**
   Answer:
   - We should test the possible answer through experiments or further observations.
   - We should analyse the results to determine whether they answer the question.

7. **How can a flat bicycle tyre illustrate scientific thinking?**
   Answer:
   - We first ask why the tyre has become flat.

- We then investigate where the air is leaking from.

8. **Why is science not simply about memorising facts?**
   Answer:
   - Science involves much more than remembering facts and figures.
   - It requires a step-by-step process of questioning, testing and finding answers.
9. **How can an ordinary person work like a scientist?**
   Answer:
   - A person can observe a problem and think of possible explanations.
   - The explanations can then be tested systematically.
10. **Why is collaboration encouraged in science?**
    Answer:
    - Some questions may be difficult to investigate alone.
    - Working together allows people to help one another and share their exploration.

D. Three-Mark Descriptive Questions:

1. **Explain why science is compared to an unending jigsaw puzzle.**
   Answer:
   - Every new discovery adds a piece to our scientific knowledge.
   - New knowledge often produces additional questions.
   - New discoveries can sometimes change our previous understanding.
2. **Explain the main stages of the scientific method.**
   Answer:
   - Observe something, wonder about it and frame a question.
   - Guess a possible answer and test it through experiments or further observations.
   - Analyse the results to see whether they answer the question.
3. **Explain how the example of a pen demonstrates scientific thinking.**
   Answer:
   - When a pen stops writing, we may guess that the ink has finished.
   - We test the guess by checking the refill.
   - If ink remains, we consider another explanation, such as dried ink, and test it.
4. **Give three examples of scientific thinking in everyday life.**
   Answer:
   - Investigating why dal spills from a cooker.
   - Finding where air is leaking from a flat bicycle tyre.
   - Checking whether a bulb or switch is responsible when a light does not work.

5. **How can curiosity make a student a better learner of science?**
   Answer:
   - Curiosity encourages keen observation.
   - It makes students ask "how?" and "why?" questions.
   - These questions motivate students to explore and find answers.
6. **What should a student do when an experiment does not support the original guess?**
   Answer:
   - The student should carefully analyse the result.
   - The original guess should be reconsidered and another possible explanation proposed.
   - The new explanation should then be tested through further investigation.
7. **Explain the importance of teamwork in scientific learning.**
   Answer:
   - Science is rarely done entirely alone.
   - People can help one another investigate difficult questions.
   - Collaborative discovery can also make scientific exploration enjoyable.
8. **How does learning science develop problem-solving ability?**
   Answer:
   - Science teaches us to observe problems carefully.
   - It encourages us to propose and test possible explanations.
   - This systematic approach helps us find solutions to increasingly difficult problems.

E. Five-Mark Descriptive Questions:

1. **Explain the scientific method with its important stages.**
   Answer:
   - Begin by observing something interesting or unexplained.
   - Wonder about the observation and frame a suitable question.
   - Guess a possible answer to the question.
   - Test the possible answer through experiments or further observations.
   - Analyse the results to determine whether they answer the original question.
2. **Explain how scientific thinking can be applied to everyday problems.**
   Answer:
   - Everyday problems can first be carefully observed.
   - Questions can then be asked about their possible causes.
   - Possible explanations can be suggested and tested.
   - Examples include a non-writing pen, spilling dal, a flat bicycle tyre and a non-working bulb.

- Thus, scientific thinking helps us systematically investigate and solve ordinary problems.

3. **A pen contains ink but does not write. Explain how you would investigate the problem scientifically.**
   Answer:
   - I would first observe the problem and ask why the pen is not writing.
   - I would check the refill to test whether the ink has finished.
   - If ink is present, I would reject or modify my first explanation.
   - I could suggest another possibility, such as dried ink, and test it.
   - I would analyse the observations to identify the likely cause.

4. **Explain the importance of curiosity, questioning and observation in learning science.**
   Answer:
   - Curiosity encourages students to explore the world around them.
   - Keen observation helps them notice interesting or unexplained phenomena.
   - Questioning encourages them to ask "how?" and "why?".
   - Such questions can lead to possible explanations and investigations.
   - Therefore, curiosity, observation and questioning form an important foundation for scientific learning.

5. **Explain why science is a continuous journey of exploration and discovery.**
   Answer:
   - Scientific knowledge continues to grow through new discoveries.
   - Each discovery adds another piece to our understanding.
   - New knowledge often creates further questions for investigation.
   - New evidence can sometimes change what we previously understood.
   - Therefore, learners are encouraged to keep exploring, wondering and asking questions.

6. **How can students develop the qualities of a young scientist?**
   Answer:
   - They should remain curious about their surroundings.
   - They should observe things carefully and ask meaningful questions.
   - They should think of possible answers and test them systematically.
   - They should analyse their observations instead of accepting assumptions without investigation.
   - They should also collaborate with others when investigating difficult questions.

7. **Explain how teamwork can improve scientific exploration.**
   Answer:

- Scientific work is often carried out collaboratively rather than alone.
- Students can seek help from friends when they cannot answer a question themselves.
- Team members can contribute different ideas and observations.
- They can work together while exploring and investigating questions.
- Collaborative discovery can make the learning of science more enjoyable.

8. **"To be a wise person, you must be a 'whys' person." Explain this message in relation to scientific learning.**
   Answer:
   - Asking "why?" reflects curiosity about the world around us.
   - Curiosity encourages careful observation and questioning.
   - Questions motivate us to search for possible explanations.
   - Testing those explanations helps us develop scientific understanding.
   - Therefore, continually wondering and asking questions supports a lifelong spirit of scientific exploration.

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6th Standard Science Book Chapter 2

Chapter 2: Diversity in the Living World

2.1 Summary of the Chapter:

Summary – Chapter 2: Diversity in the Living World:

(1) **Diversity in Living Organisms:** Nature contains a great variety of plants and animals that differ in their size, shape, colour, structure, food habits, movement and places where they live. This variety contributes to the **biodiversity** of a region.

(2) **Interdependence in Nature:** Plants and animals depend on one another. For example, trees provide food and shelter to animals, while animals can help plants by spreading seeds.

(3) **Grouping Living Organisms:** Plants and animals can be grouped according to their similarities and differences. Grouping makes the enormous diversity of living organisms easier to understand and study.

(4) **Grouping of Plants:** Plants can be classified as **herbs, shrubs and trees** based mainly on their height and the nature of their stems. Trees are generally tall with hard, thick, woody stems; shrubs have several woody stems branching near the ground; and herbs are usually small with soft, green stems.

(5) **Leaf Venation:** The arrangement or pattern of veins in a leaf is called **venation**. In **reticulate venation**, veins form a net-like pattern, whereas in **parallel venation**, the veins run parallel to one another.

(6) **Types of Roots:** Plants may have a **taproot system**, consisting of one main root with smaller side roots, or a **fibrous root system**, consisting of a bunch of similar-sized thin roots arising from the base of the stem.

(7) **Relationship between Roots and Venation:** Plants with **reticulate venation generally have taproots**, while plants with **parallel venation generally have fibrous roots**. Chickpea and wheat are given as examples of these two patterns.

(8) **Monocots and Dicots:** Plants whose seeds contain **two cotyledons** are called **dicotyledons (dicots)**, while those with **one cotyledon** are called **monocotyledons (monocots)**. Dicots generally have taproots and reticulate venation, whereas monocots have fibrous roots and parallel venation.

(9) **Diversity in Animals:** Animals can be grouped according to features such as their habitat, food, shape, size, colour, type of movement and body parts used for movement. Animals may walk, run, crawl, fly, hop, jump or swim using structures such as legs, wings and fins.

(10) **Adaptations:** Plants and animals possess special features that enable them to survive in particular surroundings; these features are called **adaptations**. For example, deodar trees have a conical shape and sloping branches suited to snowy mountains, while desert camels possess features suited to desert conditions.

(11) **Habitat:** The place where a plant or animal lives is called its **habitat**. Habitats provide organisms with food, water, air, shelter and other necessities. Habitats may be **terrestrial** (forests, deserts, grasslands and mountains) or **aquatic** (ponds, lakes, rivers and oceans); animals such as frogs can live both on land and in water and are called **amphibians**.

(12) **Conservation of Biodiversity:** Damage to habitats causes organisms to lose their homes, food and other resources, resulting in a decline in biodiversity. Protecting natural habitats and conserving plants and animals are therefore essential for maintaining the diversity and balance of the living world.

2.2 Important Formulas:

Important Formulas / Quantitative Relationships – Chapter 2: Diversity in the Living World:

After reviewing the uploaded Chapter 2, **"Diversity in the Living World," there are no specific mathematical or numerical formulas prescribed in the chapter.** The chapter is primarily conceptual and observation-based, dealing with biodiversity, classification, plant structures, animal movement, habitats and adaptations.

Therefore, **no formula-based quantitative problems are directly required from this chapter**.

However, the following **relationships/rules are important for classification and reasoning questions**:

No.	Important Relationship / Rule:
1	**Dicot seed → Two cotyledons → Reticulate venation → Taproot system**
2	**Monocot seed → One cotyledon → Parallel venation → Fibrous root system**
3	**Reticulate venation → Generally associated with taproots**
4	**Parallel venation → Generally associated with fibrous roots**
5	**Tree → Tall plant + hard, thick, woody stem + branches higher above ground**
6	**Shrub → Medium-sized plant + hard, woody stems + branches close to ground**
7	**Herb → Usually short plant + soft, green, tender stem**
8	**Climber → Weak stem + requires support for upward growth**
9	**Creeper → Weak stem + spreads/creeps along the ground**
10	**Habitat → Place that provides an organism with food + water + air + shelter + other survival needs**
11	**Terrestrial habitat → Organisms living primarily on land**
12	**Aquatic habitat → Organisms living in water**
13	**Adaptation → Special feature that enables an organism to survive in its particular habitat**
14	**Biodiversity → Variety of plants and animals occurring in a particular region**

The strongest plant-classification relationship in the chapter is:
Dicot → 2 cotyledons → Reticulate venation → Taproot
Monocot → 1 cotyledon → Parallel venation → Fibrous roots.
The chapter also emphasizes that animals may be grouped according to **type of movement and body parts used**, such as legs, wings and fins, but it does not provide a mathematical equation for movement.

Formula-based quantitative problems: Not applicable to this chapter. For a Grade 6 question bank, it would be better to emphasize **classification, identification, comparison, observation, data-table interpretation, relationship-based and application/HOTS questions** rather than artificial numerical problems.

2.3 Fill-Up the Blank LOTS type questions with Answers: (30 Questions)

Fill in the Blanks – LOTS Type:

1. The variety of plants and animals found in a particular region contributes to the ___________ of that region.
   Answer: Biodiversity

2. Plants and animals can be grouped based on their __________ and differences.
   Answer: Similarities
3. Plants can be grouped into herbs, shrubs and __________ based on their height and type of stem.
   Answer: Trees
4. Plants that are generally small and have soft, green stems are called __________.
   Answer: Herbs
5. A rose plant is an example of a __________.
   Answer: Shrub
6. A mango plant is an example of a __________.
   Answer: Tree
7. Plants with weak stems that need support to grow upwards are called __________.
   Answer: Climbers
8. Plants that spread along the ground are called __________.
   Answer: Creepers
9. The thin lines visible on the leaves of plants are called __________.
   Answer: Veins
10. The pattern of veins on a leaf is called __________.
    Answer: Venation
11. A net-like pattern of veins on a leaf is called __________ venation.
    Answer: Reticulate
12. Banana leaves exhibit __________ venation.
    Answer: Parallel
13. The main root from which smaller side roots arise is called a __________.
    Answer: Taproot
14. A bunch of similar-sized thin roots arising from the base of a stem is called a __________ root system.
    Answer: Fibrous
15. Mustard is an example of a plant having a __________ root system.
    Answer: Taproot
16. Common grass has a __________ root system.
    Answer: Fibrous
17. Plants having seeds with two cotyledons are called __________.
    Answer: Dicotyledons (dicots)
18. Plants having seeds with one cotyledon are called __________.
    Answer: Monocotyledons (monocots)
19. Chickpea is an example of a __________ plant.
    Answer: Dicot
20. Maize is an example of a __________ plant.
    Answer: Monocot
21. Dicot plants generally have __________ venation in their leaves.
    Answer: Reticulate
22. Monocot plants generally have __________ roots.
    Answer: Fibrous
23. Fish use their __________ for movement in water.
    Answer: Fins
24. Pigeons use their legs and __________ for movement.
    Answer: Wings

25. The special features that enable plants and animals to survive in a particular region are called __________.
    Answer: Adaptations
26. The place where a plant or animal lives is called its __________.
    Answer: Habitat
27. Forests, deserts, grasslands and mountains are examples of __________ habitats.
    Answer: Terrestrial
28. Ponds, lakes, rivers and oceans are examples of __________ habitats.
    Answer: Aquatic
29. Animals such as frogs that can live both on land and in water are called __________.
    Answer: Amphibians
30. Damage to natural habitats can lead to the loss of __________.
    Answer: Biodiversity

2.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

Fill in the Blanks with Answers – HOTS Type:

These questions require students to **apply, analyse, compare, infer, and relate concepts** rather than merely recall definitions.

1. A plant has soft, green and tender stems. Based on these features, it should be classified as a __________.
   Answer: Herb
2. A plant has several hard, woody stems branching close to the ground. It most likely belongs to the __________ group.
   Answer: Shrub
3. If a plant is tall and has a thick, hard, woody stem with branches arising high above the ground, it can be classified as a __________.
   Answer: Tree
4. Riya observes a net-like arrangement of veins in a leaf. The leaf shows __________ venation.
   Answer: Reticulate
5. If the veins of a leaf run side by side without forming a network, the leaf has __________ venation.
   Answer: Parallel
6. A newly discovered plant has leaves with reticulate venation. Its root system is most likely to be a __________ system.
   Answer: Taproot
7. A plant has fibrous roots. Based on the relationship described in the chapter, its leaves will most likely show __________ venation.
   Answer: Parallel
8. If a seed splits naturally into two cotyledons, the plant can be classified as a __________.
   Answer: Dicotyledon
9. A plant has one cotyledon, parallel venation and fibrous roots. It belongs to the __________ group.
   Answer: Monocotyledon
10. A student observes a plant with taproots and reticulate venation. Its seed is expected to contain __________ cotyledons.
    Answer: Two

11. If a maize-like plant has parallel venation, its root system is expected to be __________.
    Answer: Fibrous
12. An animal uses both legs and wings for movement. Based on the examples in the chapter, it could be grouped with animals such as a __________.
    Answer: Pigeon / Housefly
13. A newly observed aquatic animal moves efficiently using structures similar to those of a fish. These structures are likely to be __________.
    Answer: Fins
14. A cactus has thick and fleshy stems that help it survive where very little water is available. This feature is an example of an __________.
    Answer: Adaptation
15. A tree growing in a snowy mountain region has a conical shape and sloping branches. These features help the __________ slide off easily.
    Answer: Snow
16. If a plant cannot tolerate scarcity of water and extreme temperatures, it would find it difficult to survive in a __________ habitat.
    Answer: Desert
17. A camel with long legs and wide hooves is better suited to a __________ desert.
    Answer: Hot
18. A camel has relatively short legs and long hair to survive cold winters. It is likely adapted to the cold desert of __________.
    Answer: Ladakh
19. Camels lose very little water because they excrete little urine, produce dry dung and do not __________.
    Answer: Sweat
20. A fish taken permanently out of water would have difficulty surviving because water is part of its natural __________.
    Answer: Habitat
21. If an organism lives in a forest, desert, grassland or mountain, its habitat is broadly classified as __________.
    Answer: Terrestrial
22. An organism capable of living both in a pond and on nearby land could be grouped as an __________.
    Answer: Amphibian
23. If a pond dries up completely, the aquatic organisms living there may lose their food, shelter and other resources because their __________ has been damaged.
    Answer: Habitat
24. If many natural habitats in a region are destroyed, the __________ of that region is likely to decrease.
    Answer: Biodiversity
25. Trees provide food and shelter to animals, while some animals help spread seeds. This demonstrates the __________ between plants and animals.
    Answer: Interdependence
26. If two regions have very different climatic and environmental conditions, their biodiversity is also likely to be __________.
    Answer: Different
27. Rhododendrons growing in areas with heavy winds may be shorter and have smaller leaves. These features help them __________ in those conditions.
    Answer: Survive

28. If an unknown plant has weak stems but grows upward by taking support from another structure, it should be classified as a __________.
    Answer: Climber
29. If the same weak-stemmed plant spreads horizontally along the ground instead of climbing, it should be classified as a __________.
    Answer: Creeper
30. Protecting natural habitats is important because habitat destruction can ultimately result in the loss of __________.
    Answer: Biodiversity

2.5 One-mark questions with Answers of LOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is biodiversity?**
   Answer: Biodiversity is the variety of plants and animals found in a particular region.
2. **Why do we group plants and animals?**
   Answer: We group plants and animals to make it easier to understand and study their similarities and differences.
3. **On what basis can plants be grouped into herbs, shrubs and trees?**
   Answer: Plants can be grouped into herbs, shrubs and trees based on their height and type of stem.
4. **What is a herb?**
   Answer: A herb is a typically small plant with a soft and green stem.
5. **Give one example of a herb.**
   Answer: Tomato is an example of a herb.
6. **What is a shrub?**
   Answer: A shrub is a plant with hard, woody stems that usually branch close to the ground.
7. **Give one example of a shrub.**
   Answer: Rose is an example of a shrub.
8. **What is a tree?**
   Answer: A tree is generally a tall plant with a hard, thick and woody stem.
9. **What are climbers?**
   Answer: Climbers are plants with weak stems that need support to climb and grow.
10. **What are creepers?**
    Answer: Creepers are plants with weak stems that grow along the ground.
11. **What is venation?**
    Answer: Venation is the pattern of veins present on a leaf.
12. **What is reticulate venation?**
    Answer: Reticulate venation is the net-like pattern of veins on both sides of the main vein of a leaf.
13. **What is parallel venation?**
    Answer: Parallel venation is the arrangement in which the veins of a leaf run parallel to one another.
14. **Give one example of a plant having reticulate venation.**
    Answer: Hibiscus has reticulate venation in its leaves.
15. **Give one example of a plant having parallel venation.**
    Answer: Banana has parallel venation in its leaves.
16. **What is a taproot?**
    Answer: A taproot is the main root from which smaller side roots arise.

17. **What are fibrous roots?**
    Answer: Fibrous roots are a bunch of similar-sized thin roots arising from the base of the stem.
18. **What are dicotyledonous plants?**
    Answer: Plants whose seeds contain two cotyledons are called dicotyledonous plants or dicots.
19. **What are monocotyledonous plants?**
    Answer: Plants whose seeds contain one cotyledon are called monocotyledonous plants or monocots.
20. **What type of root system is generally found in dicot plants?**
    Answer: Dicot plants generally have a taproot system.
21. **What type of root system is generally found in monocot plants?**
    Answer: Monocot plants generally have a fibrous root system.
22. **Name two body parts used by animals for movement.**
    Answer: Legs and wings are two body parts used by animals for movement.
23. **Which body part does a fish use for movement?**
    Answer: A fish uses its fins for movement.
24. **Name any two types of movement shown by animals.**
    Answer: Walking and flying are two types of movement shown by animals.
25. **What are adaptations?**
    Answer: Adaptations are special features that enable plants and animals to survive in a particular region.
26. **What is a habitat?**
    Answer: A habitat is the place where a plant or animal lives.
27. **What does a habitat provide to living organisms?**
    Answer: A habitat provides organisms with food, water, air, shelter and other needs for survival.
28. **What are terrestrial habitats?**
    Answer: Habitats in which plants and animals live on land are called terrestrial habitats.
29. **What are aquatic habitats?**
    Answer: Habitats in which plants and animals live in water are called aquatic habitats.
30. **What are amphibians?**
    Answer: Amphibians are animals, such as frogs, that can live both in water and on land.

2.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **A plant has a soft, green stem. To which group would you classify it?**
   Answer: The plant would be classified as a herb because herbs typically have soft and green stems.
2. **A plant has several hard, woody stems branching near the ground; what type of plant is it?**
   Answer: It is a shrub because shrubs have woody stems that branch close to the ground.
3. **A plant is tall with a thick woody stem and branches arising high above the ground; how would you classify it?**

Answer: It would be classified as a tree based on its height, thick woody stem and branching pattern.

4. **A weak-stemmed plant grows upward by taking support from another plant; what type of plant is it?**
   Answer: It is a climber because its weak stem requires support to grow upward.
5. **How would you classify a weak-stemmed plant that spreads along the ground?**
   Answer: It would be classified as a creeper because creepers grow along the ground.
6. **A leaf has veins forming a net-like pattern; what type of venation does it show?**
   Answer: The leaf shows reticulate venation because its veins form a net-like pattern.
7. **A student observes parallel veins in a plant's leaves; what type of roots is the plant likely to have?**
   Answer: The plant is likely to have fibrous roots because parallel venation is generally associated with fibrous roots.
8. **If a plant has a taproot, what type of leaf venation would you expect?**
   Answer: The plant would generally be expected to have reticulate venation.
9. **A seed has two cotyledons; what type of plant will develop from it?**
   Answer: A dicotyledonous plant will develop from a seed having two cotyledons.
10. **A plant has one cotyledon, fibrous roots and parallel venation; to which group does it belong?**
    Answer: The plant belongs to the monocotyledonous group.
11. **If an unknown plant has reticulate venation and taproots, how many cotyledons would you expect in its seed?**
    Answer: Its seed would be expected to have two cotyledons.
12. **Why can a pigeon both walk and fly?**
    Answer: A pigeon can walk and fly because it uses its legs for walking and its wings for flying.
13. **Why are fins useful to a fish?**
    Answer: Fins help a fish move efficiently through water.
14. **If an animal has wings and legs, what two types of movement might it perform?**
    Answer: The animal may be able to walk and fly using its legs and wings respectively.
15. **Why are the thick and fleshy stems of desert plants useful?**
    Answer: Thick and fleshy stems help desert plants store water and survive in dry conditions.
16. **Why do deodar trees have conical shapes and sloping branches?**
    Answer: Their conical shapes and sloping branches allow snow to slide off easily in mountainous regions.
17. **Why do hot-desert camels have long legs and wide hooves?**
    Answer: Long legs and wide hooves help hot-desert camels walk on sand without sinking into it.
18. **How do the shorter legs of cold-desert camels help them?**
    Answer: Shorter legs help cold-desert camels move more easily through mountainous regions.
19. **How does reduced water loss help camels survive in deserts?**
    Answer: Reduced water loss enables camels to survive for many days without drinking water.
20. **Why do cold-desert camels grow long hair?**
    Answer: Long hair helps cold-desert camels survive the cold winters of Ladakh.

21. **Why might rhododendrons growing on windy mountain tops be shorter?**
    Answer: Their shorter height helps them survive the heavy winds found on mountain tops.
22. **A plant develops a special feature that helps it survive in its surroundings; what is this feature called?**
    Answer: Such a special survival feature is called an adaptation.
23. **Why is a habitat important for an organism's survival?**
    Answer: A habitat provides an organism with food, water, air, shelter and other necessities for survival.
24. **A frog lives both in a pond and on nearby land; how would you classify it?**
    Answer: The frog is classified as an amphibian because it can live both in water and on land.
25. **A fish is permanently removed from its pond; why would its survival be threatened?**
    Answer: Its survival would be threatened because water is an essential part of its natural habitat.
26. **What may happen to aquatic organisms if their pond dries up?**
    Answer: They may lose their habitat and the resources necessary for their survival.
27. **How can destruction of forests affect biodiversity?**
    Answer: Destruction of forests can reduce biodiversity by destroying the habitats of many plants and animals.
28. **Why can two regions have different kinds of plants and animals?**
    Answer: Two regions can have different biodiversity because their environmental conditions may be different.
29. **What does seed dispersal by animals indicate about plants and animals?**
    Answer: Seed dispersal by animals shows that plants and animals are interdependent.
30. **Why is grouping organisms useful when studying biodiversity?**
    Answer: Grouping makes biodiversity easier to study by organising organisms according to their similarities and differences.

2.7 Two-mark questions with Answers of LOTS Type: (28 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type

1. **What is biodiversity? Why is it important to observe biodiversity around us?**
   Answer:
   1. Biodiversity refers to the variety of plants and animals found in a particular region.
   2. Observing biodiversity helps us understand the different living organisms present in our surroundings.
2. **Why is grouping of plants and animals useful?**
   Answer:
   1. Grouping helps us organise plants and animals based on their similarities and differences.
   2. It makes the wide variety of living organisms easier to understand and study.
3. **State two characteristics of a tree.**
   Answer:
   1. Trees are generally tall plants with hard, thick, brown and woody stems.
   2. Their branches usually arise higher up on the stem and away from the ground.
4. **State two characteristics of shrubs.**
   Answer:

1. Shrubs generally have many hard, brown and woody stems.
2. Their stems usually start branching very close to the ground.

5. **What are herbs? Give one example.**
   Answer:
   1. Herbs are typically small plants having soft and green stems.
   2. Tomato is an example of a herb.
6. **Differentiate between climbers and creepers.**
   Answer:
   1. Climbers have weak stems and need support to climb and grow.
   2. Creepers also have weak stems, but they spread along the ground.
7. **What is venation? Name its two types discussed in the chapter.**
   Answer:
   1. The pattern of veins present on a leaf is called venation.
   2. The two types discussed are reticulate venation and parallel venation.
8. **Differentiate between reticulate and parallel venation.**
   Answer:
   1. In reticulate venation, the veins form a net-like pattern on both sides of the thick middle vein.
   2. In parallel venation, the veins of the leaf run parallel to one another.
9. **Differentiate between taproots and fibrous roots.**
   Answer:
   1. A taproot system has one main root with smaller side roots arising from it.
   2. A fibrous root system consists of a bunch of similar-sized thin roots arising from the base of the stem.
10. **What relationship exists between leaf venation and root type?**
    Answer:
    1. Plants with reticulate venation generally have taproots.
    2. Plants with parallel venation generally have fibrous roots.
11. **What are dicotyledons and monocotyledons?**
    Answer:
    1. Plants whose seeds have two cotyledons are called dicotyledons or dicots.
    2. Plants whose seeds have one cotyledon are called monocotyledons or monocots.
12. **State two differences between dicot and monocot plants.**
    Answer:
    1. Dicots generally have reticulate venation and a taproot system.
    2. Monocots generally have parallel venation and a fibrous root system.
13. **How do animals differ in their movements? Give examples.**
    Answer:
    1. Different animals may fly, run, crawl, walk, hop, jump or swim.
    2. They use different body parts such as legs, wings and fins for movement.
14. **How do a fish and a goat move?**
    Answer:
    1. A fish swims in water with the help of its fins.
    2. A goat walks on the ground with the help of its legs.
15. **What are adaptations? Give one example.**
    Answer:
    1. Adaptations are special features that enable plants and animals to survive in a particular region.

2. The conical shape of a deodar tree is an adaptation that helps it survive in mountainous regions.

16. **What is a habitat? What does it provide to an organism?**
    Answer:
    1. The place where a plant or animal lives is called its habitat.
    2. A habitat provides food, water, air, shelter and other needs required for survival.
17. **What are terrestrial habitats? Give two examples.**
    Answer:
    1. Habitats in which plants and animals live on land are called terrestrial habitats.
    2. Forests and deserts are examples of terrestrial habitats.
18. **What are aquatic habitats? Give two examples.**
    Answer:
    1. Habitats in which plants and animals live in water are called aquatic habitats.
    2. Ponds and oceans are examples of aquatic habitats.
19. **What are amphibians? Give an example.**
    Answer:
    1. Animals that can live both in water and on land are called amphibians.
    2. Frog is an example of an amphibian.
20. **How are plants and animals dependent on each other?**
    Answer:
    1. Trees provide food and shelter to some birds and other animals.
    2. Animals can help plants by spreading seeds after eating fruits.
21. **Mention two adaptations of a camel that help it survive in a hot desert.**
    Answer:
    1. A hot-desert camel has long legs and wide hooves that help it walk on sand without sinking.
    2. It loses very little water because it excretes little urine, produces dry dung and does not sweat.
22. **How are desert plants adapted to survive with little water?**
    Answer:
    1. Desert plants such as cactus have thick and fleshy stems.
    2. These stems store water and help the plants tolerate hot and dry conditions.
23. **How is a deodar tree suited to snowy mountain conditions?**
    Answer:
    1. A deodar tree has a conical shape and flexible, sloping branches.
    2. These features allow snow to slide off the tree easily.
24. **What happens when the habitat of plants and animals is damaged?**
    Answer:
    1. Organisms lose their homes, food and other resources when their habitats are damaged.
    2. Such habitat damage ultimately leads to loss of biodiversity.
25. **Mention two ways in which animals can be grouped.**
    Answer:
    1. Animals can be grouped according to their types of movement and the body parts used for movement.
    2. They can also be grouped using features such as shape, size, structure and colour.

2.8. Two-mark questions with Answers of HOTS Type: (15 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:

1. **A plant has a soft green stem and is very short. How would you classify it? Give a reason.**
   Answer:
   1. The plant can be classified as a **herb**.
   2. Herbs are generally small plants with soft and green stems.
2. **A plant has many woody stems branching close to the ground. Is it a tree or a shrub? Justify your answer.**
   Answer:
   1. The plant is a **shrub** because its stems branch close to the ground.
   2. Trees are generally taller and have branches arising higher up on a thick woody stem.
3. **Two plants have weak stems, but one grows upward while the other spreads on the ground. How would you classify them?**
   Answer:
   1. The plant growing upward with support is a **climber**.
   2. The plant spreading along the ground is a **creeper**.
4. **A student observes a net-like pattern of veins in a leaf. What can the student infer about its venation and root system?**
   Answer:
   1. The leaf has **reticulate venation** because its veins form a net-like pattern.
   2. The plant will generally have a **taproot system**.
5. **A plant has fibrous roots. What type of venation would you expect in its leaves? Explain.**
   Answer:
   1. Its leaves would generally be expected to show **parallel venation**.
   2. The chapter shows that plants with parallel venation generally have fibrous roots.
6. **A seed has two cotyledons. Predict its leaf venation and root system.**
   Answer:
   1. The plant is a **dicot** and will generally have reticulate venation.
   2. It will also generally have a **taproot system**.
7. **A plant has one cotyledon and parallel venation. What type of root system would you expect? Why?**
   Answer:
   1. The plant is a **monocot**, and it would generally have fibrous roots.
   2. Monocots generally show a relationship between one cotyledon, parallel venation and fibrous roots.
8. **A student wants to group a pigeon and a housefly together based on movement. What common features can be used?**
   Answer:
   1. Both pigeon and housefly have **legs and wings** as body parts for movement.
   2. They can therefore be grouped together based on the body parts they use for movement.
9. **A fish and a goat live in very different surroundings. How are their body parts suited to their movement?**
   Answer:
   1. A fish has fins that help it swim in water.
   2. A goat has legs that help it walk and move on land.

10. **Why would a cactus survive better than many ordinary plants in a desert?**
    Answer:
    1. A cactus has a thick and fleshy stem that helps it store water.
    2. This feature enables it to survive the hot and dry conditions of a desert.
11. **How does the shape of a deodar tree help it survive in snowy mountains?**
    Answer:
    1. A deodar tree has a conical shape with flexible, sloping branches.
    2. These features allow snow to slide off easily instead of accumulating on its branches.
12. **Why are the long legs and wide hooves of a hot-desert camel useful?**
    Answer:
    1. Its long legs help keep its body away from the hot desert surface.
    2. Its wide hooves help it walk on sand without sinking into it.
13. **How does a camel conserve water in a desert environment?**
    Answer:
    1. A camel loses very little water through urine and produces dry dung.
    2. It also does not sweat, which helps it conserve water in dry conditions.
14. **Rhododendron plants growing on mountain tops may be shorter than those growing at lower heights. Why?**
    Answer:
    1. Mountain tops may experience heavy winds and other harsh environmental conditions.
    2. The shorter form and smaller leaves help rhododendrons survive under such conditions.
15. **A frog can survive both near a pond and on land. What does this tell you about its habitat?**
    Answer:
    1. A frog is an **amphibian** because it can live both in water and on land.
    2. Therefore, it can make use of both aquatic and terrestrial surroundings.
16. **If a pond is polluted or destroyed, how might the organisms living there be affected?**
    Answer:
    1. Aquatic organisms may lose their habitat and resources necessary for survival.
    2. Continued habitat damage can result in a loss of biodiversity.
17. **Why can the same type of plant show different features when growing under different environmental conditions?**
    Answer:
    1. Environmental conditions such as temperature, water availability and wind can differ from place to place.
    2. Plants may possess adaptations that help them survive under the particular conditions of their region.
18. **A new plant species is discovered with parallel leaf venation. What two other characteristics could you predict?**
    Answer:
    1. The plant would generally be expected to have a **fibrous root system**.
    2. Its seed would likely contain **one cotyledon**, making it a monocot.
19. **Why is grouping organisms according to similarities and differences useful to scientists and students?**
    Answer:

1. Grouping organises the large variety of living organisms into manageable categories.
2. This makes it easier to compare, understand and study biodiversity.

20. **If fruit-eating animals disappear from a forest, how might some plants be affected?**
Answer:
    1. Some plants may have fewer opportunities for their seeds to be dispersed to different places.
    2. This is because animals that eat fruits can help plants by spreading their seeds.
21. **Two regions have very different climatic conditions. Would you expect them to have exactly the same biodiversity? Give reasons.**
Answer:
    1. No, the two regions are likely to have different kinds of plants and animals.
    2. Organisms possess adaptations suited to the particular environmental conditions in which they live.
22. **Why is protecting habitats necessary for conserving biodiversity?**
Answer:
    1. Habitats provide organisms with food, water, air, shelter and other requirements for survival.
    2. Protecting habitats prevents the loss of plants and animals and therefore helps conserve biodiversity.
23. **Suppose a plant cannot store enough water and is moved to a very dry desert. What difficulty might it face?**
Answer:
    1. The plant may find it difficult to survive because water availability is very low in a desert.
    2. Plants with suitable water-conserving adaptations are better able to survive such dry conditions.
24. **Why can habitat be considered more than just the physical place where an organism lives?**
Answer:
    1. A habitat is the place where an organism lives and obtains its necessities for survival.
    2. It provides resources such as food, water, air and shelter to the organism.
25. **How does the relationship between trees and animals demonstrate interdependence in nature?**
Answer:
    1. Trees provide food and shelter to many birds and other animals.
    2. In return, some animals help plants by dispersing their seeds to different places.

2.9. Three-mark questions with Answers of LOTS Type: (10 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:
1. What is biodiversity? Explain its importance.
Answer:
1. Biodiversity refers to the variety of plants and animals found in a particular region.
2. Different regions may have different varieties of living organisms.
3. Studying biodiversity helps us understand the variety of life present in our surroundings.

2. Explain the characteristics of herbs, shrubs and trees.
Answer:
1. **Herbs** are generally small plants with soft and green stems.
2. **Shrubs** have hard, woody stems that usually branch close to the ground.
3. **Trees** are generally tall plants with hard, thick, woody stems whose branches arise higher above the ground.

3. What are climbers and creepers? How are they different?
Answer:
1. Climbers are plants with weak stems that require support to grow upward.
2. Creepers also have weak stems, but they spread along the ground.
3. Thus, climbers grow upward with support, whereas creepers grow along the ground.

4. What is venation? Explain the two types of venation.
Answer:
1. The pattern of veins on a leaf is called **venation**.
2. In **reticulate venation**, veins form a net-like pattern on both sides of the main vein.
3. In **parallel venation**, the veins run parallel to one another.

5. Differentiate between taproot and fibrous root systems.
Answer:
1. In a taproot system, there is one main root from which smaller side roots arise.
2. In a fibrous root system, a bunch of similar-sized thin roots arise from the base of the stem.
3. Mustard and hibiscus have taproots, whereas common grass has fibrous roots.

6. Explain the relationship between leaf venation and the type of roots in plants.
Answer:
1. Plants having reticulate venation generally have a taproot system.
2. Plants having parallel venation generally have a fibrous root system.
3. Thus, observing leaf venation can often help us identify the type of root system of a plant.

7. Differentiate between dicotyledonous and monocotyledonous plants.
Answer:
1. Dicotyledonous plants have seeds containing two cotyledons, while monocotyledonous plants have seeds containing one cotyledon.
2. Dicots generally have reticulate venation and taproots.
3. Monocots generally have parallel venation and fibrous roots.

8. Explain how animals can be grouped based on their movement.
Answer:
1. Animals show different types of movement such as walking, running, crawling, hopping, jumping and flying.
2. Different body parts such as legs, wings and fins help animals in movement.
3. Animals can therefore be grouped according to their types of movement and the body parts used for movement.

9. What are adaptations? Give two examples.
Answer:
1. Adaptations are special features that enable plants and animals to survive in a particular region.
2. The thick and fleshy stem of a cactus helps it store water in desert conditions.
3. The conical shape and sloping branches of a deodar tree help snow slide off easily in mountain regions.

10. What is a habitat? What does it provide to living organisms?
Answer:

1. A habitat is the place where a plant or animal lives.
2. A habitat provides food, water, air and shelter to living organisms.
3. It also provides other conditions and resources necessary for their survival.

11. Explain terrestrial and aquatic habitats with examples.

Answer:

1. Habitats in which plants and animals live on land are called **terrestrial habitats**, such as forests, deserts, grasslands and mountains.
2. Habitats in which organisms live in water are called **aquatic habitats**, such as ponds, lakes, rivers and oceans.
3. Frogs can live both in water and on land and are therefore called amphibians.

12. Describe three adaptations of camels for survival in deserts.

Answer:

1. Hot-desert camels have long legs and wide hooves that help them walk on sand without sinking.
2. Camels lose very little water because they excrete little urine, produce dry dung and do not sweat.
3. Cold-desert camels have features such as shorter legs and long hair that help them survive in cold mountainous conditions.

13. Explain how plants and animals depend on each other.

Answer:

1. Trees provide food and shelter to many birds and other animals.
2. Some animals eat fruits and help spread the seeds to different places.
3. Thus, plants and animals are interdependent and support each other's survival.

14. Describe the adaptations of plants living in deserts and mountains.

Answer:

1. Desert plants such as cactus have thick and fleshy stems that store water.
2. Mountain trees such as deodar have conical shapes and flexible, sloping branches.
3. These features help cactus survive dry conditions and deodar trees survive snowy mountain conditions.

15. Why is conservation of habitats important for biodiversity?

Answer:

1. Natural habitats provide plants and animals with the resources necessary for survival.
2. Damage to habitats can cause organisms to lose their homes, food and other essential resources.
3. Therefore, protecting natural habitats is important to prevent the loss of biodiversity.

16. Explain three bases that can be used for grouping plants and animals.

Answer:

1. Plants can be grouped based on features such as height, type of stem and presence or absence of flowers.
2. Animals can be grouped according to their food habits, habitats, colours and types of movement.
3. Such grouping based on similarities and differences makes organisms easier to study.

17. How are a fish and a goat adapted for movement in their respective habitats?

Answer:

1. A fish lives in water and has a streamlined body that helps it move through water.
2. Its fins help it swim and move efficiently in its aquatic habitat.
3. A goat has legs that enable it to walk and move on land.

18. Describe the relationship among cotyledons, leaf venation and root systems.

Answer:

1. Dicot plants have two cotyledons and generally show reticulate venation.

2. Dicots generally possess taproots, while monocots with one cotyledon generally have parallel venation.
3. Monocot plants generally possess fibrous root systems.

2.10. Three-mark questions with Answers of HOTS Type: (18 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:

1. A plant has reticulate venation, but its roots are not visible. Predict its root system and seed type with reasons.

Answer:

1. The plant is likely to have a **taproot system** because reticulate venation is generally associated with taproots.
2. It is also likely to be a **dicotyledonous plant**.
3. Therefore, its seed would generally contain **two cotyledons**.

2. A student finds a plant with fibrous roots and parallel leaf venation. What can be inferred about its seed? Explain.

Answer:

1. The plant is likely to be a **monocotyledonous plant** because it has fibrous roots and parallel venation.
2. Monocot plants generally have seeds containing **one cotyledon**.
3. Thus, root type and leaf venation can help predict the number of cotyledons in the seed.

3. Two plants have weak stems, but one grows upward on a fence while the other spreads along the ground. Analyse their differences.

Answer:

1. The plant growing upward with the support of the fence is a **climber**.
2. The plant spreading along the ground is a **creeper**.
3. Although both have weak stems, their growth patterns help us classify them into different groups.

4. A plant has several hard, woody stems branching near the ground. Explain why it should not be classified as a tree.

Answer:

1. The plant should be classified as a **shrub** because its woody stems branch close to the ground.
2. Trees generally have a thick woody stem with branches arising higher above the ground.
3. Therefore, the position of branching, along with stem characteristics, helps distinguish shrubs from trees.

5. A cactus and a deodar tree are exchanged between their natural habitats. Why might they find survival difficult?

Answer:

1. A cactus is adapted to dry desert conditions through features such as its thick, fleshy stem.
2. A deodar is adapted to snowy mountains through its conical shape and flexible, sloping branches.
3. Moving them to very different surroundings may make their existing adaptations less suitable for the new conditions.

6. Why would a cactus have a better chance of surviving prolonged water scarcity than many plants from wetter regions?

Answer:

1. A cactus has a thick and fleshy stem that can store water.
2. This stored water helps it withstand the dry conditions of a desert.

3. Thus, its structural adaptation gives it an advantage when water is scarce.

7. Compare a hot-desert camel and a cold-desert camel in terms of their adaptations.

Answer:

1. A hot-desert camel has long legs and wide hooves that help it move over sandy ground.
2. A cold-desert camel has shorter legs and long hair suited to cold mountainous conditions.
3. These differences show that related animals can have different adaptations according to their habitats.

8. Suppose the fruit-eating animals in a forest decrease greatly. How could this affect some plants in the forest?

Answer:

1. Fruit-eating animals help some plants by carrying or spreading their seeds to different places.
2. A decrease in these animals may reduce the dispersal of such seeds.
3. This demonstrates that plants and animals are interdependent in an ecosystem.

9. A pond is gradually filled with waste and becomes unsuitable for aquatic organisms. Predict three possible consequences.

Answer:

1. Aquatic organisms may lose the suitable habitat in which they live.
2. They may also lose access to resources and conditions required for their survival.
3. Continued habitat destruction can ultimately lead to a reduction in biodiversity.

10. A student says, "All plants can be classified only by their height." Why is this method insufficient?

Answer:

1. Height is only one feature that can be used to group plants.
2. Plants can also be compared using stem type, leaf venation, roots, seeds and other characteristics.
3. Using several observable features provides a more meaningful basis for grouping plants.

11. How could you predict the root system of an unknown plant without uprooting it?

Answer:

1. First, observe the pattern of veins on the leaves of the plant.
2. Reticulate venation generally indicates a taproot, while parallel venation generally indicates fibrous roots.
3. Thus, leaf venation can be used to predict the root system without uprooting the plant.

12. A student groups a fish and a pigeon together simply because both can move. Why is this grouping incomplete?

Answer:

1. Both animals move, but they use different body parts and modes of movement.
2. A fish uses fins for swimming, whereas a pigeon uses legs and wings for walking and flying.
3. Therefore, grouping animals becomes more meaningful when the type of movement and body parts used are also considered.

13. Why might destroying a forest affect both animals and plants even if only some trees are initially removed?

Answer:

1. Trees provide food and shelter to many birds and other animals.
2. Animals, in turn, may help plants by dispersing their seeds.
3. Therefore, disturbing one part of this interdependent relationship can affect other organisms and eventually biodiversity.

14. A rhododendron growing on a windy mountain top is shorter and has smaller leaves than one growing lower down. What can you infer?
Answer:
1. Environmental conditions can influence the features useful for a plant's survival.
2. Shorter height and smaller leaves can help rhododendrons withstand harsh conditions such as heavy winds.
3. These differences illustrate how organisms possess adaptations suited to their surroundings.

15. Why can a frog make use of both terrestrial and aquatic surroundings, unlike a fish?
Answer:
1. A frog can live both in water and on land and is therefore classified as an **amphibian**.
2. A fish is adapted mainly for an aquatic habitat and uses fins for movement in water.
3. Hence, their different adaptations determine the kinds of habitats in which they can live.

16. Two areas have different environmental conditions. Why would you expect differences in their biodiversity?
Answer:
1. Different surroundings provide different living conditions for plants and animals.
2. Organisms possess adaptations that help them survive under particular environmental conditions.
3. Therefore, regions with different conditions are likely to support different varieties of organisms.

17. Why is habitat conservation necessary even for organisms that are not currently endangered?
Answer:
1. A habitat provides organisms with food, water, air, shelter and other necessities for survival.
2. Damage to habitats can disturb the survival of the organisms living there.
3. Conserving habitats therefore helps prevent future loss of biodiversity.

18. How does grouping organisms help us understand diversity without ignoring their differences?
Answer:
1. Organisms can be grouped by identifying similarities in selected characteristics.
2. Their differences can then be compared within and between these groups.
3. This systematic grouping makes the enormous diversity of living organisms easier to study and understand.

2.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:
1. Explain how plants can be classified as herbs, shrubs, trees, climbers and creepers.
Answer:
1. **Herbs** are generally small plants with soft and green stems.
2. **Shrubs** are medium-sized plants with hard, woody stems that usually branch close to the ground.
3. **Trees** are generally tall plants with hard, thick and woody stems, with branches arising higher above the ground.
4. **Climbers** have weak stems and require support to climb and grow upward.
5. **Creepers** also have weak stems, but they spread and grow along the ground.

2. Explain the relationship among leaf venation, root systems and cotyledons in plants.
Answer:

1. The pattern of veins on a leaf is called **venation**, and it may be reticulate or parallel.
2. Plants with **reticulate venation** generally have a **taproot system**.
3. Plants with **parallel venation** generally have a **fibrous root system**.
4. **Dicotyledonous plants** have two cotyledons and generally possess reticulate venation and taproots.
5. **Monocotyledonous plants** have one cotyledon and generally possess parallel venation and fibrous roots.

3. Describe the different ways in which animals can be grouped based on their movement and body parts.

Answer:

1. Animals show different kinds of movement such as walking, running, crawling, hopping, jumping, flying and swimming.
2. An **ant** uses its legs for movement.
3. A **goat** uses its legs for walking and jumping.
4. A **pigeon and housefly** use both legs and wings for movement, while a fish uses its fins.
5. Therefore, animals can be grouped according to their types of movement and the body parts they use for movement.

4. What is a habitat? Explain the different types of habitats discussed in the chapter.

Answer:

1. A **habitat** is the place where a plant or animal lives.
2. A habitat provides organisms with food, water, air, shelter and other requirements for survival.
3. **Terrestrial habitats** are habitats on land, such as forests, deserts, grasslands and mountains.
4. **Aquatic habitats** are habitats in water, such as ponds, lakes, rivers and oceans.
5. Some animals, such as frogs, can live both in water and on land and are called **amphibians**.

5. What are adaptations? Explain with suitable examples from different habitats.

Answer:

1. **Adaptations** are special features that enable plants and animals to survive in a particular region.
2. Cactus plants have thick and fleshy stems that help them store water in desert conditions.
3. Deodar trees have a conical shape and flexible, sloping branches that allow snow to slide off easily.
4. Hot-desert camels have long legs and wide hooves that help them move over sandy ground.
5. Such adaptations enable organisms to survive under the particular environmental conditions of their habitats.

6. Describe the adaptations of camels that help them survive in desert habitats.

Answer:

1. Camels have special features that enable them to survive under harsh desert conditions.
2. Hot-desert camels have **long legs and wide hooves** that help them move over sand without sinking.
3. Camels lose very little water through urine and produce **dry dung**.
4. They do not sweat, which further helps them conserve water.
5. Cold-desert camels have features such as **shorter legs and long hair** that help them survive cold mountainous conditions.

7. Explain biodiversity and the importance of protecting natural habitats.

Answer:

1. **Biodiversity** refers to the variety of plants and animals found in a particular region.
2. Different habitats support different varieties of plants and animals according to their environmental conditions.
3. Natural habitats provide organisms with food, water, air, shelter and other necessities for survival.
4. Damage to natural habitats can cause organisms to lose their homes and essential resources.
5. Therefore, protecting habitats is necessary to prevent the loss of biodiversity.

8. Explain the differences between taproot and fibrous root systems with their relationship to leaf venation.

Answer:

1. In a **taproot system**, there is one main root from which smaller side roots arise.
2. Mustard and hibiscus are examples of plants having taproots.
3. In a **fibrous root system**, a bunch of similar-sized thin roots arises from the base of the stem, as seen in grass.
4. Plants with taproots generally have **reticulate venation** in their leaves.
5. Plants with fibrous roots generally have **parallel venation** in their leaves.

9. Explain how plants and animals are interdependent in nature.

Answer:

1. Plants and animals depend on one another for different needs in their surroundings.
2. Trees provide **food** to many birds and other animals.
3. Trees also provide **shelter** and places for animals to live.
4. Some animals eat fruits and help plants by spreading their seeds to different places.
5. Thus, the relationship between plants and animals demonstrates their **interdependence in nature**.

10. Explain how grouping helps in the study of plants and animals.

Answer:

1. There is a great variety of plants and animals around us, showing many similarities and differences.
2. Plants can be grouped using features such as height, stem type and presence or absence of flowers.
3. Animals can be grouped according to features such as food habits, habitats, colour and movement.
4. Organisms can also be compared using their shape, size, structure and other observable characteristics.
5. Grouping makes the enormous diversity of living organisms easier to organise, compare and study.

2.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:

1. A student observes an unknown plant with reticulate venation but cannot see its roots or seeds. Using the relationships discussed in the chapter, predict its root system and seed type.

Answer:

1. The net-like arrangement of veins shows that the plant has **reticulate venation**.
2. Plants with reticulate venation generally possess a **taproot system**.
3. Such plants are generally classified as **dicotyledonous plants**.
4. A dicot seed contains **two cotyledons**, as seen in chickpea.

5. Thus, leaf venation can help us predict both the root system and the number of cotyledons in a plant.

2. Two plants have weak stems, but Plant A grows upward using a fence while Plant B spreads along the ground. Analyse and classify the two plants.

Answer:

1. Both plants have weak stems, so they cannot remain upright independently in the same way as trees or shrubs.
2. Plant A uses the fence for support and therefore can be classified as a **climber**.
3. Plant B grows by spreading along the ground and can therefore be classified as a **creeper**.
4. The two plants cannot be placed in the same group merely because both have weak stems.
5. Their different growth patterns provide an additional characteristic for correctly grouping them.

3. Suppose a cactus growing in a desert and a deodar growing in a snowy mountain are shifted to each other's habitats. Analyse the possible difficulties they may face.

Answer:

1. A cactus has a thick and fleshy stem suited to storing water under hot and dry desert conditions.
2. A deodar has a conical shape and flexible, sloping branches that allow snow to slide off easily.
3. If the cactus is shifted to snowy mountains, its desert adaptations may not be suited to the new conditions.
4. Similarly, the deodar's mountain adaptations may not provide the same advantage under hot and dry desert conditions.
5. This shows that adaptations help organisms survive under the particular environmental conditions of their habitats.

4. A student finds a plant whose seed has one cotyledon. Predict its leaf venation and root system and explain the relationship among these features.

Answer:

1. A seed having one cotyledon indicates that the plant is a **monocotyledon** or monocot.
2. Monocot plants generally have **parallel venation** in their leaves.
3. They also generally possess a **fibrous root system**.
4. Thus, one cotyledon, parallel venation and fibrous roots are generally associated features in monocot plants.
5. Observing one of these characteristics can therefore help predict the other characteristics of the plant.

5. A forest loses a large number of fruit-eating animals. Analyse how this could affect plants and biodiversity in the forest.

Answer:

1. Some fruit-eating animals help plants by spreading their seeds to different places.
2. If these animals decrease, the dispersal of seeds of some plants may also decrease.
3. Reduced seed dispersal can affect the ability of those plants to spread to new places.
4. This disturbance can affect the interdependent relationship between plants and animals.
5. Therefore, changes in one group of organisms can potentially influence the biodiversity of the region.

6. A pond near a village is gradually destroyed due to human activities. Analyse its possible effects on the organisms living there.

Answer:

1. A pond is an **aquatic habitat** that supports various plants and animals.

2. Organisms living there depend on their habitat for food, water, shelter and other survival requirements.
3. Destruction of the pond can cause these organisms to lose their natural habitat and essential resources.
4. As a result, many organisms may not be able to survive in that location.
5. Continued damage to natural habitats can ultimately lead to a **loss of biodiversity**.

7. A student says, "The height of a plant is enough to classify it correctly." Evaluate this statement.

Answer:

1. Plant height is useful for grouping plants, but it is not the only characteristic that should be observed.
2. The nature of the stem and the position of branches also help distinguish herbs, shrubs and trees.
3. Leaf venation can further classify plants according to reticulate or parallel patterns.
4. Root systems and the number of cotyledons provide additional characteristics for grouping plants.
5. Therefore, using several observable features provides a more meaningful way of studying plant diversity.

8. Compare how a fish and a goat are suited for movement in their respective habitats.

Answer:

1. A fish lives in an aquatic habitat, whereas a goat is adapted for life on land.
2. A fish has a **streamlined body** that helps it move through water.
3. It uses its **fins** for movement in water.
4. A goat uses its **legs** for walking and moving on land.
5. These differences show that animals possess body structures suited to movement in their respective surroundings.

9. A hot-desert camel and a cold-desert camel live under different environmental conditions. Analyse how their features help them survive.

Answer:

1. A hot-desert camel has **long legs and wide hooves** that help it move over sandy surfaces.
2. Camels conserve water by excreting little urine, producing dry dung and not sweating.
3. A cold-desert camel has **shorter legs** suited to mountainous surroundings.
4. It also has **long hair**, which helps it survive cold winters.
5. These differences demonstrate how animals can possess different adaptations according to the conditions of their habitats.

10. Imagine that a natural forest is cleared extensively for construction. Explain how this can disturb the relationship between organisms and affect biodiversity.

Answer:

1. Forest trees provide food and shelter to many birds and other animals.
2. Some animals also help plants by dispersing their seeds after eating fruits.
3. Clearing the forest destroys or damages the habitats on which these organisms depend.
4. Habitat destruction can disturb the interdependence between plants and animals and reduce their chances of survival.
5. Therefore, extensive destruction of natural habitats can ultimately result in the **loss of biodiversity**.

2.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. During a nature walk, you observe three plants: Plant A has a soft green stem, Plant B has several woody stems branching near the ground, and Plant C is tall with a thick woody stem. Classify them and explain your observations.

Answer:

1. Plant A can be classified as a **herb** because it has a soft and green stem.
2. Plant B can be classified as a **shrub** because it has woody stems that branch close to the ground.
3. Plant C can be classified as a **tree** because it is tall and has a thick woody stem.
4. Height, stem characteristics and branching patterns can therefore be used for grouping plants.
5. Such observation-based classification helps us systematically study the diversity of plants around us.

2. A farmer observes that a crop has parallel venation but does not want to uproot the plants to examine their roots. How can the farmer predict the root system and seed type?

Answer:

1. The farmer can use the relationship between leaf venation, roots and cotyledons to make a prediction.
2. Since the leaves have **parallel venation**, the plants will generally have a **fibrous root system**.
3. Plants with parallel venation and fibrous roots are generally **monocotyledonous plants**.
4. Therefore, their seeds are expected to contain **one cotyledon**.
5. Thus, observing the leaves can help predict underground root features and seed characteristics without uprooting the crop.

3. Your school wants to prepare a biodiversity record of its campus. Explain how you would carry out this activity using the ideas from the chapter.

Answer:

1. First, we would observe and record the different plants and animals found on the school campus.
2. Plants could be grouped using features such as height, stem type, leaf venation and other observable characteristics.
3. Animals could be grouped according to their movement and the body parts they use for movement.
4. We could prepare tables showing the similarities and differences among the organisms observed.
5. This activity would help us understand and document the **biodiversity** present on our school campus.

4. A pond in your neighbourhood is being filled with waste and its water area is decreasing. Using your knowledge of habitats and biodiversity, explain why this should concern the community.

Answer:

1. A pond is an **aquatic habitat** for many plants and animals.
2. Organisms living there depend on the habitat for the conditions and resources required for survival.
3. Filling the pond with waste damages the natural habitat of these organisms.
4. Habitat damage can make it difficult for organisms to survive and can ultimately cause a loss of biodiversity.
5. Therefore, protecting the pond is important for conserving the plants and animals that depend on it.

5. You are asked to select a plant better suited to a dry region with very little water. What features would you look for? Explain using cactus as an example.

Answer:

1. I would look for a plant having features that help it survive under conditions of water scarcity.
2. A **cactus** is an example of a plant suited to dry desert conditions.
3. It has a **thick and fleshy stem** that helps it store water.
4. The stored water helps the plant survive when water is not easily available in its surroundings.
5. Therefore, plants with suitable water-storage adaptations are better suited to dry habitats.

6. While visiting a snowy mountain region, you notice many trees with conical shapes and sloping branches. Explain how these features are useful.

Answer:

1. Trees such as **deodar** are found in mountainous regions where snowfall occurs.
2. These trees have a **conical shape** and flexible, sloping branches.
3. The sloping branches allow snow to slide off easily.
4. This prevents large amounts of snow from remaining accumulated on the branches.
5. Thus, these structural features are adaptations that help the trees survive in snowy mountain conditions.

7. During a visit to a desert, you notice that camels can survive where water is scarce and can walk easily on sand. Explain the features responsible for this ability.

Answer:

1. Hot-desert camels have **long legs and wide hooves** suited to movement over sandy ground.
2. Their wide hooves help them walk on sand without sinking into it.
3. Camels also conserve water by excreting only a small quantity of urine.
4. They produce dry dung and do not sweat, which further reduces water loss.
5. These adaptations enable camels to survive and move effectively in desert conditions.

8. A student finds two unknown seeds: Seed A splits into two equal parts, while Seed B does not split into two cotyledons. How can the student classify the plants and predict their leaves and roots?

Answer:

1. Seed A has **two cotyledons**, so its plant can be classified as a **dicotyledon**.
2. The dicot plant will generally have **reticulate venation and a taproot system**.
3. Seed B with one cotyledon represents a **monocotyledonous plant**.
4. The monocot plant will generally have **parallel venation and a fibrous root system**.
5. Thus, examining cotyledons can help predict important characteristics of the leaves and roots.

9. A forest area is being cleared, and the number of fruit-eating birds and animals is decreasing. Explain how this could also affect the plants of the forest.

Answer:

1. Trees provide food and shelter to many birds and other animals.
2. Some animals eat fruits and help plants by spreading their seeds to different places.
3. If fruit-eating animals decrease, the dispersal of some plant seeds may also decrease.
4. Forest clearing also damages the habitats required by both plants and animals.
5. Therefore, protecting forests helps maintain the interdependence of organisms and conserve biodiversity.

10. Your class is given pictures of an ant, goat, pigeon, housefly and fish and asked to group them according to movement. How would you complete the task?

Answer:

1. I would first observe the type of movement and the body parts used by each animal.

2. The **ant and goat** can be grouped as animals that use legs for movement, though the goat can also jump.
3. The **pigeon and housefly** use both legs and wings for movement.
4. The **fish** uses fins to move through water.
5. This activity shows that animals can be systematically grouped according to their modes of movement and the body parts used for movement.

2.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:
1. A student observes a plant with reticulate venation. Which combination is most likely to be correct?
A. Fibrous roots and one cotyledon
B. Taproot and two cotyledons
C. Fibrous roots and two cotyledons
D. Taproot and one cotyledon
Answer: B. Taproot and two cotyledons
2. Which combination correctly represents a monocotyledonous plant?
A. Two cotyledons – reticulate venation – taproot
B. One cotyledon – reticulate venation – fibrous roots
C. One cotyledon – parallel venation – fibrous roots
D. Two cotyledons – parallel venation – taproot
Answer: C. One cotyledon – parallel venation – fibrous roots
3. A plant has several hard, woody stems arising close to the ground. It should be classified as a:
A. Herb
B. Shrub
C. Tree
D. Creeper
Answer: B. Shrub
4. Which characteristic best distinguishes a climber from a creeper?
A. Presence of roots
B. Presence of leaves
C. Need for support to grow upward
D. Presence of a green stem
Answer: C. Need for support to grow upward
5. Four plants have the following characteristics. Which is most likely a tree?
A. Short plant with a soft green stem
B. Weak-stemmed plant spreading on the ground
C. Medium plant with many woody stems branching near the ground
D. Tall plant with a thick woody stem and branches arising high above the ground
Answer: D. Tall plant with a thick woody stem and branches arising high above the ground
6. Which pair is correctly matched?
A. Hibiscus – Parallel venation
B. Banana – Reticulate venation
C. Hibiscus – Reticulate venation
D. Grass – Reticulate venation
Answer: C. Hibiscus – Reticulate venation

7. A student cannot uproot a plant but wants to predict its root type. Which feature would be most useful to observe?
A. Flower colour
B. Leaf venation
C. Plant height
D. Number of branches
Answer: B. Leaf venation
8. Which statement about fibrous roots is correct?
A. They consist of one thick main root.
B. They arise only from branches.
C. They consist of many similar-sized thin roots arising from the stem base.
D. They are found only in trees.
Answer: C. They consist of many similar-sized thin roots arising from the stem base.
9. Chickpea and maize seeds are examined. Which statement is correct?
A. Both have one cotyledon.
B. Chickpea has two cotyledons and maize has one.
C. Chickpea has one cotyledon and maize has two.
D. Both have two cotyledons.
Answer: B. Chickpea has two cotyledons and maize has one.
10. Consider the following characteristics:
I. Two cotyledons
II. Reticulate venation
III. Taproot system
These features together indicate a:
A. Monocot
B. Dicot
C. Creeper only
D. Aquatic plant only
Answer: B. Dicot
11. Which sequence correctly links a plant characteristic with its likely associated features?
A. Parallel venation → fibrous roots → monocot
B. Parallel venation → taproot → dicot
C. Reticulate venation → fibrous roots → monocot
D. Reticulate venation → fibrous roots → dicot
Answer: A. Parallel venation → fibrous roots → monocot
12. An ant, goat, pigeon, housefly and fish are grouped according to body parts used for movement. Which pair would most naturally be grouped together because both use legs and wings?
A. Ant and goat
B. Pigeon and housefly
C. Fish and pigeon
D. Goat and fish
Answer: B. Pigeon and housefly
13. Which body structure is most directly associated with the movement of a fish?
A. Wings
B. Hooves
C. Fins
D. Roots
Answer: C. Fins

14. Why does the streamlined body of a fish help it in its habitat?
A. It helps the fish climb trees.
B. It helps the fish move through water.
C. It helps the fish store water.
D. It helps the fish walk on land.
Answer: B. It helps the fish move through water.
15. Which feature is an adaptation of cactus to desert conditions?
A. Thin and delicate stem
B. Thick and fleshy stem
C. Broad wings
D. Fibrous body covering
Answer: B. Thick and fleshy stem
16. Why are conical shape and sloping branches advantageous to deodar trees?
A. They help store desert water.
B. They allow snow to slide off easily.
C. They help the tree swim in water.
D. They attract fruit-eating animals.
Answer: B. They allow snow to slide off easily.
17. A camel has wide hooves. What is the most appropriate explanation for this adaptation?
A. They help it fly.
B. They prevent it from sinking easily into sand.
C. They help it climb trees.
D. They help it breathe in dry air.
Answer: B. They prevent it from sinking easily into sand.
18. Which combination helps a camel conserve water?
A. More sweating and watery dung
B. Little urine, dry dung and absence of sweating
C. Frequent urination and sweating
D. Wide hooves and wings
Answer: B. Little urine, dry dung and absence of sweating
19. Which statement best describes an adaptation?
A. Any temporary movement of an animal
B. A special feature that enables an organism to survive in a particular region
C. The colour of every organism
D. The process of grouping organisms
Answer: B. A special feature that enables an organism to survive in a particular region
20. Which of the following is NOT primarily a terrestrial habitat?
A. Forest
B. Desert
C. Grassland
D. Pond
Answer: D. Pond
21. A frog is different from a fish in terms of habitat because a frog:
A. Lives only in water
B. Lives only in deserts
C. Can live both on land and in water
D. Cannot move in water
Answer: C. Can live both on land and in water
22. Which of the following best defines a habitat?

A. Only the shelter of an animal
B. Only the food source of an organism
C. The place where an organism lives and obtains its survival needs
D. A group of organisms with similar colours
Answer: C. The place where an organism lives and obtains its survival needs
23. Which situation is most likely to cause a loss of biodiversity?
A. Protecting natural forests
B. Conserving ponds
C. Destroying natural habitats
D. Observing plants without harming them
Answer: C. Destroying natural habitats
24. Fruit-eating animals can benefit plants mainly by:
A. Changing reticulate venation into parallel venation
B. Spreading seeds to different places
C. Changing shrubs into trees
D. Producing fibrous roots
Answer: B. Spreading seeds to different places
25. Which observation provides the best evidence of interdependence between plants and animals?
A. Trees have woody stems.
B. Fish possess fins.
C. Trees provide food to animals, while animals help disperse seeds.
D. Leaves have different patterns of veins.
Answer: C. Trees provide food to animals, while animals help disperse seeds.
26. A newly discovered plant has one cotyledon. Which set of characteristics would you predict?
A. Reticulate venation and taproot
B. Parallel venation and fibrous roots
C. Reticulate venation and fibrous roots
D. Parallel venation and taproot
Answer: B. Parallel venation and fibrous roots
27. Consider the following statements:
Statement I: Plants with reticulate venation generally have taproots.
Statement II: Plants with parallel venation generally have fibrous roots.
Which option is correct?
A. Only Statement I is correct
B. Only Statement II is correct
C. Both statements are correct
D. Both statements are incorrect
Answer: C. Both statements are correct
28. Which of the following represents the most scientific way of grouping organisms?
A. Grouping them randomly
B. Grouping them only by whether we like them
C. Grouping them according to observable similarities and differences
D. Grouping all organisms into a single category
Answer: C. Grouping them according to observable similarities and differences
29. If a natural pond dries up completely, which sequence is most logical?
A. Habitat improves → organisms increase → biodiversity decreases
B. Habitat loss → survival difficulties → possible biodiversity loss

C. More water → fewer organisms → biodiversity increases
D. Habitat loss → more aquatic organisms → biodiversity increases
Answer: B. Habitat loss → survival difficulties → possible biodiversity loss
30. Four students make the following statements. Who is correct?
A. **Anu:** All plants with weak stems are trees.
B. **Ravi:** All aquatic animals can live on land.
C. **Meera:** Adaptations help organisms survive in their particular surroundings.
D. **Kiran:** Habitat has no connection with biodiversity.
Answer: C. Meera

2.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
Based on the observation, classification, biodiversity, habitat and adaptation concepts developed in the chapter, the following best practices can make teaching more experiential and student-centred.

(1) Biodiversity Walk and Observation Diary:
Take students on a guided biodiversity walk around the school campus or neighbourhood. Ask them to record plants and animals observed, their distinguishing features, habitats and modes of movement, and maintain a simple **Biodiversity Observation Diary**. This directly reinforces the chapter's emphasis on observing diversity in the surroundings.

(2) Hands-on Plant Classification Activity:
Provide students with safe plant samples, photographs or specimens and ask them to classify plants as **herbs, shrubs, trees, climbers and creepers**. Students should justify each classification using height, stem type and branching pattern rather than simply memorising examples.

(3) Leaf–Root–Seed Investigation:
Give students different leaves and seeds and let them identify **reticulate/parallel venation** and **monocot/dicot seeds**. They can then predict whether the plant is likely to have a taproot or fibrous root system, helping them discover the relationship among these characteristics through observation.

(4) Habitat–Adaptation Matching Activity:
Prepare cards showing organisms such as **cactus, deodar, camel, fish and rhododendron**, along with cards showing their habitats and adaptations. Students match each organism with its appropriate habitat and explain how its particular features help it survive there.

(5) Think–Pair–Share on "Why This Adaptation?":
Present questions such as, "Why does cactus have a fleshy stem?", "Why does deodar have sloping branches?" or "Why does a camel have wide hooves?" Students first think individually, discuss with a partner and then present their reasoning to the class, promoting conceptual understanding rather than rote learning.

(6) Animal Movement Classification Chart:
Ask groups to prepare charts classifying animals according to how they move and the body parts they use. Examples such as ant, goat, pigeon, housefly and fish can help students understand that animals can be grouped systematically using observable characteristics.

(7) Local Habitat Case Study:
Select a nearby pond, garden, forest patch or other familiar habitat and ask students to identify the plants and animals likely to depend on it. Discuss what might happen if that

habitat were polluted or destroyed, connecting classroom learning with biodiversity conservation.

(8) **Plant–Animal Interdependence Concept Map:**
Students can draw a concept map showing relationships such as **tree → food/shelter → animals** and **fruit-eating animals → seed dispersal → plants**. This helps them visualise the interdependence between plants and animals described in the chapter.

(9) **Observation Before Explanation:**
Wherever possible, begin the lesson with a real specimen, photograph or familiar local example and ask students to **observe → compare → classify → explain** before introducing the formal terminology. This follows the chapter's inquiry-oriented approach of studying organisms through similarities and differences.

(10) **Continuous Formative Assessment:**
Use short exit slips, picture identification, classification tables, "give a reason" questions and quick oral quizzes after each concept. Questions such as "A plant has parallel venation—predict its roots" assess whether students can connect concepts instead of merely recalling definitions.

Recommended classroom approach: Observe → Explore → Classify → Compare → Relate → Apply → Conserve. This sequence is particularly suitable for this chapter because it moves students from direct observation of biodiversity to understanding classification, adaptations, habitats and the need for conservation.

2.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for 7th Standard Students:
The chapter provides excellent scope for innovative, inquiry-based learning because students can directly observe, classify and connect living organisms with their habitats and adaptations.

(1) **Digital Biodiversity Map of the School Campus:**
Students can photograph different plants and animals found around the school and mark their locations on a simple digital or printed campus map. Each entry can include the organism's name, observable characteristics, plant/animal group and habitat, resulting in a student-created **"Biodiversity Map of Our School."**

(2) **"Detective Botanist" Challenge:**
Give students an unknown leaf and ask them to work like plant detectives: identify its venation, predict its root system and finally predict whether it is likely to be a monocot or dicot. Students earn points for each correct inference and justification, turning the relationship among leaves, roots and seeds into an investigative game.

(3) **Build-a-Habitat 3D Model:**
Groups can create miniature models of **forest, desert, mountain and aquatic habitats** using reusable or waste materials. They then place suitable plants and animals in each model and attach labels explaining the adaptations that help them survive there.

(4) **Adaptation Superpower Cards:**
Students can design collectible "superpower cards" for organisms such as cactus, deodar, camel and fish. Each card can contain **Habitat – Special Feature – Survival Advantage**, helping students understand that adaptations are features that enable organisms to survive in particular surroundings.

(5) **QR-Code Biodiversity Trail:**
Create a biodiversity trail around the school by placing teacher-generated QR codes near selected plants or observation points. Scanning a code can reveal a student-prepared fact sheet, photograph, classification question or clue such as "Observe my

leaves—can you predict my root system?" This extends the chapter's observation and classification activities into interactive learning.

(6) "Design an Organism" STEM Challenge:
Give groups a habitat such as a hot desert, snowy mountain, pond or grassland and ask them to design an imaginary organism capable of surviving there. Students must propose five suitable adaptations and explain the survival advantage of each, applying the chapter's concept of adaptation creatively.

(7) Biodiversity Data Scientists:
Students can conduct a simple campus survey and enter the organisms they observe into a spreadsheet. They can classify them into categories, count the number in each category and create simple graphs, integrating **Science + Mathematics + Digital Literacy** while studying biodiversity.

(8) Animal Movement Simulation Lab:
Assign students different animals and ask them to demonstrate or model how they move using structures such as legs, wings or fins. Other students identify the animal's mode of movement and classify it according to the body parts involved.

(9) "What If the Habitat Disappears?" Problem-Solving Game:
Present a scenario such as: *"The local pond is being filled for construction. What could happen to the organisms living there?"* Teams identify consequences, construct a cause-and-effect chain—**habitat damage → loss of resources → difficulty in survival → biodiversity loss**—and suggest conservation measures.

(10) Plant–Animal Interdependence Role Play:
Students take roles such as tree, fruit, seed, bird and other animals and demonstrate how organisms depend on one another. For example, the "tree" provides food and shelter while the "bird" or "animal" helps disperse seeds, making interdependence visible and memorable.

(11) Student-Made Micro-Documentary:
Small groups can create a 2–3 minute video titled **"Diversity Around Us."** They can record local plants, animals, habitats and observable adaptations and provide their own narration using terminology learned in the chapter.

(12) Biodiversity Escape-Room Challenge:
Create interconnected clue stations involving **herb/shrub/tree identification, leaf venation, root systems, monocot/dicot classification, animal movement, habitats and adaptations**. Each correct answer provides a clue for the next station, turning chapter revision into collaborative problem-solving.

A useful innovative learning cycle for this chapter would be: **Explore → Photograph → Classify → Predict → Create → Explain → Conserve.** This shifts students from simply remembering definitions to becoming active observers and investigators of the living world.

2.17: Practicing Questions/Question Bank

A. Fill in the Blanks – 1 Mark Each:

1. The variety of plants and animals found in a particular region is called __________.
   Answer: Biodiversity

2. Small plants with soft and green stems are called __________.
   Answer: Herbs

3. Plants with weak stems that need support to grow upward are called __________.
   Answer: Climbers

4. The pattern of veins on a leaf is called __________.
   Answer: Venation

5. A net-like arrangement of veins is called __________ venation.
   Answer: Reticulate

6. Banana leaves generally show __________ venation.
   Answer: Parallel

7. A root system having one main root with smaller side roots is called a __________ system.
   Answer: Taproot

8. A bunch of similar-sized thin roots arising from the base of a stem forms a __________ root system.
   Answer: Fibrous

9. Plants whose seeds have two cotyledons are called __________.
   Answer: Dicots

10. Plants whose seeds contain one cotyledon are called __________.
    Answer: Monocots

11. Fish use their __________ for movement in water.
    Answer: Fins

12. The place where a plant or animal lives is called its __________.
    Answer: Habitat

13. Special features that help organisms survive in a particular region are called __________.
    Answer: Adaptations

14. Forests and deserts are examples of __________ habitats.
    Answer: Terrestrial

15. Frogs that can live both on land and in water are called __________.
    Answer: Amphibians

B. One-Mark Descriptive Questions:

1. **What is biodiversity?**
   Answer: Biodiversity is the variety of plants and animals found in a particular region.

2. **What is a herb?**
   Answer: A herb is generally a small plant having a soft and green stem.

3. **What is a shrub?**
   Answer: A shrub is a plant with hard, woody stems that usually branch close to the ground.

4. **What is a climber?**
   Answer: A climber is a weak-stemmed plant that requires support to grow upward.

5. **What is venation?**
   Answer: Venation is the pattern of veins present on a leaf.

6. **What is reticulate venation?**
   Answer: Reticulate venation is an arrangement in which leaf veins form a net-like pattern.

7. **What is a taproot?**
   Answer: A taproot is the main root from which smaller side roots arise.

8. **What is a dicot?**
   Answer: A dicot is a plant whose seed contains two cotyledons.

9. **What is an adaptation?**
   Answer: An adaptation is a special feature that enables an organism to survive in a particular region.

10. **What is a habitat?**
    Answer: A habitat is the place where a plant or animal lives.

C. Two-Mark Descriptive Questions:

1. Differentiate between herbs and shrubs.

Answer:

1. Herbs are generally small plants with soft and green stems.
2. Shrubs have hard, woody stems that usually branch close to the ground.

2. Differentiate between climbers and creepers.

Answer:

1. Climbers have weak stems and require support to grow upward.
2. Creepers have weak stems but spread along the ground.

3. Differentiate between reticulate and parallel venation.

Answer:

1. In reticulate venation, veins form a net-like pattern.
2. In parallel venation, veins run parallel to one another.

4. Differentiate between taproot and fibrous root systems.

Answer:

1. A taproot system has one main root with smaller side roots.
2. A fibrous root system consists of many similar-sized thin roots arising from the stem base.

5. State the relationship between leaf venation and root type.

Answer:

1. Plants with reticulate venation generally have taproots.
2. Plants with parallel venation generally have fibrous roots.

6. Differentiate between monocots and dicots.

Answer:

1. Dicots have two cotyledons and generally possess reticulate venation and taproots.

2. Monocots have one cotyledon and generally possess parallel venation and fibrous roots.

7. What does a habitat provide to an organism?

Answer:

1. A habitat provides food, water, air and shelter.
2. It also provides other conditions and resources required for survival.

8. How are plants and animals interdependent?

Answer:

1. Trees provide food and shelter to many animals.
2. Some animals help plants by dispersing their seeds.

D. Three-Mark Descriptive Questions:

1. Explain the characteristics of herbs, shrubs and trees.

Answer:

1. Herbs are generally small plants with soft, green stems.
2. Shrubs have hard, woody stems that branch close to the ground.
3. Trees are generally tall with thick woody stems and branches arising higher above the ground.

2. Explain the relationship among cotyledons, leaf venation and root systems.

Answer:

1. Dicots have two cotyledons and generally show reticulate venation.
2. Dicots generally have taproots, while monocots have one cotyledon and generally show parallel venation.
3. Monocots generally possess fibrous root systems.

3. Explain how animals can be grouped based on movement.

Answer:

1. Animals show movements such as walking, running, crawling, hopping, flying and swimming.
2. They use structures such as legs, wings and fins for movement.
3. Animals can therefore be grouped according to their mode of movement and the body parts used.

4. Explain three adaptations of a camel.

Answer:

1. Long legs and wide hooves help hot-desert camels move over sandy ground.
2. Camels conserve water by producing little urine and dry dung.

3. They do not sweat, which further reduces water loss.

5. Explain terrestrial and aquatic habitats.

Answer:

1. Terrestrial habitats are land habitats such as forests, deserts, grasslands and mountains.
2. Aquatic habitats are water habitats such as ponds, lakes, rivers and oceans.
3. Some animals, such as frogs, can live both in water and on land.

6. Why is protecting natural habitats important?

Answer:

1. Habitats provide organisms with the resources needed for survival.
2. Habitat destruction can cause plants and animals to lose their homes and essential resources.
3. Therefore, protecting habitats helps prevent the loss of biodiversity.

E. Five-Mark Descriptive Questions:

1. Explain how plants can be grouped based on their observable characteristics.

Answer:

1. Plants can be grouped by observing features such as height and type of stem.
2. Herbs generally have small bodies and soft green stems.
3. Shrubs have woody stems that branch close to the ground.
4. Trees are generally tall and have thick woody stems with branches arising higher up.
5. Weak-stemmed plants may be further identified as climbers or creepers according to their growth pattern.

2. Explain the relationship among seeds, leaf venation and roots with suitable examples.

Answer:

1. Plants can be classified as dicots or monocots according to the number of cotyledons in their seeds.
2. Chickpea has two cotyledons and is therefore a dicot.
3. Dicots generally have reticulate venation and taproots.
4. Maize has one cotyledon and is therefore a monocot.
5. Monocots generally have parallel venation and fibrous roots.

3. Explain adaptations in desert and mountain organisms.

Answer:

1. Adaptations are special features that enable organisms to survive in particular regions.
2. Cactus has a thick, fleshy stem that helps it store water in dry desert conditions.

3. Deodar has a conical shape and sloping branches that help snow slide off.
4. Hot-desert camels have long legs and wide hooves suited to movement on sand.
5. These examples show how organisms possess features suited to the conditions of their habitats.

4. A pond near your school is being destroyed for construction. Explain how this could affect biodiversity.

Answer:

1. The pond is an aquatic habitat for many plants and animals.
2. These organisms depend on their habitat for conditions and resources necessary for survival.
3. Destruction of the pond can cause organisms to lose their natural habitat.
4. The organisms may then find it difficult to survive in that area.
5. Therefore, destruction of natural habitats can ultimately result in loss of biodiversity.

5. Explain why biodiversity and habitat conservation are closely related.

Answer:

1. Biodiversity represents the variety of plants and animals found in a region.
2. Different organisms live in habitats suited to their requirements and adaptations.
3. Habitats provide food, water, air, shelter and other necessities for survival.
4. Damage to habitats threatens the organisms dependent on them.
5. Hence, conserving natural habitats is essential for protecting biodiversity.

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6th Standard Science Book Chapter 3

Chapter 3: Mindful Eating: A Path to a Healthy Body

3.1 Summary of the Chapter:

Summary:

(1) **Diversity in Food:** People across India eat a wide variety of foods. Food choices differ according to locally cultivated crops, climate, taste preferences, culture and traditions.

(2) **Changing Cooking Practices:** Culinary practices have changed from traditional methods to modern methods due to technological development, improved transportation and better communication. Examples include the shift from **chulha to gas stove** and from **sil-batta to electrical grinder**.

(3) **Major Nutrients:** The major nutrients present in food are **carbohydrates, proteins, fats, vitamins and minerals**; dietary fibre and water are also essential components of our diet.

(4) **Energy-Giving and Body-Building Foods:** Carbohydrates and fats mainly provide energy, while proteins support the **growth and repair of the body** and are therefore called body-building nutrients.

(5) **Protective Nutrients:** Vitamins and minerals are called **protective nutrients** because they help protect the body from diseases and keep it healthy. Important examples include Vitamins A, B_1, C and D and minerals such as calcium, iodine and iron.

(6) **Deficiency Diseases:** Long-term deficiency of nutrients can cause diseases or disorders; for example, Vitamin C deficiency causes **scurvy**, Vitamin D deficiency causes **rickets**, iodine deficiency causes **goitre**, and iron deficiency causes **anaemia**.

(7) **Roughage and Water:** Dietary fibre or roughage helps remove undigested food and ensures smooth passage of stools. Water helps the body absorb nutrients and remove wastes through sweat and urine, so sufficient water should be consumed regularly.

(8) **Testing Food Components:** Simple experiments can identify nutrients in food—**blue-black colour with iodine indicates starch, an oily patch on paper indicates fat, and violet colour in the protein test indicates protein**.

(9) **Balanced Diet:** A **balanced diet** contains all essential nutrients, roughage and water in the right amounts for proper growth and development. Nutritional requirements may differ according to age, physical activity, health status, lifestyle and other factors.

(10) **Avoiding Junk Food:** Junk foods generally contain high amounts of sugar and fat but low amounts of proteins, vitamins, minerals and dietary fibre. Frequent consumption is unhealthy, so a balanced diet should be preferred.

(11) **Millets as Nutri-Cereals:** Millets such as **jowar, bajra, ragi and sanwa** are nutritious grains rich in vitamins, minerals and dietary fibre. They are called **nutri-cereals** and contribute significantly to a balanced diet.

(12) **Food Miles and Responsible Eating: Food miles** refers to the distance travelled by food from the producer to the consumer. Choosing locally grown foods can reduce transport cost and pollution, support local farmers and provide fresher food; we should also respect food and take only as much as we can consume to avoid wastage.

3.2 Important Formulas:

Important Formulas for Quantitative Problems:

This chapter is mainly **conceptual and activity-based**, so it does **not contain many fixed mathematical formulas**. However, a few simple calculations can be useful for questions based on **nutritional labels, quantities of nutrients, percentages, food intake, and food miles**.

1. **Total Nutrient Quantity**

$$\text{Total nutrient} = \frac{\text{Nutrient per 100 g} \times \text{Quantity consumed (g)}}{100}$$

This can be used to calculate the amount of carbohydrate, fat, protein or dietary fibre consumed from packaged food.

2. **Total Energy Consumed**

$$\text{Energy consumed} = \frac{\text{Energy per 100 g} \times \text{Quantity consumed (g)}}{100}$$

For example, if a food provides 355 kcal per 100 g, the energy supplied by 50 g can be calculated using this formula. The chapter includes nutritional information per 100 g for foods such as potato wafers and roasted chana.

3. **Percentage of a Nutrient**

$$\text{Percentage of nutrient} = \frac{\text{Mass of nutrient}}{\text{Total mass of food}} \times 100$$

This is useful when comparing how much protein, fat, carbohydrate or fibre is present in different food items.

4. **Difference Between Nutrient Quantities**

$$\text{Difference} = \text{Higher value} - \text{Lower value}$$

This can be used when comparing the nutritional values of two foods, such as roasted chana and potato wafers.

5. **Ratio of Two Nutrients**

$$\text{Ratio} = \frac{\text{Quantity of Nutrient A}}{\text{Quantity of Nutrient B}}$$

For example, students may compare the protein-to-fat ratio or fibre-to-carbohydrate ratio of two foods.

6. **Food Miles**

$$\text{Food Miles} = \text{Total distance travelled by food from producer to consumer}$$

If the food passes through several stages, then:

$$\text{Total Food Miles} = d_1 + d_2 + d_3 + \cdots + d_n$$

The chapter defines food miles as the distance travelled by a food item from its place of production to the consumer.

7. **Average Daily Food Intake**

$$\text{Average daily intake} = \frac{\text{Total quantity consumed over several days}}{\text{Number of days}}$$

This can be applied to activities where students record food eaten over a week.

8. **Percentage of Food Wasted**

$$\text{Food wastage \%} = \frac{\text{Quantity of food wasted}}{\text{Quantity of food served}} \times 100$$

This is a useful applied calculation connected with the chapter's emphasis on avoiding food wastage.

9. **Food Consumed**

$$\text{Food consumed} = \text{Food served} - \text{Food wasted}$$

10. **Percentage Reduction in Food Miles**

$$\text{Reduction \%} = \frac{\text{Original food miles} - \text{New food miles}}{\text{Original food miles}} \times 100$$

This can be used to compare imported or distant food with locally produced food.

Important Note

The uploaded chapter itself does **not prescribe formal numerical formulas**. Its quantitative scope mainly comes from interpreting **nutritional information per 100 g, comparing nutrient quantities, calculating food miles, and analysing food consumption or wastage**.

The chapter primarily focuses on nutrients, deficiency diseases, food tests, balanced diets, junk foods, millets and responsible food choices.

3.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

Fill in the Blanks with Answers – LOTS Type

1. The major nutrients in our food include carbohydrates, proteins, fats, vitamins and __________.
   Answer: Minerals
2. Nutrients that mainly provide energy to the body are __________ and fats.
   Answer: Carbohydrates
3. __________ help in the growth and repair of the body.
   Answer: Proteins
4. Vitamins and minerals are also called __________ nutrients.
   Answer: Protective
5. Food components that provide energy, support growth, repair and protect the body are called __________.
   Answer: Nutrients
6. The deficiency of Vitamin C causes __________.
   Answer: Scurvy
7. The deficiency of Vitamin D causes __________.
   Answer: Rickets
8. The deficiency of iron can cause __________.
   Answer: Anaemia
9. The deficiency of iodine can cause __________.
   Answer: Goitre
10. Common salt mixed with the required quantity of iodine salts is called __________ salt.
    Answer: Iodised
11. Papaya, mango and carrot are sources of Vitamin __________.
    Answer: A
12. Orange, amla, lemon and guava are good sources of Vitamin __________.
    Answer: C
13. Fish, edible mushrooms, eggs and butter are sources of Vitamin __________.
    Answer: D
14. Green leafy vegetables, fresh fruits, wholegrains, pulses and nuts are good sources of __________.
    Answer: Roughage
15. __________ helps in the smooth passage of stools and prevents constipation.
    Answer: Roughage / Dietary fibre
16. __________ is an essential part of our diet that helps the body absorb nutrients from food.
    Answer: Water
17. Water helps remove wastes from the body through sweat and __________.
    Answer: Urine
18. Starch is a type of __________.
    Answer: Carbohydrate
19. An oily patch left on paper by a food item indicates the presence of __________.
    Answer: Fat
20. Simple food tests can be used to detect starch, fat and __________ in food items.
    Answer: Protein

21. A diet containing all essential nutrients, roughage and water in appropriate quantities is called a __________ diet.
Answer: Balanced
22. Nutritional requirements of individuals may vary according to age, physical activity and __________ conditions.
Answer: Health
23. Traditional food of a state is usually based on the __________ grown in that state.
Answer: Crops
24. The choice of food in different regions may depend on cultivation, taste preferences, culture and __________.
Answer: Traditions
25. Rice, ragi, urad and coconut are some locally grown crops mentioned for the state of __________.
Answer: Karnataka
26. Makki di roti and sarson da saag are traditional foods associated with __________.
Answer: Punjab
27. Millets such as jowar, bajra and ragi are also known as __________ cereals.
Answer: Nutri-cereals
28. Foods that are high in sugar and fat but low in important nutrients and fibre are commonly called __________ foods.
Answer: Junk
29. The distance travelled by a food item from its place of production to the consumer is called __________.
Answer: Food miles
30. Eating locally grown and __________-based food, to the extent possible, is healthy for the body and good for the environment.
Answer: Plant
31. We should drink sufficient __________ regularly to keep ourselves healthy.
Answer: Water
32. Potato, bread and boiled rice are among the food items that can be tested for the presence of __________.
Answer: Starch
33. The nutritional requirements of every individual are not necessarily __________.
Answer: Same
34. Food choices across India vary partly because different regions have different soil and __________ conditions.
Answer: Climatic
35. Eating mindfully means making food choices that contribute to a __________ body.
Answer: Healthy

3.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

Fill in the Blanks with Answers – HOTS Type

These questions emphasize **application, reasoning, inference, comparison, and cause–effect relationships** based on the uploaded chapter.

1. Riya feels tired after skipping breakfast because her body has not received enough __________ from food.
Answer: Energy
2. A marathon runner drinks glucose water during a race because glucose provides __________ energy.
Answer: Instant

3. A growing child should include adequate pulses, milk and nuts because these foods are rich in __________.
   Answer: Proteins
4. A sportsperson who wants to build and repair muscles should increase the intake of __________-rich foods.
   Answer: Protein
5. A child who has difficulty seeing in dim light may be deficient in Vitamin __________.
   Answer: A
6. A person suffering from bleeding gums and slow healing of wounds may be deficient in Vitamin __________.
   Answer: C
7. If a child's bones become soft and bent due to a nutritional deficiency, the child may be suffering from __________.
   Answer: Rickets
8. A person with swelling at the front of the neck should ensure adequate intake of __________.
   Answer: Iodine
9. A person suffering from weakness and shortness of breath due to iron deficiency may have __________.
   Answer: Anaemia
10. If a person frequently suffers from constipation, increasing __________ in the diet may help in the smooth passage of stools.
    Answer: Roughage / Dietary fibre
11. A person who drinks too little water may find it difficult for the body to absorb nutrients and efficiently remove __________.
    Answer: Waste
12. To increase roughage naturally, a student should choose wholegrains and fresh fruits instead of highly __________ foods.
    Answer: Processed
13. When iodine solution added to a food sample produces a blue-black colour, the sample contains __________.
    Answer: Starch
14. If pressing a food item on paper leaves a translucent oily patch after drying, the food contains __________.
    Answer: Fat
15. During the protein test, if the contents of a test tube turn violet, the food sample contains __________.
    Answer: Protein
16. If peanuts give positive results for both the fat and protein tests, we can infer that a single food item can contain __________ nutrients.
    Answer: Multiple
17. A diet containing carbohydrates and fats but lacking sufficient vitamins and minerals cannot be considered a __________ diet.
    Answer: Balanced
18. A twelve-year-old active child and an elderly person may require different amounts of nutrients because nutritional requirements depend partly on age and __________ activity.
    Answer: Physical

19. A diet containing essential nutrients but lacking roughage and sufficient water would not be considered completely __________.
Answer: Balanced
20. A student choosing roasted chana instead of potato wafers is likely making a healthier choice because junk foods generally contain fewer proteins, vitamins, minerals and dietary __________.
Answer: Fibres
21. Regularly consuming foods rich in sugar and fat but poor in essential nutrients may increase the risk of becoming __________.
Answer: Obese
22. If a region grows large quantities of ragi, traditional dishes of that region are likely to contain __________.
Answer: Ragi
23. Differences in traditional foods among Indian states can partly be explained by differences in locally grown __________.
Answer: Crops
24. Two regions with different soil and climatic conditions are likely to grow __________ types of crops.
Answer: Different
25. If vegetables are exposed to excessive heat during cooking, some heat-sensitive nutrients such as Vitamin __________ may be lost.
Answer: C
26. Washing fruits and vegetables after cutting or peeling them may result in the loss of some __________.
Answer: Vitamins
27. If a child rarely eats fruits and vegetables, the diet may lack both protective nutrients and dietary __________.
Answer: Fibre / Roughage
28. A person who avoids sunlight completely may reduce the body's natural production of Vitamin __________.
Answer: D
29. Jowar, bajra and ragi can contribute to a balanced diet because they are nutrient-rich __________.
Answer: Millets / Nutri-cereals
30. Choosing locally produced food instead of food transported from a distant region can reduce __________.
Answer: Food miles
31. Reducing food miles can lower transport-related cost and __________.
Answer: Pollution
32. Buying locally grown foods can benefit both the environment and local __________.
Answer: Farmers
33. If a student takes more food than can be eaten and leaves the remainder on the plate, it contributes to food __________.
Answer: Wastage
34. Remembering the effort of farmers and others involved in bringing food from farm to plate encourages us to __________ food.
Answer: Respect
35. The principle "take only as much food as you can consume" helps reduce food __________.
Answer: Wastage

3.5 One-mark questions with Answers of LOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is meant by a nutrient?**
   Answer: Nutrients are food components that provide energy, support growth and repair, protect the body from diseases, and maintain bodily functions.
2. **Name the five major nutrients present in our food.**
   Answer: The five major nutrients are carbohydrates, proteins, fats, vitamins and minerals.
3. **What is the main function of carbohydrates?**
   Answer: Carbohydrates are a primary source of energy for our body.
4. **Why are carbohydrates and fats called energy-giving foods?**
   Answer: Carbohydrates and fats are called energy-giving foods because they provide energy for performing various activities.
5. **What is the main function of proteins?**
   Answer: Proteins help in the growth and repair of our body.
6. **Why are proteins called body-building foods?**
   Answer: Proteins are called body-building foods because they support the growth and repair of the body.
7. **Why are vitamins and minerals called protective nutrients?**
   Answer: Vitamins and minerals are called protective nutrients because they protect our body from diseases and help keep us healthy.
8. **Name one good source of Vitamin A.**
   Answer: Carrot is a good source of Vitamin A.
9. **Name one good source of Vitamin C.**
   Answer: Amla is a good source of Vitamin C.
10. **Name one source of Vitamin D.**
    Answer: Eggs are a source of Vitamin D.
11. **Which disease is caused by the deficiency of Vitamin C?**
    Answer: Deficiency of Vitamin C causes scurvy.
12. **Which disease is caused by the deficiency of Vitamin D?**
    Answer: Deficiency of Vitamin D causes rickets.
13. **Which disorder is caused by iodine deficiency?**
    Answer: Iodine deficiency causes goitre.
14. **Which disease is associated with iron deficiency?**
    Answer: Iron deficiency causes anaemia.
15. **What is iodised salt?**
    Answer: Iodised salt is common salt mixed with the required quantities of salts of iodine.
16. **What is dietary fibre also known as?**
    Answer: Dietary fibre is also known as roughage.
17. **What is the function of roughage in our diet?**
    Answer: Roughage helps the body get rid of undigested food and ensures the smooth passage of stools.
18. **State one function of water in our body.**
    Answer: Water helps the body absorb nutrients from food.
19. **Name two good sources of roughage.**
    Answer: Fresh fruits and wholegrains are good sources of roughage.

20. **What is a balanced diet?**
    Answer: A balanced diet contains all essential nutrients, roughage and water in the right amounts for proper growth and development.
21. **What colour indicates the presence of starch in a food sample?**
    Answer: A blue-black colour indicates the presence of starch.
22. **How can the presence of fat in a food item be identified?**
    Answer: An oily patch left on paper indicates the presence of fat in the food item.
23. **What colour indicates the presence of protein during the protein test?**
    Answer: A violet colour indicates the presence of protein.
24. **Name the solution used to test starch in food.**
    Answer: Diluted iodine solution is used to test the presence of starch in food.
25. **What are junk foods?**
    Answer: Junk foods are foods that are generally high in sugar and fat but low in proteins, minerals, vitamins and dietary fibres.
26. **What are millets?**
    Answer: Millets are highly nutritious, small-sized grains that can be cultivated under different climatic conditions.
27. **Why are millets called nutri-cereals?**
    Answer: Millets are called nutri-cereals because they are rich in nutrients such as vitamins, minerals and dietary fibre.
28. **Name any two millets mentioned in the chapter.**
    Answer: Jowar and bajra are two millets mentioned in the chapter.
29. **What are food miles?**
    Answer: Food miles are the distance travelled by a food item from its place of production to the consumer.
30. **Give one benefit of reducing food miles.**
    Answer: Reducing food miles helps decrease pollution caused during transportation.
31. **Why should we prefer locally grown food?**
    Answer: Locally grown food is healthy, supports local producers and helps reduce food miles.
32. **Why should we avoid wasting food?**
    Answer: We should avoid wasting food because considerable time and effort are involved in bringing food from the farm to our plate.
33. **What factors influence food choices in different regions of India?**
    Answer: Food choices are influenced by locally cultivated crops, taste preferences, culture and traditions.
34. **What are culinary practices?**
    Answer: Culinary practices are the methods and practices used for preparing and cooking food.
35. **Mention one example of a change from traditional to modern cooking practices.**
    Answer: The use of a modern gas stove instead of a traditional chulha is an example of a change in cooking practices.

3.6 One-mark questions with Answers of HOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type

1. **Why does a person feel tired after missing a meal?**
   Answer: A person feels tired because the body does not receive enough energy from food.

2. **Why does a marathon runner drink glucose water during or after a race?**
   Answer: A marathon runner drinks glucose water because glucose provides instant energy.
3. **Why should a sportsperson include more protein-rich foods in the diet?**
   Answer: A sportsperson needs more protein because it helps build and repair muscles.
4. **Why are carbohydrates and fats called energy-giving foods?**
   Answer: Carbohydrates and fats are called energy-giving foods because they provide energy for performing various activities.
5. **A child has bleeding gums and slow healing of wounds; which nutrient deficiency is likely responsible?**
   Answer: The child is likely suffering from Vitamin C deficiency.
6. **A child has soft and bent bones; which vitamin should be included adequately in the diet?**
   Answer: Vitamin D should be included adequately because its deficiency can cause rickets.
7. **A person has swelling at the front of the neck; which mineral may be deficient in the diet?**
   Answer: The person may be deficient in iodine.
8. **A person frequently experiences weakness and shortness of breath; which mineral deficiency could be responsible?**
   Answer: Iron deficiency could be responsible for these symptoms.
9. **Why should a person with poor vision in darkness include Vitamin A-rich foods?**
   Answer: Vitamin A helps keep the eyes healthy, and its deficiency can cause night blindness.
10. **Why is iodised salt preferable where iodine deficiency is common?**
    Answer: Iodised salt supplies iodine and helps prevent iodine-deficiency disorders such as goitre.
11. **Why should fruits and vegetables not be exposed to excessive heat during cooking?**
    Answer: Excessive heat can destroy some nutrients, such as Vitamin C.
12. **Why should vegetables preferably be washed before cutting rather than after cutting?**
    Answer: Washing vegetables after cutting or peeling may result in the loss of some vitamins.
13. **Why should a person suffering from difficulty in passing stools eat fibre-rich food?**
    Answer: Fibre or roughage helps remove undigested food and ensures smooth passage of stools.
14. **Why is sufficient water necessary even when a person eats nutritious food?**
    Answer: Water is necessary because it helps absorb nutrients and remove wastes from the body.
15. **A food sample turns blue-black after adding iodine solution; what can you infer?**
    Answer: We can infer that the food sample contains starch.
16. **A food item leaves an oily patch on paper even after the water has dried; what does this indicate?**
    Answer: The persistent oily patch indicates the presence of fat in the food.
17. **A food sample turns violet during the protein test; what conclusion can you draw?**
    Answer: The violet colour indicates that protein is present in the food sample.

18. **Why can peanuts be considered a source of more than one nutrient?**
Answer: Peanuts can be considered a source of multiple nutrients because they show the presence of both proteins and fats.
19. **Why may a growing child and a grandparent require different diets?**
Answer: Their nutritional requirements may differ because nutrient needs vary with factors such as age, physical activity, health status and lifestyle.
20. **Why is a diet containing only carbohydrates and fats not considered balanced?**
Answer: Such a diet is not balanced because it does not provide all the essential nutrients, roughage and water in the right amounts.
21. **Why would roasted chana generally be a better choice than potato wafers?**
Answer: Roasted chana contains more protein and dietary fibre and much less fat than the potato wafers shown in the chapter.
22. **Why should junk food not be consumed frequently?**
Answer: Junk food should not be consumed frequently because it is often high in calories, sugar or fat while being low in important nutrients and dietary fibre.
23. **Why are millets considered useful in a balanced diet?**
Answer: Millets are useful because they provide vitamins, minerals such as iron and calcium, and dietary fibre.
24. **Why are millets called nutri-cereals?**
Answer: Millets are called nutri-cereals because they are highly nutritious and contribute significantly to a balanced diet.
25. **Why might traditional foods differ between Karnataka and Punjab?**
Answer: Traditional foods differ because locally grown crops, climate, taste preferences, culture and traditions vary between regions.
26. **Why have electrical grinders replaced traditional sil-batta in many homes?**
Answer: Electrical grinders are widely used because technological development has made grinding easier and more convenient.
27. **Why is eating locally grown food beneficial to the environment?**
Answer: Locally grown food can reduce transportation distance and thereby help reduce transport-related pollution.
28. **Why does reducing food miles support local farmers?**
Answer: Reducing food miles encourages the purchase and consumption of food produced by nearby farmers.
29. **Why can reducing food miles help keep food fresh?**
Answer: Shorter transportation distances can help food reach consumers more quickly and remain fresh.
30. **Why should we take only as much food as we can eat?**
Answer: Taking only the amount we can consume helps reduce food wastage.
31. **A student eats mainly packaged snacks and avoids fruits and vegetables; what component may be insufficient in the diet?**
Answer: The student's diet may be insufficient in dietary fibre and protective nutrients.
32. **Why is sunlight important even though it is not a food item?**
Answer: Sunlight is important because the body can naturally produce Vitamin D upon exposure to it.
33. **Why can one food item not always be classified as containing only one nutrient?**
Answer: A single food item may contain multiple nutrients, as demonstrated by peanuts containing both protein and fat.
34. **Why should we read nutritional information on packaged foods before choosing them?**

Answer: Nutritional information helps us compare the amounts of nutrients and make healthier food choices.

35. **Why is mindful eating important for maintaining good health?**
Answer: Mindful eating encourages appropriate, balanced and nutritious food choices that help maintain a healthy body.

3.7 Two-mark questions with Answers of LOTS Type: (30 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is the importance of food in our daily life?**
   Answer:
   1. Food is an essential component of our daily life.
   2. It provides the nutrients required for energy, growth, repair and maintenance of the body.
2. **Why is there diversity in the food eaten in different regions of India?**
   Answer:
   1. Different regions grow different crops depending on their soil and climatic conditions.
   2. Food choices also vary according to taste preferences, culture and traditions.
3. **Mention two changes that have occurred in culinary practices over time.**
   Answer:
   1. Traditional chulhas have been replaced by modern gas stoves in many homes.
   2. Manual grinding with a sil-batta has increasingly been replaced by electrical grinders.
4. **What are carbohydrates? Give two examples of carbohydrate-rich foods.**
   Answer:
   1. Carbohydrates are one of the primary sources of energy in our diet.
   2. Wheat and rice are examples of carbohydrate-rich foods.
5. **What are fats? Name two sources of fats.**
   Answer:
   1. Fats are food components that provide stored energy.
   2. Groundnuts and sunflower seeds are two sources of fats.
6. **State two functions of proteins.**
   Answer:
   1. Proteins help in the growth of our body.
   2. They also help in the repair of body tissues.
7. **Mention two plant sources and two animal sources of proteins.**
   Answer:
   1. Pulses and beans are plant sources of protein.
   2. Milk and eggs are animal sources of protein.
8. **What is Vitamin A important for? Name two of its sources.**
   Answer:
   1. Vitamin A helps keep our eyes and skin healthy.
   2. Carrot and papaya are good sources of Vitamin A.
9. **State the function and two sources of Vitamin C.**
   Answer:
   1. Vitamin C helps the body fight diseases.
   2. Amla and guava are good sources of Vitamin C.
10. **State the function and two sources of Vitamin D.**
    Answer:

1. Vitamin D helps the body absorb calcium for healthy bones and teeth.
2. Sunlight exposure and eggs are sources of Vitamin D.

11. **Why is calcium important? Name two sources of calcium.**
Answer:
    1. Calcium helps keep our bones and teeth healthy.
    2. Milk and paneer are good sources of calcium.
12. **What is the importance of iron in our diet? Name two sources.**
Answer:
    1. Iron is an important component of blood.
    2. Green leafy vegetables and beetroot are sources of iron.
13. **What is the importance of iodine? Name two sources of iodine.**
Answer:
    1. Iodine helps us perform physical and mental activities.
    2. Seaweed and iodised salt are sources of iodine.
14. **What are dietary fibres? State one function.**
Answer:
    1. Dietary fibres, also known as roughage, are essential components of food even though they do not provide nutrients.
    2. They help remove undigested food and ensure smooth passage of stools.
15. **Why is water an essential part of our diet?**
Answer:
    1. Water helps the body absorb nutrients from food.
    2. It helps remove wastes from the body through sweat and urine.
16. **What happens when iodine solution is added to a starch-containing food? What does the change indicate?**
Answer:
    1. The food turns blue-black when diluted iodine solution is added.
    2. The blue-black colour indicates the presence of starch.
17. **What is a balanced diet? Mention its essential components.**
Answer:
    1. A balanced diet contains all the components required for proper growth and development in the right amounts.
    2. It includes essential nutrients, roughage and water.
18. **What are junk foods? Why should their frequent consumption be avoided?**
Answer:
    1. Junk foods are foods high in calories due to high sugar and fat but low in several important nutrients and dietary fibre.
    2. Their frequent consumption is unhealthy and can contribute to obesity and other health problems.
19. **What are millets? Name any three millets mentioned in the chapter.**
Answer:
    1. Millets are highly nutritious, small-sized grains that can be cultivated under different climatic conditions.
    2. Jowar, bajra and ragi are three examples of millets.
20. **What is meant by food miles? State one advantage of reducing food miles.**
Answer:
    1. Food miles refer to the entire distance travelled by a food item from the producer to the consumer.
    2. Reducing food miles helps reduce transportation costs and pollution.

3.8. Two-mark questions with Answers of HOTS Type: (15 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:
1. Rohan skips breakfast and feels tired during the first class. Why?
Answer:
1. Skipping breakfast means his body does not receive enough energy from food.
2. Carbohydrates are a primary energy source, so inadequate intake can make him feel less energetic.

2. Why might a marathon runner prefer glucose water during a race rather than waiting for a full meal?
Answer:
1. Glucose provides instant energy required during strenuous physical activity.
2. It is a carbohydrate, and carbohydrates are one of the primary sources of energy in our diet.

3. A growing child eats sufficient rice but very little pulses, milk or nuts. What problem may arise and why?
Answer:
1. The child's diet may not provide enough protein despite supplying carbohydrates.
2. Insufficient protein can affect proper growth and repair of the body.

4. A student has difficulty seeing objects in dim light. Which deficiency do you suspect and what dietary change would you suggest?
Answer:
1. The student may have Vitamin A deficiency, which can cause poor vision or night blindness.
2. Foods such as carrot, papaya, mango or milk should be included in the diet.

5. A child has bleeding gums and wounds that heal slowly. Identify the likely cause and suggest suitable foods.
Answer:
1. These symptoms indicate a possible Vitamin C deficiency leading to scurvy.
2. The child should include Vitamin C-rich foods such as amla, guava, orange and lemon.

6. Why might a doctor advise both calcium and Vitamin D for maintaining healthy bones?
Answer:
1. Calcium is required for keeping bones and teeth healthy.
2. Vitamin D helps the body absorb calcium and thus supports bone and teeth health.

7. A person has swelling at the front of the neck. What nutritional change may help and why?
Answer:
1. The swelling may indicate goitre caused by iodine deficiency.
2. Including iodised salt or other iodine sources in the diet can help provide the required iodine.

8. A student frequently experiences constipation despite eating sufficient food. What change should be made to the diet?
Answer:
1. The student should increase the intake of roughage through fruits, vegetables, wholegrains, pulses and nuts.
2. Roughage helps remove undigested food and ensures smooth passage of stools.

9. Why should vegetables be washed before cutting rather than repeatedly washed after cutting?
Answer:
1. Washing cut or peeled vegetables may result in the loss of some vitamins.

2. Therefore, fruits and vegetables should be thoroughly washed before they are cut or consumed.

10. A food sample turns blue-black when iodine solution is added. What can you conclude?

Answer:

1. The blue-black colour shows that starch is present in the food sample.
2. Since starch is a type of carbohydrate, the food contains a carbohydrate component.

11. A food sample leaves an oily patch on paper even after the paper dries. What inference can you make?

Answer:

1. A persistent oily patch indicates that the food contains fat.
2. The sample can therefore be classified as containing an energy-storing food component.

12. A food sample gives a violet colour in the protein test. What does this observation tell you?

Answer:

1. The violet colour indicates the presence of protein in the food item.
2. Such a food can contribute to the growth and repair of the body.

13. Peanuts test positive for both protein and fat. What conclusion can you draw?

Answer:

1. Peanuts contain more than one type of nutrient—both protein and fat.
2. This demonstrates that a single food item may contain multiple nutrients.

14. Why should a twelve-year-old child and an elderly person not necessarily follow identical diets?

Answer:

1. Nutritional requirements vary according to factors such as age, gender, physical activity, health status and lifestyle.
2. Therefore, the type and amount of nutrients needed by a child and an elderly person may differ.

15. A student eats carbohydrates, proteins and fats but consumes very little fruit, vegetables or water. Can the diet be considered balanced? Why?

Answer:

1. No, the diet cannot be considered balanced because a balanced diet must contain all essential nutrients, roughage and water in the right amounts.
2. Fruits and vegetables provide important vitamins, minerals and dietary fibre, while water is also an essential dietary component.

16. Potato wafers provide 536 kcal and 35 g fat per 100 g, whereas roasted chana provides 355 kcal and 6.26 g fat. Which is the healthier choice based on the chapter's comparison?

Answer:

1. Roasted chana is the better choice because it contains much less fat and provides more protein and dietary fibre than potato wafers.
2. The chapter advises avoiding frequent consumption of high-calorie, high-fat junk foods.

17. Why would replacing some packaged junk foods with millets be a healthier choice?

Answer:

1. Millets provide vitamins, minerals such as iron and calcium, and dietary fibre.
2. They contribute significantly to a balanced diet and are therefore called nutri-cereals.

18. Why can locally grown food be considered beneficial for both people and the environment?

Answer:

1. Locally grown food can reduce food miles, thereby lowering transportation costs and pollution.
2. It also supports local farmers and helps keep food fresh and healthy.

19. Two regions of India have very different traditional diets. Give two reasons for this difference.

Answer:

1. Different soil and climatic conditions lead to the cultivation of different crops in different regions.
2. Food choices also vary because of differences in taste preferences, culture and traditions.

20. Why have modern gas stoves and electrical grinders become common compared with traditional cooking tools?

Answer:

1. Technological development has introduced modern tools that make cooking and grinding more convenient.
2. Improved transportation and communication have also contributed to changes in culinary practices.

21. A student eats large quantities of food every day but still has nutrient deficiencies. How is this possible?

Answer:

1. Eating a large quantity of food does not ensure that all essential nutrients are present in the right amounts.
2. A healthy diet must be balanced and contain essential nutrients, roughage and water in appropriate quantities.

22. Why can frequent consumption of junk food cause health problems even though it provides plenty of energy?

Answer:

1. Junk foods may provide high calories because of high sugar and fat content but contain low amounts of proteins, vitamins, minerals and dietary fibre.
2. Frequent consumption can contribute to obesity and associated health problems.

23. Why is sunlight considered important in nutrition even though it is not food?

Answer:

1. The human body can naturally produce Vitamin D when exposed to sunlight.
2. Vitamin D is important because it helps the body absorb calcium for healthy bones and teeth.

24. Why is throwing away uneaten food also a waste of human effort?

Answer:

1. Farmers and other community members invest considerable time and effort in bringing food from the farm to our plate.
2. Taking only as much as we can consume respects this effort and reduces food wastage.

25. A packaged food is fortified with an essential nutrient. What does “fortified” mean, and why is it done?

Answer:

1. Fortification means adding nutrients to food during processing.
2. It is done to improve the nutritional quality of the food, as in iodised salt and some baby foods.

6.9. Three-mark questions with Answers of LOTS Type: (10 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:

1. What are nutrients? Name the major nutrients and state their importance.
Answer:
1. Nutrients are components of food that provide energy, support growth and repair, protect the body from diseases, and maintain bodily functions.
2. The major nutrients are **carbohydrates, proteins, fats, vitamins and minerals**.
3. Different nutrients perform different functions and are essential for maintaining a healthy body.

2. Explain the importance of carbohydrates and fats in our diet.
Answer:
1. Carbohydrates are one of the primary sources of energy in our diet.
2. Fats provide stored energy and are obtained from foods such as nuts, seeds, ghee and oils.
3. Since carbohydrates and fats provide energy for performing various activities, they are called **energy-giving foods**.

3. Explain the importance and sources of proteins.
Answer:
1. Proteins help in the growth and repair of our body and are therefore called **body-building foods**.
2. Pulses, beans, peas and nuts are important plant sources of protein.
3. Milk, paneer, eggs, fish and meat are animal sources of protein.

4. Explain Vitamin A with reference to its function, sources and deficiency.
Answer:
1. Vitamin A helps keep our eyes and skin healthy.
2. Papaya, carrot, mango and milk are sources of Vitamin A.
3. Its deficiency may cause poor vision and loss of vision in darkness, known as **night blindness**.

5. Write a short note on Vitamin C.
Answer:
1. Vitamin C helps the body fight diseases.
2. Amla, guava, green chilli, orange and lemon are important sources of Vitamin C.
3. Its deficiency causes **scurvy**, which may result in bleeding gums and slow healing of wounds.

6. Explain the importance of Vitamin D and calcium for our body.
Answer:
1. Vitamin D helps the body absorb calcium for maintaining healthy bones and teeth.
2. Exposure to sunlight, milk, butter, fish and eggs are sources of Vitamin D, while milk products are important sources of calcium.
3. Vitamin D deficiency can cause rickets, while calcium deficiency can result in weak bones and tooth decay.

7. Explain the importance of iodine and iron in our diet.
Answer:
1. Iodine helps us perform physical and mental activities, and its deficiency can cause **goitre**.
2. Iron is an important component of blood, and its deficiency can cause **anaemia**.
3. Iodised salt is a source of iodine, while green leafy vegetables, beetroot and pomegranate are sources of iron.

8. What is roughage? Explain its importance and sources.
Answer:
1. Dietary fibre, also known as roughage, is an essential component of food although it does not provide nutrients to the body.

2. It helps remove undigested food and ensures smooth passage of stools.
3. Green leafy vegetables, fresh fruits, wholegrains, pulses and nuts are good sources of roughage.

9. Explain the importance of water in our diet.

Answer:

1. Water is an essential part of our diet.
2. It helps the body absorb nutrients from food.
3. It also helps remove wastes from the body through sweat and urine.

10. Describe the test used to detect starch in food.

Answer:

1. Place a small piece of the food item on a separate dish.
2. Add two or three drops of diluted iodine solution to the food item using a dropper.
3. The appearance of a **blue-black colour** indicates the presence of starch.

11. Describe how the presence of fat can be tested in a food item.

Answer:

1. Place the food item on a piece of paper, wrap the paper around it and press it.
2. If the food contains water, allow the paper to dry before observing it.
3. A persistent **oily patch** on the paper indicates the presence of fat.

12. Describe the test for proteins in food.

Answer:

1. Prepare a paste or powder of the food sample, place it in a test tube, add water and shake it well.
2. Add two drops of copper sulfate solution followed by ten drops of caustic soda solution and leave the test tube undisturbed for a few minutes.
3. The appearance of a **violet colour** indicates the presence of protein.

13. What is a balanced diet? Explain why nutritional requirements vary among people.

Answer:

1. A balanced diet contains all essential nutrients, roughage and water in the right amounts for proper growth and development.
2. The type and amount of nutrients required are not the same for everyone.
3. Nutritional requirements vary according to factors such as **age, gender, physical activity, health status and lifestyle**.

14. What are junk foods? Why should they be avoided?

Answer:

1. Junk foods are generally high in calories because of high sugar and fat content but low in proteins, minerals, vitamins and dietary fibre.
2. Potato wafers, candy bars and carbonated drinks are examples given in the chapter.
3. Frequent consumption of junk food is unhealthy and may contribute to obesity and other health problems.

15. Explain why millets are called nutri-cereals.

Answer:

1. Millets such as **jowar, bajra, ragi and sanwa** are highly nutritious, small-sized grains.
2. They are good sources of vitamins, minerals such as iron and calcium, and dietary fibre.
3. They contribute significantly to a balanced diet and are therefore called **nutri-cereals**.

16. What are food miles? State the benefits of reducing them.

Answer:

1. Food miles refer to the entire distance travelled by a food item from the producer to the consumer.
2. Reducing food miles helps reduce the cost and pollution associated with transportation.
3. It also supports local farmers and helps keep food fresh and healthy.

17. Explain why food habits differ across various regions of India.
Answer:
1. Different regions of India have different soil and climatic conditions and therefore grow different crops.
2. Traditional foods of a region are generally related to the crops grown locally.
3. Food choices also vary according to **taste preferences, culture and traditions**.

18. How have culinary practices changed over time?
Answer:
1. Traditional cooking using a **chulha** has increasingly been replaced by cooking on modern gas stoves.
2. Manual grinding using a **sil-batta** has increasingly been replaced by electrical grinders.
3. These changes are associated with technological development, improved transportation and better communication.

19. Explain how cooking and washing may affect the nutritional value of fruits and vegetables.
Answer:
1. Some nutrients, such as Vitamin C, may be lost when vegetables are exposed to high heat during cooking.
2. Washing fruits and vegetables after cutting or peeling them may also cause the loss of some vitamins.
3. Therefore, fruits and vegetables should be thoroughly washed before consumption, and including some uncooked fruits and vegetables can help retain nutrients.

20. What is food fortification? Explain with examples.
Answer:
1. Food fortification involves adding nutrients to food during processing to improve its nutritional quality.
2. **Iodised salt and some baby foods** are examples of fortified foods mentioned in the chapter.
3. Packaged food labels provide information about the nutrients and their amounts in the food.

3.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:

1. Rahul eats mainly rice and potatoes but very little pulses, milk, fruits or vegetables. Analyse why his diet may not be balanced.
Answer:
1. Rice and potatoes mainly provide carbohydrates, which supply energy to the body.
2. Rahul's diet may lack adequate proteins, vitamins, minerals and dietary fibre because he consumes very little of their major food sources.
3. A balanced diet should contain all essential nutrients, roughage and water in the right amounts.

2. A child has bleeding gums and wounds that heal slowly. Identify the likely deficiency and suggest suitable dietary changes.
Answer:
1. These symptoms indicate a possible deficiency of **Vitamin C**, which can cause scurvy.
2. The child should include Vitamin C-rich foods such as amla, guava, orange, lemon and green chilli.
3. Regular inclusion of such foods can help provide the Vitamin C required by the body.

3. A student frequently eats potato wafers instead of roasted chana as an evening snack. Which would be the better choice and why?
Answer:
1. Roasted chana would be a better choice because it contains considerably less fat than the potato wafers compared in the chapter.
2. It also provides more protein and dietary fibre than the potato wafers.
3. Therefore, roasted chana contributes useful nutrients without the high fat content associated with the wafers.

4. A student adds iodine solution to two food samples; Sample A turns blue-black while Sample B shows no such change. What can be concluded?
Answer:
1. Sample A contains starch because iodine produces a blue-black colour in the presence of starch.
2. Sample B does not show evidence of starch through this test because no blue-black colour appears.
3. Thus, the iodine test can be used to compare food samples for the presence of starch.

5. A child rarely goes outdoors and develops weak, soft bones. Explain the possible nutritional connection.
Answer:
1. Limited exposure to sunlight may reduce the body's natural production of **Vitamin D**.
2. Vitamin D helps the body absorb calcium required for healthy bones and teeth.
3. Deficiency of Vitamin D can cause rickets, in which bones may become soft and bent.

6. Why might the nutritional requirements of an active 12-year-old student differ from those of an elderly person?
Answer:
1. Nutritional requirements are influenced by factors such as age, physical activity, health status and lifestyle.
2. An active growing child may therefore require a different quantity and combination of nutrients from an elderly person.
3. Hence, the same diet need not be equally suitable for every individual.

7. A student eats nutritious foods but drinks very little water and consumes almost no roughage. Predict two possible difficulties.
Answer:
1. Lack of roughage may make the smooth passage of stools difficult because roughage helps remove undigested food.
2. Insufficient water may affect nutrient absorption and the removal of wastes through sweat and urine.
3. Therefore, both roughage and water are essential components of a healthy diet.

8. A food sample leaves an oily patch on paper and also turns violet during the protein test. What can you infer?
Answer:
1. The persistent oily patch indicates the presence of **fat** in the food sample.
2. The violet colour in the protein test indicates the presence of **protein**.
3. Therefore, the food contains more than one nutrient, showing that a single food item may contain multiple nutrients.

9. Why should vegetables be washed before cutting and not overcooked?
Answer:
1. Washing vegetables after cutting or peeling may result in the loss of some vitamins.
2. Exposure to excessive heat during cooking may also destroy nutrients such as Vitamin C.

3. Therefore, appropriate washing and cooking practices help retain more nutrients in food.

10. A family has the option of buying vegetables grown nearby or similar vegetables transported from a distant region. Why might locally grown vegetables be preferable?
Answer:
1. Locally produced food travels fewer food miles before reaching the consumer.
2. Lower food miles can reduce transportation costs and pollution while helping keep food fresh.
3. Choosing local produce can also support local farmers.

11. A student consumes plenty of food every day but still develops a deficiency disease. Explain how this is possible.
Answer:
1. The quantity of food eaten alone does not determine whether a diet is nutritionally adequate.
2. A diet may be large in quantity but still lack a particular vitamin or mineral required by the body.
3. Prolonged deficiency of a nutrient can therefore cause a deficiency disease even when sufficient food is consumed.

12. Why can frequent consumption of junk food be harmful even though such food provides a large amount of energy?
Answer:
1. Junk foods may provide high calories because they contain high amounts of sugar and fat.
2. They generally contain low amounts of proteins, vitamins, minerals and dietary fibre.
3. Frequent consumption can therefore lead to an unbalanced diet and may contribute to obesity and other health problems.

13. A region commonly grows ragi, while another grows wheat and mustard. How can this influence the food habits of the two regions?
Answer:
1. Traditional food habits are often influenced by crops that are cultivated locally.
2. Different soil and climatic conditions allow different crops to grow in different regions.
3. Hence, the two regions may develop different traditional dishes based on their locally available crops.

14. Why would including millets in the regular diet be considered a healthy choice?
Answer:
1. Millets provide vitamins and minerals such as iron and calcium.
2. They are also good sources of dietary fibre and contribute significantly to a balanced diet.
3. Because of their nutritional value, millets are referred to as **nutri-cereals**.

15. A student eats only foods that provide carbohydrates, proteins and fats. Explain why this diet is still incomplete.
Answer:
1. A healthy diet requires vitamins and minerals in addition to carbohydrates, proteins and fats.
2. Roughage and water are also essential components needed for proper body functioning.
3. Therefore, a balanced diet must contain all essential nutrients, roughage and water in appropriate amounts.

16. A family throws away leftover food after every meal. Explain why this practice should be changed.
Answer:

1. Considerable time and effort of farmers and other community members are involved in bringing food from farm to plate.
2. Throwing away edible food wastes both the food and the effort involved in producing and supplying it.
3. The family should take only as much food as it can consume and thereby minimise wastage.

17. Why is iodised salt an example of using nutrition knowledge to prevent disease?
Answer:
1. Iodine deficiency can cause goitre, which is characterised by swelling at the front of the neck.
2. Iodised salt contains the required quantity of iodine salts and helps provide iodine through the diet.
3. Thus, using iodised salt can help prevent health problems associated with iodine deficiency.

18. Two children of the same age eat different traditional foods but are both healthy. How can this be explained?
Answer:
1. A balanced diet does not require everyone to eat exactly the same food items.
2. Different foods can provide the essential nutrients, roughage and water required by the body.
3. Therefore, diverse regional diets can support good health when they provide the necessary dietary components in appropriate amounts.

19. A student wants to choose between packaged junk food and a locally prepared millet snack. Give three reasons for choosing the millet snack.
Answer:
1. Millets are nutritious and provide vitamins, minerals and dietary fibre.
2. Junk foods are generally high in sugar and fat while being low in several important nutrients and fibre.
3. A locally prepared millet snack may also reduce food miles and support local food production.

20. Explain how mindful eating can benefit both personal health and the environment.
Answer:
1. Mindful eating encourages the selection of a balanced diet containing appropriate nutrients, roughage and water.
2. Choosing locally grown foods can reduce food miles and the pollution associated with transportation.
3. Avoiding unnecessary food wastage also promotes responsible use of food resources.

6.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:
1. Explain the major nutrients present in food and their functions.
Answer:
1. **Carbohydrates** are one of the primary sources of energy and are found in foods such as wheat, rice, maize and potatoes.
2. **Fats** provide stored energy and are obtained from foods such as nuts and seeds.
3. **Proteins** help in the growth and repair of the body and are therefore called body-building foods.
4. **Vitamins and minerals** are protective nutrients that help maintain health and protect the body from diseases.

5. A healthy diet should provide these major nutrients in appropriate amounts to support the body's different functions.

2. Explain the importance of vitamins and minerals with suitable examples.

Answer:

1. Vitamins and minerals are needed in small amounts and are called **protective nutrients** because they help keep the body healthy.
2. **Vitamin A** helps maintain healthy eyes and skin, and its deficiency may cause poor vision or night blindness.
3. **Vitamin C** helps the body fight diseases, and its deficiency causes scurvy with symptoms such as bleeding gums and slow wound healing.
4. **Vitamin D** helps the body absorb calcium for healthy bones and teeth, while its deficiency can cause rickets.
5. Minerals such as **iodine and iron** are also essential, and their deficiencies can cause goitre and anaemia respectively.

3. Describe five deficiency diseases or conditions discussed in the chapter.

Answer:

1. **Night blindness** may result from Vitamin A deficiency and causes difficulty in seeing in dim light or darkness.
2. **Scurvy** is caused by Vitamin C deficiency and may cause bleeding gums and slow healing of wounds.
3. **Rickets** is caused by Vitamin D deficiency and can result in soft and bent bones.
4. **Goitre** is associated with iodine deficiency and may cause swelling at the front of the neck.
5. **Anaemia** is associated with iron deficiency and may cause weakness and shortness of breath.

4. Explain the importance of a balanced diet.

Answer:

1. A **balanced diet** contains all essential nutrients, roughage and water in the right amounts.
2. It provides the body with carbohydrates and fats needed for energy.
3. It provides proteins required for the growth and repair of the body.
4. Vitamins and minerals in a balanced diet help maintain health and protect the body from deficiency diseases.
5. The amount and type of food required may vary according to age, gender, physical activity, health status and lifestyle.

5. Describe the importance of roughage and water in our diet.

Answer:

1. Dietary fibre, also called **roughage**, is an essential component of food even though it does not provide nutrients.
2. Roughage helps the body remove undigested food and ensures the smooth passage of stools.
3. Green leafy vegetables, fresh fruits, wholegrains, pulses and nuts are good sources of roughage.
4. Water helps the body absorb nutrients from food.
5. Water also helps remove wastes from the body through sweat and urine, so sufficient water should be consumed every day.

6. Describe the tests used to detect starch, fat and protein in food.

Answer:

1. To test for **starch**, a few drops of diluted iodine solution are added to the food sample.
2. The appearance of a **blue-black colour** indicates the presence of starch.

3. To test for **fat**, the food is pressed on paper, and a persistent oily patch after drying indicates the presence of fat.
4. To test for **protein**, the prepared food sample is treated with copper sulfate solution and caustic soda solution.
5. The appearance of a **violet colour** indicates the presence of protein in the food sample.

7. Explain why food habits and culinary practices differ across India.

Answer:

1. India has a great diversity of foods because different foods are available and consumed in different regions.
2. Traditional foods are often connected with crops that are grown locally in a particular region.
3. Soil and climatic conditions influence the crops that can be cultivated in different places.
4. Taste preferences, culture and traditions also influence the food choices of people.
5. Culinary practices have also changed over time because of technological development, transportation and communication.

8. Explain millets and their nutritional importance.

Answer:

1. Millets are small-sized grains that are native crops of India and can grow under different climatic conditions.
2. **Jowar, bajra, ragi and sanwa** are examples of millets mentioned in the chapter.
3. Millets are highly nutritious and are good sources of vitamins.
4. They also provide minerals such as iron and calcium along with dietary fibre.
5. Because they contribute significantly to a balanced diet, millets are also known as **nutri-cereals**.

9. Explain junk food and the importance of making healthy food choices.

Answer:

1. Some junk foods contain high calories because of their high sugar and fat content.
2. Such foods generally contain low amounts of proteins, minerals, vitamins and dietary fibre.
3. Potato wafers, candy bars and carbonated drinks are examples of junk foods discussed in the chapter.
4. Frequent consumption of junk food is unhealthy and may contribute to obesity.
5. Therefore, nutritious foods that contribute to a balanced diet should be preferred over frequent consumption of junk foods.

10. Explain the concept of food miles and the benefits of reducing them.

Answer:

1. **Food miles** refer to the entire distance travelled by a food item from the producer to the consumer.
2. Food may pass through several stages such as production, storage, processing, transportation and retail before reaching our plate.
3. Reducing food miles can reduce the cost associated with transporting food.
4. It can also reduce pollution caused by transportation and support local farmers.
5. Consuming locally produced food can therefore help keep food fresh and healthy while benefiting the environment.

11. Explain how food preparation practices can affect the nutrients present in food.

Answer:

1. Some nutrients present in food can be lost during preparation and cooking.
2. Nutrients such as **Vitamin C** may be lost when food is exposed to high heat during cooking.

3. Some vitamins may also be lost if fruits and vegetables are washed after they are cut or peeled.
4. Fruits and vegetables should therefore be washed thoroughly before cutting or consuming them.
5. Appropriate food preparation practices can help retain more of the nutrients naturally present in foods.

12. Explain the journey of food from the farm to our plate using chapati as an example.
Answer:
1. The journey begins when a farmer grows and harvests the **wheat crop**.
2. The harvested crop undergoes processes such as **threshing and winnowing** to obtain wheat grains.
3. The grains are stored and later **ground and packed** as wheat flour.
4. The flour is transported to retail shops, from where consumers purchase it.
5. Finally, the wheat flour is used to prepare **chapatis**, completing the journey from the farm to our plate.

6.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:
1. Riya eats mainly rice, fried potatoes and sweets every day but rarely consumes pulses, fruits, vegetables or milk. Analyse her diet and suggest how she can improve it.
Answer:
1. Rice and potatoes provide carbohydrates, while fried foods and sweets may provide considerable energy from carbohydrates and fats.
2. Her diet may not provide sufficient proteins, vitamins, minerals and dietary fibre because she rarely eats foods rich in these components.
3. She should include pulses, beans, milk or other protein-rich foods to support the growth and repair of her body.
4. Fruits and vegetables should be included to provide protective nutrients and dietary fibre.
5. Her meals should contain essential nutrients, roughage and water in the right amounts to form a balanced diet.

2. A child has bleeding gums and wounds that heal slowly. Analyse the condition and suggest appropriate dietary measures.
Answer:
1. Bleeding gums and slow healing of wounds indicate a possible deficiency of **Vitamin C**.
2. Prolonged Vitamin C deficiency can result in the deficiency disease called **scurvy**.
3. The child should include Vitamin C-rich foods such as amla, guava, green chilli, orange and lemon in the diet.
4. Care should be taken during food preparation because Vitamin C can be lost due to high heat during cooking.
5. Fruits and vegetables should also be washed before cutting or peeling because washing them afterwards may result in the loss of some vitamins.

3. A student complains of weak and soft bones and spends very little time outdoors. Explain the possible cause and suggest measures based on the chapter.
Answer:
1. The symptoms may indicate a deficiency of **Vitamin D**, which can cause rickets and lead to soft or bent bones.

2. Vitamin D is important because it helps the body absorb calcium needed for healthy bones and teeth.
3. The human body can naturally produce Vitamin D when exposed to sunlight.
4. Foods such as milk, butter, fish and eggs are also sources of Vitamin D mentioned in the chapter.
5. Therefore, appropriate sunlight exposure along with Vitamin D- and calcium-containing foods can support healthy bones and teeth.

4. Two students choose different snacks: one eats 100 g of potato wafers while the other eats 100 g of roasted chana. Compare their choices and decide which is nutritionally preferable.

Answer:

1. Potato wafers provide **536 kcal and 35 g of fat**, whereas roasted chana provides **355 kcal and 6.26 g of fat** per 100 g.
2. Roasted chana provides **18.64 g of protein**, compared with only **7 g** in potato wafers.
3. Roasted chana also contains **16.8 g of dietary fibre**, whereas potato wafers contain only **4.8 g**.
4. Thus, roasted chana provides more protein and fibre with considerably less fat than potato wafers.
5. Based on these nutritional values and the chapter's discussion of junk food, roasted chana is the nutritionally preferable choice.

5. A food sample turns blue-black with iodine, leaves an oily patch on paper and turns violet in the protein test. Analyse the observations.

Answer:

1. The blue-black colour after adding iodine indicates that the food contains **starch**.
2. The persistent oily patch on paper indicates the presence of **fat**.
3. The violet colour obtained in the protein test indicates the presence of **protein**.
4. Therefore, the tested food contains at least three food components—starch, fat and protein.
5. These observations demonstrate that a single food item can contain more than one nutrient.

6. A family prefers packaged junk food because it is convenient and provides plenty of calories. Evaluate this practice from a nutritional point of view.

Answer:

1. A food providing plenty of calories does not necessarily mean that it provides a balanced diet.
2. Junk foods may be high in calories because of their high sugar and fat content.
3. They generally contain low amounts of proteins, minerals, vitamins and dietary fibre.
4. Frequent consumption of such foods is unhealthy and may contribute to obesity and related health problems.
5. The family should therefore prefer foods that provide essential nutrients, roughage and water in appropriate amounts.

7. A family buys vegetables transported from a distant place even though similar vegetables are grown locally. Analyse the advantages of choosing locally grown food.

Answer:

1. Locally grown food generally travels a shorter distance from the producer to the consumer and therefore has fewer **food miles**.
2. Reducing food miles can reduce the transportation cost associated with bringing food to consumers.
3. It can also reduce pollution caused by transportation.

4. Purchasing locally produced food supports local farmers and can help keep food fresh and healthy.
5. Therefore, choosing locally grown food can benefit consumers, farmers and the environment.

8. A family washes vegetables only after chopping them and cooks them for a long time at high temperature. Evaluate these practices and suggest improvements.

Answer:

1. Washing vegetables after cutting or peeling them may result in the loss of some vitamins.
2. Cooking at high temperatures may also cause the loss of some nutrients such as **Vitamin C**.
3. Vegetables should therefore be thoroughly washed before they are cut or peeled.
4. Cooking practices that avoid unnecessary exposure to high heat can help reduce nutrient loss.
5. Appropriate washing and cooking methods can therefore help preserve more of the nutrients naturally present in food.

9. A student says, "If I eat enough food to fill my stomach, my diet is balanced." Evaluate this statement.

Answer:

1. The statement is incorrect because the quantity of food alone does not determine whether a diet is balanced.
2. A balanced diet must contain all essential nutrients, roughage and water in the right amounts.
3. Carbohydrates and fats provide energy, while proteins support growth and repair of the body.
4. Vitamins and minerals are protective nutrients that help maintain health and prevent deficiency conditions.
5. Therefore, a person must consider the variety and nutritional composition of food rather than merely the amount eaten.

10. A school wants to encourage students to include millets in their meals. Give five reasons supporting this decision.

Answer:

1. Millets such as **jowar, bajra, ragi and sanwa** are highly nutritious grains.
2. They are good sources of vitamins required for maintaining health.
3. They provide important minerals such as **iron and calcium**.
4. Millets are also good sources of dietary fibre and contribute significantly to a balanced diet.
5. Because of their nutritional benefits, millets are appropriately known as **nutri-cereals**.

11. A student develops swelling at the front of the neck. Use your knowledge of nutrition to analyse the condition and suggest a preventive measure.

Answer:

1. Swelling at the front of the neck may indicate **goitre**.
2. Goitre can occur when the body does not receive sufficient iodine.
3. Iodine is a mineral required for physical and mental activities.
4. Seaweed, water chestnut and iodised salt are sources of iodine mentioned in the chapter.
5. Regular use of iodised salt can help provide dietary iodine and reduce the risk of iodine-deficiency problems.

12. A student regularly takes more food than needed and throws the leftovers away. Analyse why this behaviour is inconsistent with mindful eating.

Answer:

1. Food reaches our plate only after the efforts of farmers and many other members of the community.
2. The journey of food can involve cultivation, harvesting, processing, storage, transportation, retailing and preparation.
3. Throwing away edible food wastes the food as well as the effort involved in bringing it to our plate.
4. The chapter advises us to take only as much food as we can consume.
5. Mindful eating therefore includes valuing food and consciously reducing unnecessary food wastage.

6.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. Planning a Healthy School Lunch

Ananya brings white rice, potato chips and a sweet drink for lunch every day. Using the ideas from the chapter, suggest five changes that would make her lunch more balanced.

Answer:

1. She should include a protein-rich food such as pulses, beans, paneer or another suitable protein source to support growth and repair.
2. Fresh vegetables and fruits should be included to provide vitamins, minerals and dietary fibre.
3. Foods such as wholegrains or millets can be included because they provide useful nutrients and fibre.
4. Frequent consumption of potato chips and sugary drinks should be reduced because junk foods can be high in sugar or fat and low in several important nutrients and fibre.
5. She should also drink sufficient water because water helps in nutrient absorption and removal of wastes from the body.

2. Solving a Deficiency Problem

A student frequently has bleeding gums and notices that small wounds take a long time to heal. Apply your knowledge of nutrients to identify the problem and suggest a suitable dietary plan.

Answer:

1. Bleeding gums and slow wound healing are symptoms associated with **Vitamin C deficiency**.
2. Prolonged Vitamin C deficiency can lead to the deficiency disease called **scurvy**.
3. The student should include Vitamin C-rich foods such as amla, guava, green chilli, orange and lemon in the diet.
4. These foods should not be unnecessarily exposed to high heat because Vitamin C can be lost during cooking.
5. Fruits and vegetables should preferably be washed before cutting or peeling because washing them afterwards may result in the loss of some vitamins.

3. Selecting a Healthier Packaged Snack

A shop offers 100 g packets of potato wafers and roasted chana. The wafers contain 536 kcal, 35 g fat, 7 g protein and 4.8 g fibre, while roasted chana contains 355 kcal, 6.26 g fat, 18.64 g protein and 16.8 g fibre. Which should a student choose? Justify your answer.

Answer:

1. The student should prefer **roasted chana** because it contains much less fat than potato wafers.
2. Roasted chana provides **18.64 g protein**, which is substantially higher than the **7 g** provided by potato wafers.
3. It also provides **16.8 g dietary fibre**, compared with only **4.8 g** in potato wafers.

4. Potato wafers provide considerably more energy and fat, while the chapter identifies such high-calorie, high-fat foods as choices that should not be consumed frequently.
5. Therefore, based on the nutrition-label comparison in the chapter, roasted chana is the nutritionally preferable snack.

4. Investigating an Unknown Food Sample

During a laboratory activity, a food sample turns blue-black with iodine, leaves a persistent oily patch on paper and turns violet during another test. Interpret all three observations.

Answer:

1. The **blue-black colour** with iodine indicates the presence of starch in the food sample.
2. The **persistent oily patch** on paper indicates the presence of fat.
3. The **violet colour** produced in the protein test indicates the presence of protein.
4. Thus, the sample contains starch, fat and protein rather than only one food component.
5. The experiment demonstrates that a single food item can contain multiple nutrients.

5. Helping a Child with Weak Bones

A child has weak, soft bones and spends almost all day indoors. Using the chapter, suggest five points that could help explain and address the situation.

Answer:

1. Weak or soft bones may be associated with a deficiency of **Vitamin D**, which can cause rickets.
2. Vitamin D is important because it helps the body absorb calcium required for healthy bones and teeth.
3. The body can naturally produce Vitamin D when it is exposed to sunlight.
4. Milk, butter, fish and eggs are food sources of Vitamin D mentioned in the chapter.
5. Calcium-containing foods such as milk, curd, cheese and paneer are also important for maintaining healthy bones and teeth.

6. Improving a Family's Cooking Practices

A family washes vegetables after chopping them and cooks them for a long time at high heat. Suggest five improvements based on the chapter.

Answer:

1. Fruits and vegetables should be thoroughly washed **before** they are cut or peeled.
2. Washing them after cutting or peeling may result in the loss of some vitamins.
3. Unnecessary exposure to high heat should be avoided because some nutrients can be lost during cooking.
4. Vitamin C is specifically mentioned as a nutrient that may be lost due to high heat.
5. Appropriate washing and cooking practices can therefore help retain more of the nutrients present in food.

7. Promoting Millets in the School Canteen

Your school wants to introduce millet-based dishes instead of relying mainly on packaged snacks. Give five points supporting this proposal.

Answer:

1. Millets such as **jowar, bajra, ragi and sanwa** are highly nutritious grains.
2. They are sources of vitamins needed by the body.
3. Millets also provide important minerals such as **iron and calcium**.
4. They are good sources of dietary fibre and can contribute significantly to a balanced diet.
5. Because of their nutritional value, millets are known as **nutri-cereals**, making millet-based dishes a useful option for the school menu.

8. Reducing Food Miles in a Community

A housing society buys vegetables transported hundreds of kilometres even though similar vegetables are grown by nearby farmers. Suggest five reasons for purchasing more locally produced food.

Answer:

1. Buying nearby produce reduces the **food miles**, or the distance travelled by food from producer to consumer.
2. Lower food miles can reduce transportation costs.
3. Reduced transportation can also help decrease pollution.
4. Purchasing locally produced food supports local farmers.
5. Locally sourced food can also reach consumers fresher, making it a beneficial choice for people and the environment.

9. Tackling Food Wastage at a School Function

After a school celebration, large quantities of uneaten food are found on students' plates. As a student leader, suggest five points to encourage mindful food consumption.

Answer:

1. Students should take only as much food as they are able to consume.
2. They should remember that farmers invest considerable effort in growing the crops used to prepare food.
3. Food also passes through activities such as processing, storage, transportation and retail before reaching consumers.
4. Wasting food therefore also disregards the efforts of the many people involved in bringing it from the farm to the plate.
5. Students should develop the habit of valuing food and consciously avoiding unnecessary wastage.

10. Designing a Diet for an Active Student

A 13-year-old student participates in sports every day and wants to know what kinds of foods should be included in a balanced diet. Give five suggestions based on the chapter.

Answer:

1. The diet should contain adequate carbohydrates and fats because they provide energy for different activities.
2. Protein-rich foods such as pulses, beans, milk products or other suitable sources should be included because proteins support growth and repair.
3. Fruits and vegetables should be included to supply vitamins, minerals and dietary fibre.
4. Sufficient water should be consumed because it assists nutrient absorption and removal of wastes.
5. Since nutritional requirements vary with factors including age and physical activity, the student's balanced diet should provide essential nutrients, roughage and water in amounts appropriate to these needs.

6.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

The following **30 MCQs** include conceptual, application-based, analytical, assertion–reason, and data-interpretation questions suitable for competitive/Olympiad preparation.

1. Which combination correctly represents the major nutrients in food?

A. Carbohydrates, proteins, fats, vitamins and minerals
B. Carbohydrates, water, roughage, oxygen and minerals
C. Proteins, water, starch, fibre and vitamins
D. Fats, water, roughage, minerals and oxygen

Answer: A. Carbohydrates, proteins, fats, vitamins and minerals

2. A student feels tired after missing a meal. Which nutrient group would most directly help provide energy?
A. Vitamins
B. Minerals
C. Carbohydrates
D. Roughage
Answer: C. Carbohydrates
3. Which pair is correctly matched?
A. Proteins — protective foods
B. Carbohydrates — body-building foods
C. Vitamins and minerals — protective nutrients
D. Roughage — energy-giving nutrient
Answer: C. Vitamins and minerals — protective nutrients
4. Which sequence correctly matches nutrient, deficiency disease and symptom?
A. Vitamin C → Scurvy → Bleeding gums
B. Vitamin D → Goitre → Swollen neck
C. Iodine → Anaemia → Weakness
D. Iron → Rickets → Bent bones
Answer: A. Vitamin C → Scurvy → Bleeding gums
5. A child has difficulty seeing in dim light. Which food would be the most relevant addition to the diet based on the chapter?
A. Carrot
B. Iodised salt
C. Rice
D. Sugar
Answer: A. Carrot
6. Which statement best explains why Vitamin D and calcium are closely related?
A. Vitamin D converts calcium into protein.
B. Vitamin D helps the body absorb calcium.
C. Calcium produces Vitamin D in the body.
D. Both are carbohydrates required for energy.
Answer: B. Vitamin D helps the body absorb calcium.
7. A person develops swelling at the front of the neck due to a nutritional deficiency. Which item would be most relevant?
A. Iodised salt
B. Potato
C. Butter
D. Rice
Answer: A. Iodised salt
8. Which combination is correctly matched?
A. Iron deficiency — Anaemia
B. Calcium deficiency — Scurvy
C. Vitamin C deficiency — Rickets
D. Iodine deficiency — Beriberi
Answer: A. Iron deficiency — Anaemia
9. Which of the following is NOT a major function of roughage?
A. Helping remove undigested food
B. Ensuring smooth passage of stools
C. Providing dietary fibre
D. Providing large amounts of energy

Answer: D. Providing large amounts of energy

10. Which group contains only good sources of roughage mentioned in the chapter?

A. Wholegrains, pulses, nuts and fresh fruits
B. Sugar, butter, oil and salt
C. Fish, eggs, butter and sugar
D. Salt, oil, ghee and glucose

Answer: A. Wholegrains, pulses, nuts and fresh fruits

11. A food sample becomes blue-black after a reagent is added. Which conclusion is correct?

A. It contains protein.
B. It contains starch.
C. It contains fat.
D. It contains Vitamin C.

Answer: B. It contains starch.

12. Four food samples are tested on paper. Which observation indicates the presence of fat?

A. A blue-black colour
B. A violet colour
C. A persistent oily patch
D. Formation of bubbles

Answer: C. A persistent oily patch

13. A food sample produces a violet colour during the prescribed protein test. The sample most likely contains:

A. starch
B. protein
C. fat
D. iodine

Answer: B. Protein

14. Peanuts test positive for both protein and fat. Which conclusion is most appropriate?

A. Every food contains all nutrients.
B. A food item can contain more than one nutrient.
C. Protein changes into fat during testing.
D. Food tests cannot distinguish nutrients.

Answer: B. A food item can contain more than one nutrient.

15. Which of the following best defines a balanced diet?

A. A diet containing only energy-giving foods
B. A diet containing only fruits and vegetables
C. A diet containing all essential nutrients, roughage and water in the right amounts
D. A diet containing equal quantities of every food item

Answer: C. A diet containing all essential nutrients, roughage and water in the right amounts

16. Two students of the same age may still have different nutritional requirements primarily because requirements also depend on:

A. handwriting and school subjects
B. physical activity, health status and lifestyle
C. favourite colour and hobbies
D. number of friends

Answer: B. Physical activity, health status and lifestyle

17. Study the nutritional information below.

Food (per 100 g)	Energy	Fat	Protein	Fibre
Potato wafers	536 kcal	35 g	7 g	4.8 g
Roasted chana	355 kcal	6.26 g	18.64 g	16.8 g

Which conclusion is correct?
A. Potato wafers contain more protein and fibre.
B. Roasted chana contains more fat.
C. Roasted chana contains more protein and fibre and less fat.
D. Both foods have almost identical nutritional composition.
Answer: C. Roasted chana contains more protein and fibre and less fat.
18. Why should frequent consumption of junk food be avoided?
A. It contains no energy.
B. It may be high in sugar and fat but low in several important nutrients and fibre.
C. It always contains excess protein.
D. It contains only water and minerals.
Answer: B. It may be high in sugar and fat but low in several important nutrients and fibre.
19. Which set contains only millets mentioned in the chapter?
A. Jowar, bajra, ragi, sanwa
B. Wheat, rice, maize, barley
C. Rice, ragi, wheat, gram
D. Bajra, rice, maize, wheat
Answer: A. Jowar, bajra, ragi, sanwa
20. Millets are called "nutri-cereals" mainly because they:
A. contain only carbohydrates
B. are always eaten raw
C. provide vitamins, minerals and dietary fibre
D. contain no minerals
Answer: C. They provide vitamins, minerals and dietary fibre.
21. A family wants to minimise the loss of vitamins while preparing vegetables. Which practice is most appropriate?
A. Cut the vegetables and then wash them repeatedly.
B. Cook them for a very long time at high heat.
C. Wash them before cutting and avoid unnecessary high-heat cooking.
D. Soak the chopped vegetables and discard the water.
Answer: C. Wash them before cutting and avoid unnecessary high-heat cooking.
22. Which nutrient is specifically mentioned as being lost due to high heat during cooking?
A. Vitamin C
B. Iodine
C. Calcium
D. Iron
Answer: A. Vitamin C
23. Which statement about water is correct?
A. Water only provides energy.
B. Water helps in nutrient absorption and removal of wastes.
C. Water is required only during summer.
D. Water can replace all nutrients.
Answer: B. Water helps in nutrient absorption and removal of wastes.

24. Which factor would most likely explain why Karnataka and Punjab have different traditional foods?
A. All regions grow identical crops.
B. Soil, climate, locally grown crops, culture and traditions vary.
C. Traditional foods are unrelated to local agriculture.
D. Only packaged foods determine regional diets.
Answer: B. Soil, climate, locally grown crops, culture and traditions vary.
25. Which development best illustrates a change in culinary practices due to technology?
A. Replacing an electrical grinder with a sil-batta
B. Replacing a gas stove with raw firewood everywhere
C. Replacing manual grinding with an electrical grinder
D. Replacing cooked food with only raw food
Answer: C. Replacing manual grinding with an electrical grinder
26. Which sequence best represents the journey of wheat from farm to plate?
A. Retail shop → farmer → grinding → harvesting → chapati
B. Growing wheat → threshing/winnowing → storage → grinding/packing → retail/plate
C. Grinding → growing → storage → harvesting → plate
D. Storage → growing → retail → threshing → grinding
Answer: B. Growing wheat → threshing/winnowing → storage → grinding/packing → retail/plate
27. "Food miles" refers to:
A. the distance a person walks after eating
B. the distance travelled by food from producer to consumer
C. the area of farmland used for crops
D. the distance between two restaurants
Answer: B. The distance travelled by food from producer to consumer
28. Which action would most directly help reduce food miles?
A. Buying similar produce transported from a distant region
B. Choosing locally grown produce
C. Throwing away leftover food
D. Buying only packaged food
Answer: B. Choosing locally grown produce
29. Consider the following Assertion and Reason.
Assertion (A): A diet containing only carbohydrates and fats cannot be considered balanced.
Reason (R): A balanced diet must contain all essential nutrients, roughage and water in the right amounts.
A. Both A and R are true, and R correctly explains A.
B. Both A and R are true, but R does not explain A.
C. A is true, but R is false.
D. A is false, but R is true.
Answer: A. Both A and R are true, and R correctly explains A.
30. Consider the following Assertion and Reason.
Assertion (A): Locally produced food can be an environmentally favourable choice.
Reason (R): Reducing food miles can decrease transportation-related costs and pollution.
A. Both A and R are true, and R correctly explains A.
B. Both A and R are true, but R does not explain A.
C. A is true, but R is false.
D. Both A and R are false.
Answer: A. Both A and R are true, and R correctly explains A.

1.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

Best Practices While Teaching Chapter 3: "Mindful Eating – A Path to a Healthy Body":

1. Maintain a Weekly Food Diary:

Ask students to maintain a **seven-day food diary** recording their breakfast, lunch, snacks and dinner. In the classroom, students can classify the foods according to major nutrients and discuss whether their meals provide adequate variety. This directly extends the chapter's food-record activity and promotes awareness of everyday eating habits.

2. Conduct Hands-on Food Testing Activities:

Organise supervised practical activities to test common foods for **starch, fat and protein**. Students can observe the blue-black colour in the iodine test for starch, the oily patch for fat, and the violet colour in the protein test. This converts theoretical learning about nutrients into observation-based scientific learning; the protein-test chemicals should be handled with the safety precautions specified in the chapter.

3. Use a "Build a Balanced Plate" Activity:

Provide students with pictures or names of locally available foods and ask groups to design a **balanced meal**. They should justify their choices by identifying sources of carbohydrates, proteins, fats, vitamins, minerals, roughage and water. The activity reinforces the chapter's concept that a balanced diet contains essential nutrients, roughage and water in the right amounts.

4. Create a Nutrient–Deficiency Matching Game:

Prepare cards containing **nutrients, food sources, deficiency diseases and symptoms**, and ask students to form correct combinations. For example, students can match Vitamin C–scurvy–bleeding gums, Vitamin D–rickets–soft/bent bones, iodine–goitre–neck swelling, and iron–anaemia–weakness. This provides an engaging method for reinforcing important nutrient relationships.

5. Practise Nutrition-Label Reading:

Bring sample packaged-food labels to class and teach students to compare **energy, fat, carbohydrates, protein and dietary fibre**. Students can model their analysis on the chapter's comparison of potato wafers and roasted chana and explain which option is nutritionally preferable. This develops practical decision-making skills for everyday food choices.

6. Promote Local and Traditional Food Exploration:

Ask students to collect information from parents or grandparents about traditional foods eaten in their families and the locally grown crops used to prepare them. Students can then compare food traditions across regions and relate the differences to soil, climate, taste, culture and traditions. This connects classroom science with family and community knowledge.

7. Organise a "Millet/Nutri-Cereal Day":

Conduct a classroom or school-level activity featuring **jowar, bajra, ragi and sanwa** and dishes prepared from them. Students can prepare charts explaining how millets provide vitamins, minerals such as iron and calcium, and dietary fibre. This reinforces why the chapter describes millets as **nutri-cereals**.

8. Demonstrate Nutrient-Saving Cooking Practices:

Use simple demonstrations or picture sequences to compare appropriate and inappropriate ways of preparing vegetables. Emphasise washing fruits and vegetables before cutting and avoiding unnecessary exposure to high heat, since some vitamins may be lost through these practices. Students can develop a classroom poster titled **"Cook Smart—Save Nutrients."**

9. Introduce a "Farm-to-Plate" Project:

Ask students to select a familiar food, such as chapati, and trace its journey from **farmer → processing → storage → transportation → retailer → consumer**. They can represent the journey through a flowchart, poster or role-play. The chapter's wheat-to-chapati example provides a suitable model for this activity.

10. Conduct a Food-Miles and Local-Food Challenge:

Students can identify which foods in their homes are locally produced and which travel longer distances before reaching them. Discuss how reducing **food miles** can lower transportation costs and pollution, support local farmers and help keep food fresh. This integrates nutrition education with environmental responsibility.

11. Implement a "Zero Food Waste" Classroom Campaign:

Encourage students to observe food wastage during lunch and develop simple strategies such as **"Take only what you can eat."** Connect the campaign with the chapter's emphasis on recognising the efforts of farmers and others involved in bringing food to our plates. This helps transform the concept of mindful eating into responsible behaviour.

12. Use Case-Based Assessment:

Instead of relying only on recall questions, present situations such as **bleeding gums, weak bones, neck swelling, constipation, or an unbalanced lunch box** and ask students to identify the cause and recommend appropriate food choices. Such cases allow students to apply the chapter's concepts of nutrients, deficiency conditions, roughage and balanced diets to familiar situations.

3.16 Innovations Opportunity List from the Chapter: (10 Ideas)

1. Digital "My Smart Plate" Designer:

Students can use a simple presentation or drawing application to create a **virtual balanced plate** using pictures of foods available at home. They should label each food according to carbohydrates, proteins, fats, vitamins, minerals or dietary fibre and explain why their plate is balanced. This creatively reinforces the idea that a balanced diet contains essential nutrients, roughage and water in the right amounts.

2. QR-Code Nutrient Hunt:

Place QR codes at different stations around the classroom, each revealing a food item, nutrient, food source or deficiency symptom. Student teams scan the codes and solve challenges such as **"Which nutrient is deficient?"**, **"Which food should be added?"**, or **"Is this energy-giving, body-building or protective?"** The content can be built directly around the nutrient functions and deficiency conditions presented in the chapter.

3. "Food Detective Lab" Challenge:

Turn the starch, fat and protein tests into a mystery investigation in which groups receive coded food samples and determine their contents experimentally. Students use blue-black colour for starch, a persistent oily patch for fat and violet colour for protein as their scientific evidence. The protein-test chemicals should be handled only with the safety precautions specified in the chapter.

4. Nutrition Label Mathematics Lab:

Give groups nutrition labels and ask them to become **"Nutrition Data Analysts."** They can compare energy, protein, fat and dietary fibre and rank foods based on selected nutritional criteria. The chapter's comparison of potato wafers and roasted chana provides an excellent model for this data-based learning activity.

5. "Deficiency Disease Doctor" Simulation:

Create a role-play in which one student acts as a person describing symptoms and another acts as a **nutrition detective** who identifies the possible nutrient deficiency and recommends appropriate food sources. Cases can include night blindness, scurvy, rickets, goitre and anaemia. This transforms factual knowledge about deficiency conditions into application-oriented learning.

6. Millet Innovation Challenge:
Groups can design an imaginary **healthy millet-based snack or school lunch item** using jowar, bajra, ragi or sanwa. They can create a product name, package design and a short nutrition message explaining the benefits of millets. This builds on the chapter's description of millets as nutritious sources of vitamins, iron, calcium and dietary fibre.
7. Interactive "Farm-to-Plate" Human Chain:
Convert the classroom into a living supply chain, with students taking the roles of **farmer, processor, storage worker, transporter, retailer, cook and consumer**. Students arrange themselves in the correct sequence and explain their contribution to getting food onto the plate. The wheat-to-chapati journey in the chapter can serve as the model.
8. Food-Miles Mapping Project:
Students can select five commonly eaten foods and map where they come from, distinguishing locally produced items from those transported over longer distances. They can then discuss how shorter food miles may reduce transportation costs and pollution, support local farmers and help keep food fresh.
9. "Grandparents' Kitchen to Smart Kitchen" Digital Story:
Students can interview grandparents or older family members about earlier cooking and grinding practices and compare them with present-day methods. They can create a digital story showing changes such as **chulha → gas stove** and **sil-batta → electrical grinder**. This integrates science with technology, history and family knowledge.
10. Nutrient-Loss Investigation:
Students can create a visual investigation comparing different ways of washing, cutting and cooking vegetables and predict which practices are more likely to preserve nutrients. The activity should highlight the chapter's points that some vitamins may be lost when cut or peeled foods are washed and that nutrients such as Vitamin C may be lost due to high heat.
11. "Zero-Waste Lunch" Gamification:
Introduce a class challenge in which students aim to minimise edible food left on their plates while taking only the amount they can comfortably consume. Instead of rewarding who eats the most, recognise **responsible serving, minimal wastage and awareness of the effort involved in bringing food from farm to plate**. This directly promotes the chapter's message of mindful food consumption.
12. Student-Created Nutrition Escape Room:
Create stations containing puzzles on **nutrients, deficiency diseases, food tests, balanced diets, millets and food miles**. Each correct solution gives students a clue or code needed to progress to the next station. This can turn revision of the chapter into collaborative problem-solving while keeping the scientific content aligned with the chapter.
13. "Healthy Food Influencer" Video Challenge:
Students can prepare a **60-second educational video** promoting one chapter-based idea—for example, choosing a balanced diet, eating millets, reducing junk food, drinking sufficient water or reducing food wastage. The activity combines science learning with communication, creativity and responsible digital-media skills.
14. Regional Food Map of India:
Create a large interactive map where students attach pictures or cards showing regional crops and traditional dishes. They can explain how **local cultivation, soil, climate, taste, culture and traditions** influence food choices. This turns the chapter's discussion of food diversity into an interdisciplinary geography–science activity.
15. "Mindful Eating Innovation Fair":
As a culminating activity, teams can present one solution to a food-related problem such as **junk-food consumption, poor dietary balance, food wastage, long food miles or low**

awareness of millets. Their solutions could be posters, models, games, campaigns, digital presentations or prototype meal plans.

3.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. __________ are one of the primary sources of energy in our diet.
   Answer: Carbohydrates

2. Proteins help in the __________ and repair of our body.
   Answer: Growth

3. Carbohydrates and fats are called __________ foods.
   Answer: Energy-giving

4. Proteins are also known as __________ foods.
   Answer: Body-building

5. Vitamins and minerals are called __________ nutrients.
   Answer: Protective

6. Deficiency of Vitamin C causes __________.
   Answer: Scurvy

7. Deficiency of Vitamin D causes __________.
   Answer: Rickets

8. Deficiency of iodine may cause __________.
   Answer: Goitre

9. Deficiency of iron may cause __________.
   Answer: Anaemia

10. Dietary fibre is also known as __________.
    Answer: Roughage

11. Iodine solution produces a __________ colour in the presence of starch.
    Answer: Blue-black

12. A persistent __________ patch on paper indicates the presence of fat.
    Answer: Oily

13. A __________ colour in the prescribed protein test indicates the presence of protein.
    Answer: Violet

14. Jowar, bajra and ragi are examples of __________.
    Answer: Millets

15. Millets are also called __________ because of their nutritional value.
    Answer: Nutri-cereals

16. The distance travelled by food from producer to consumer is called __________.
    Answer: Food miles

17. The human body can naturally produce Vitamin D when exposed to __________.
    Answer: Sunlight

18. A balanced diet includes essential nutrients, roughage and __________ in the right amounts.
Answer: Water

19. Frequent consumption of junk food may contribute to __________.
Answer: Obesity

20. Food choices vary according to locally grown crops, taste, culture and __________.
Answer: Traditions

These concepts are directly developed through the chapter's discussion of nutrients, deficiency conditions, balanced diets, food testing and food choices.

B. One-Mark Questions:

1. What are nutrients?
Answer: Nutrients are components of food that provide energy, support growth and repair, protect against diseases and maintain bodily functions.

2. Name the five major nutrients.
Answer: Carbohydrates, proteins, fats, vitamins and minerals.

3. Why are carbohydrates called energy-giving foods?
Answer: Carbohydrates are called energy-giving foods because they are a primary source of energy for the body.

4. Why are proteins called body-building foods?
Answer: Proteins are called body-building foods because they help in the growth and repair of the body.

5. Name one disease caused by Vitamin C deficiency.
Answer: Scurvy.

6. Which deficiency causes rickets?
Answer: Vitamin D deficiency.

7. Which mineral deficiency causes goitre?
Answer: Iodine deficiency.

8. Which mineral deficiency is associated with anaemia?
Answer: Iron deficiency.

9. What is roughage?
Answer: Roughage is dietary fibre that helps remove undigested food and ensures smooth passage of stools.

10. What does a blue-black colour in the iodine test indicate?
Answer: It indicates the presence of starch.

11. What does an oily patch on paper indicate?
Answer: It indicates the presence of fat.

12. What does violet colour in the protein test indicate?
Answer: It indicates the presence of protein.

13. What is a balanced diet?
    Answer: A balanced diet contains all essential nutrients, roughage and water in the right amounts.
14. Give two examples of millets.
    Answer: Ragi and bajra are examples of millets.
15. What are food miles?
    Answer: Food miles refer to the distance travelled by food from the producer to the consumer.

C. Two-Mark Descriptive Questions:

1. Why are proteins important in our diet?

Answer:

1. Proteins help in the growth of the body.
2. They also help repair body tissues.

2. State two functions of water in our body.

Answer:

1. Water helps the body absorb nutrients from food.
2. It helps remove wastes through sweat and urine.

3. Why is roughage important?

Answer:

1. Roughage helps the body remove undigested food.
2. It ensures the smooth passage of stools.

4. How can starch be detected in a food sample?

Answer:

1. Add a few drops of diluted iodine solution to the food sample.
2. A blue-black colour indicates the presence of starch.

5. Why should vegetables be washed before cutting?

Answer:

1. Washing vegetables after cutting or peeling may result in the loss of some vitamins.
2. Therefore, washing them before cutting helps avoid unnecessary nutrient loss.

6. Why are millets called nutri-cereals?

Answer:

1. Millets provide vitamins, minerals such as iron and calcium, and dietary fibre.
2. They contribute significantly to a balanced diet and are therefore called nutri-cereals.

7. Why should frequent consumption of junk food be avoided?

Answer:

1. Junk foods can be high in sugar and fat but low in several important nutrients and dietary fibre.
2. Frequent consumption is unhealthy and may contribute to obesity.

8. Give two benefits of reducing food miles.

Answer:

1. Reducing food miles can decrease transportation costs and pollution.
2. It can support local farmers and help keep food fresh.

9. Why do traditional foods vary from one region to another?

Answer:

1. Different soil and climatic conditions result in different locally grown crops.
2. Food choices are also influenced by taste, culture and traditions.

10. Why can the dietary requirements of two people differ?

Answer:

1. Nutritional requirements depend on factors such as age, gender and physical activity.
2. Health status and lifestyle also influence nutritional requirements.

D. Three-Mark Descriptive Questions:

1. Explain carbohydrates, fats and proteins according to their major functions.

Answer:

1. Carbohydrates are a primary source of energy.
2. Fats provide stored energy to the body.
3. Proteins help in growth and repair of the body.

2. Explain Vitamin C deficiency.

Answer:

1. Vitamin C helps the body fight diseases.
2. Its deficiency causes scurvy, with symptoms such as bleeding gums and slow wound healing.
3. Amla, guava, orange and lemon are sources of Vitamin C.

3. Explain the importance of Vitamin D.

Answer:

1. Vitamin D helps the body absorb calcium for healthy bones and teeth.

2. Its deficiency can cause rickets, resulting in soft or bent bones.
3. Sunlight exposure, milk, butter, fish and eggs can help provide Vitamin D.

4. Describe the three food tests discussed in the chapter.

Answer:

1. A blue-black colour with iodine indicates starch.
2. A persistent oily patch on paper indicates fat.
3. A violet colour in the prescribed protein test indicates protein.

5. Explain three characteristics of a balanced diet.

Answer:

1. It contains all essential nutrients in appropriate amounts.
2. It also contains sufficient roughage and water.
3. Its composition should suit an individual's nutritional requirements.

6. Why are millets considered valuable foods?

Answer:

1. Millets such as jowar, bajra, ragi and sanwa are highly nutritious.
2. They provide vitamins, iron, calcium and dietary fibre.
3. They contribute to a balanced diet and are called nutri-cereals.

7. Explain how cooking practices may influence the nutritional value of food.

Answer:

1. Some nutrients such as Vitamin C may be lost because of high heat during cooking.
2. Washing fruits and vegetables after cutting or peeling may also cause the loss of some vitamins.
3. Suitable preparation and cooking practices can therefore help minimise nutrient loss.

8. Explain the concept and importance of food miles.

Answer:

1. Food miles represent the distance travelled by food from producer to consumer.
2. Reducing food miles can lower transportation costs and pollution.
3. It can also support local farmers and help keep food fresh.

E. Five-Mark Descriptive Questions:

1. Explain the major nutrients and their importance.

Answer:

1. Carbohydrates are a primary source of energy for the body.
2. Fats provide stored energy.
3. Proteins support growth and repair and are called body-building foods.
4. Vitamins help maintain health and protect the body from deficiency conditions.
5. Minerals such as calcium, iodine and iron perform important functions in maintaining the body.

2. Explain five important deficiency conditions discussed in the chapter.

Answer:

1. Vitamin A deficiency may result in poor vision or night blindness.
2. Vitamin C deficiency causes scurvy, which may produce bleeding gums and slow wound healing.
3. Vitamin D deficiency causes rickets, in which bones may become soft and bent.
4. Iodine deficiency can cause goitre, characterised by swelling at the front of the neck.
5. Iron deficiency can cause anaemia, with symptoms such as weakness and shortness of breath.

3. Explain how you would test a food sample for starch, fat and protein.

Answer:

1. Add diluted iodine solution to the food sample to test for starch.
2. A blue-black colour confirms the presence of starch.
3. Pressing food on paper and observing a persistent oily patch indicates fat.
4. The prescribed copper sulfate and caustic soda test is used to test a prepared food sample for protein.
5. The appearance of violet colour confirms the presence of protein.

4. Explain the importance of eating a balanced diet.

Answer:

1. A balanced diet provides carbohydrates and fats required for energy.
2. It provides proteins necessary for growth and repair.
3. Vitamins and minerals help maintain health and protect the body from deficiency conditions.
4. Roughage supports the smooth removal of undigested food, while water helps nutrient absorption and waste removal.
5. A balanced diet therefore contains all essential nutrients, roughage and water in the right amounts.

5. Explain five ways in which students can practise mindful eating.

Answer:

1. Choose a varied and balanced diet containing essential nutrients, roughage and water.

2. Limit frequent consumption of junk foods that are high in sugar and fat but low in several important nutrients and fibre.
3. Include nutritious foods such as fruits, vegetables, pulses and millets in regular meals.
4. Prefer locally grown foods where appropriate to reduce food miles and support local farmers.
5. Take only as much food as can be consumed and avoid unnecessary food wastage.

6. Explain why millets can play an important role in a healthy diet.

Answer:

1. Millets such as jowar, bajra, ragi and sanwa are nutritious grains.
2. They can be cultivated under different climatic conditions.
3. They provide vitamins required for maintaining health.
4. They are also sources of iron, calcium and dietary fibre.
5. Their nutritional contribution to a balanced diet is why they are called **nutri-cereals**.

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6th Standard Science Book Chapter 4

Chapter 4: Exploring Magnets

4.1 Summary of the Chapter:

Chapter 4: Exploring Magnets — Summary

(1) **Magnets** are objects that attract certain materials. Naturally occurring magnets called **lodestones** were known in ancient times, while most magnets used today are **artificial magnets** made in different shapes such as bar, U-shaped, ring, disc, cylindrical, and spherical magnets.

(2) Materials that are attracted towards a magnet are called **magnetic materials**. **Iron, nickel, and cobalt** are examples of magnetic materials. Materials that are not attracted by magnets are called **non-magnetic materials**.

(3) A magnet has **two poles**—the **North pole (N)** and the **South pole (S)**. The magnetic force is strongest near these poles, which is why maximum iron filings collect near the ends of a bar magnet.

(4) The poles of a magnet **always occur in pairs**. Even when a magnet is broken into smaller pieces, each piece has both a North and a South pole; a single magnetic pole cannot be obtained.

(5) When a magnet is **freely suspended**, it always comes to rest approximately along the **north-south direction**. The end pointing north is called the North pole, while the other end is the South pole.

(6) The Earth itself behaves like a **giant magnet**. This property causes a freely suspended magnet to align itself in the north-south direction and makes magnets useful for finding directions.

(7) A **magnetic compass** uses a freely rotating magnetised needle to determine directions. The compass needle settles along the north-south direction, enabling the other directions to be identified from the marked dial.

(8) A simple magnetic compass can be constructed by **magnetising an iron sewing needle**, passing it through a cork, and floating the cork on water. The magnetised needle eventually aligns itself in a particular direction.

(9) Magnets exert forces of **attraction and repulsion**. **Unlike poles attract** each other (N–S), whereas **like poles repel** each other (N–N or S–S).

(10) **Repulsion is an important test for identifying a magnet.** An ordinary iron bar is attracted by both poles of a magnet, whereas another magnet can show either attraction or repulsion depending on the poles brought together.

(11) Magnetic force can act **without direct contact** and can even pass through non-magnetic materials such as **wood, cardboard, plastic, and glass**. This is demonstrated using a magnet and a magnetic compass.

(12) Magnets have many interesting practical applications, such as **compasses, magnetic toys, retrieving magnetic objects, magnetic mazes, and models based on attraction and repulsion**. Magnets should be handled carefully and should not be heated, hammered, dropped, or kept near certain electronic devices.

4.2 Important Formulas:

Important Formulas / Quantitative Relationships – Chapter 4: *Exploring Magnets:*

The Chapter 4 is mainly **conceptual and activity-based**. It does **not introduce mathematical formulas or numerical equations** for magnetic force, field strength, etc. The exercises focus mainly on identifying poles, counting attracted objects, and reasoning about attraction and repulsion.

Therefore, students should **not be expected to memorise advanced magnetism formulas**. For quantitative or data-based problems related to this chapter, the following simple mathematical relationships may be useful:

No.	Formula / Relationship	Use
1	**Total objects = Magnetic objects + Non-magnetic objects**	Classification/counting problems
2	**Magnetic objects = Total objects − Non-magnetic objects**	Finding the number attracted by a magnet
3	**Non-magnetic objects = Total objects − Magnetic objects**	Finding the number not attracted
4	**Percentage attracted = (No. attracted ÷ Total tested) × 100**	Comparing experimental results
5	**Percentage not attracted = (No. not attracted ÷ Total tested) × 100**	Classification-based problems
6	**Fraction attracted = No. attracted ÷ Total objects tested**	Simple fraction-based questions
7	**Average objects attracted = Total objects attracted ÷ Number of trials**	Repeated magnet experiments
8	**Difference in attraction = Larger number attracted − Smaller number attracted**	Comparing the strength/effect of different magnets
9	**Total poles = 2 × Number of magnet pieces**	If a magnet is divided into pieces, every piece still has N and S poles
10	**Number of N poles = Number of S poles = Number of magnet pieces**	Pole-counting questions after breaking magnets

Important relationships to remember:
These are **not numerical formulas**, but they are the most important rules for solving reasoning and application problems:
Unlike poles → Attraction

$$N - S \rightarrow \text{Attraction}$$

Like poles → Repulsion

$$N - N \rightarrow \text{Repulsion}$$
$$S - S \rightarrow \text{Repulsion}$$

The chapter explicitly establishes these attraction–repulsion relationships.
A freely suspended magnet also follows:

$$\boxed{\text{Direction of alignment} = \text{North-South}}$$

The North-seeking end points towards North and the other end towards South.
Pole-counting example:
If a bar magnet is broken into **5 pieces**:

$$\text{Total number of poles} = 2 \times 5 = 10$$

Therefore:

- North poles = **5**
- South poles = **5**
- Total poles = **10**

This follows from the chapter's principle that magnetic poles always occur in pairs and that even the smallest broken piece has both N and S poles.

Note for the Question Bank: For this Grade 6 chapter, quantitative questions should preferably involve **counting poles, comparing numbers of pins/U-clips attracted, percentages/fractions of magnetic materials, interpreting tables, and attraction–repulsion patterns**, rather than advanced formulas for magnetic force or magnetic field.

4.3 Fill-Up the Blank LOTS type questions with Answers: (20 Questions)

LOTS Fill-in-the-Blank Questions with Answers:

1. Materials that are attracted towards a magnet are called __________ **materials**.
   Answer: Magnetic
2. Materials that are not attracted towards a magnet are called __________ **materials**.
   Answer: Non-magnetic
3. __________ is a common metal that is attracted by a magnet.
   Answer: Iron
4. Apart from iron, __________ and cobalt are also magnetic metals.
   Answer: Nickel
5. A magnet has __________ poles.
   Answer: Two
6. The two poles of a magnet are called the North pole and the __________ **pole**.
   Answer: South
7. Maximum iron filings stick near the __________ of a bar magnet.
   Answer: Ends
8. The poles of a magnet always exist in __________.
   Answer: Pairs
9. A single North pole or a single South pole __________ exist independently.
   Answer: Cannot
10. A freely suspended magnet comes to rest along the __________ **direction**.
    Answer: North-South
11. The end of a freely suspended magnet pointing towards North is called the __________ **pole**.
    Answer: North
12. The Earth itself behaves like a giant __________.
    Answer: Magnet
13. A device used for finding directions with the help of a magnetised needle is called a magnetic __________.
    Answer: Compass
14. The needle of a magnetic compass can rotate __________.
    Answer: Freely
15. To magnetise an iron sewing needle, a pole of a magnet is repeatedly moved along its __________.
    Answer: Length
16. In the activity for making a simple compass, the magnetised needle is passed through a piece of __________.
    Answer: Cork
17. Unlike poles of two magnets __________ each other.
    Answer: Attract
18. Like poles of two magnets __________ each other.
    Answer: Repel
19. The North pole of one magnet and the __________ **pole** of another magnet attract each other.
    Answer: South

20. Magnetic effect can act through __________ **materials** such as wood, cardboard, plastic and glass.
Answer: Non-magnetic

4.4 Fill-Up the Blank HOTS type questions with Answers: (25 Questions)

20 HOTS Fill-in-the-Blank Questions with Answers:

1. If a freely suspended object always settles along the north-south direction, the object is likely to be a __________.
Answer: Magnet
2. If a bar magnet is broken into four pieces, the total number of magnetic poles formed will be __________.
Answer: Eight
3. If a bar magnet is broken into six pieces, the number of North poles obtained will be __________.
Answer: Six
4. Breaking a magnet repeatedly cannot produce an isolated North pole because magnetic poles always occur in __________.
Answer: Pairs
5. An unknown metal object is attracted by both poles of a known magnet. Attraction alone cannot prove that the object is a __________.
Answer: Magnet
6. If an unknown metal bar repels the North pole of a known magnet, the nearby end of the unknown bar must be its __________ **pole**.
Answer: North
7. If one end of an unknown bar repels the South pole of a known magnet, that end must be its __________ **pole**.
Answer: South
8. The sure property that can distinguish a magnet from an ordinary iron bar is __________.
Answer: Repulsion
9. Two toy cars carrying magnets move away from each other when brought close. The facing poles of their magnets must be __________ **poles**.
Answer: Like
10. If two suspended magnets move towards each other when brought close, their facing poles must be __________ **poles**.
Answer: Unlike
11. If the North pole of a magnet is brought near the North end of a compass needle, the compass needle will move __________ from it.
Answer: Away
12. If the South pole of a bar magnet is brought close to the North pole of a compass needle, the needle will move __________ the bar magnet.
Answer: Towards
13. A steel paper clip lying in water can be moved using a magnet without touching it because magnetic force can act from a __________.
Answer: Distance
14. If a cardboard sheet is placed between a magnet and a compass, the magnetic effect can still pass through because cardboard is a __________ **material**.
Answer: Non-magnetic

15. Replacing cardboard with a thin glass sheet between a magnet and a compass will cause no appreciable change in the needle's __________.
    Answer: Deflection
16. When a bar magnet is rolled over steel U-clips, more clips are expected to collect near its ends because the magnetic effect is strongest at the __________.
    Answer: Poles
17. If positions A and C are the two ends of a bar magnet and B is its middle, the __________ number of steel clips would normally be attracted at position B.
    Answer: Least
18. A mechanic can prevent steel screws from repeatedly falling from a screwdriver by making the screwdriver __________.
    Answer: Magnetic / Magnetised
19. Two ring magnets placed one above the other remain separated without touching when their facing surfaces have __________ **poles**.
    Answer: Like
20. To make two repelling ring magnets come into contact without pushing them, one magnet can be __________ so that unlike poles face each other.
    Answer: Reversed / Turned over

Additional HOTS Questions

21. If a freely suspended magnet points north-south even after being rotated several times, this behaviour can be used for finding __________.
    Answer: Directions
22. A magnetised needle floating on a cork can work as a simple __________.
    Answer: Magnetic compass
23. If a North pole attracts one end of an unknown magnet, that end is most likely the __________ **pole**.
    Answer: South
24. If magnet X remains suspended above magnet Y without moving down, the magnetic force acting between their facing poles is __________.
    Answer: Repulsion
25. A steel ball inside a cardboard maze can be guided by moving a magnet underneath because magnetic effect can pass through __________.
    Answer: Cardboard / Non-magnetic materials

4.5 One-mark questions with Answers of LOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is a magnet?**
   Answer: A magnet is an object that attracts magnetic materials such as iron, nickel and cobalt.
2. **What are naturally occurring magnets called?**
   Answer: Naturally occurring magnets are called **lodestones**.
3. **What are magnetic materials?**
   Answer: Materials that are attracted towards a magnet are called magnetic materials.
4. **Name three magnetic metals.**
   Answer: Iron, nickel and cobalt are magnetic metals.
5. **What are non-magnetic materials?**
   Answer: Materials that are not attracted towards a magnet are called non-magnetic materials.
6. **Name the two poles of a magnet.**
   Answer: The two poles of a magnet are the North pole and the South pole.

7. **Where is the magnetic attraction strongest in a bar magnet?**
   Answer: Magnetic attraction is strongest near the two ends or poles of a bar magnet.
8. **Can a magnet have only one pole?**
   Answer: No, a magnet cannot have a single pole because its North and South poles always occur in pairs.
9. **What happens to the poles when a magnet is broken into smaller pieces?**
   Answer: Each smaller piece has both a North pole and a South pole.
10. **In which direction does a freely suspended magnet come to rest?**
    Answer: A freely suspended magnet comes to rest along the north-south direction.
11. **What is the North-seeking pole of a magnet?**
    Answer: The end of a freely suspended magnet that points towards North is called the North-seeking or North pole.
12. **Why does a freely suspended magnet align in the north-south direction?**
    Answer: A freely suspended magnet aligns north-south because the Earth itself behaves like a giant magnet.
13. **What is a magnetic compass?**
    Answer: A magnetic compass is a device containing a freely rotating magnetic needle used for finding directions.
14. **What direction does the needle of a magnetic compass indicate?**
    Answer: The magnetic compass needle indicates the north-south direction.
15. **Which end of a compass needle is usually painted red?**
    Answer: The end of the compass needle that points towards North is usually painted red.
16. **How can an iron sewing needle be magnetised?**
    Answer: An iron sewing needle can be magnetised by repeatedly stroking it in one direction with the same pole of a magnet.
17. **How can a magnetised needle be used as a simple compass?**
    Answer: A magnetised needle can be floated horizontally on a cork in water to make a simple compass.
18. **What was the ancient Indian navigation device similar to a magnetic compass called?**
    Answer: The ancient Indian navigation device was called **matsya-yantra (or machchh-yantra)**.
19. **What happens when unlike poles of two magnets are brought together?**
    Answer: Unlike poles of two magnets attract each other.
20. **What happens when like poles of two magnets are brought together?**
    Answer: Like poles of two magnets repel each other.
21. **Which pairs of magnetic poles repel each other?**
    Answer: North-North and South-South pole pairs repel each other.
22. **Which pairs of magnetic poles attract each other?**
    Answer: A North pole and a South pole attract each other.
23. **Which property can be used to identify a magnet?**
    Answer: The property of repulsion can be used to identify a magnet.
24. **What happens when the North pole of a magnet is brought near the North pole of a compass needle?**
    Answer: The North pole of the compass needle moves away due to repulsion.
25. **What happens when the South pole of a magnet is brought near the North pole of a compass needle?**
    Answer: The North pole of the compass needle moves towards the South pole due to attraction.

26. **Can magnetic effect act through non-magnetic materials?**
    Answer: Yes, magnetic effect can act through non-magnetic materials.
27. **Name two non-magnetic materials through which magnetic effect can act.**
    Answer: Wood and cardboard are two non-magnetic materials through which magnetic effect can act.
28. **Why do more iron filings collect near the ends of a bar magnet?**
    Answer: More iron filings collect near the ends because the magnetic effect is strongest at the poles.
29. **Name any three shapes in which artificial magnets are made.**
    Answer: Artificial magnets may be made as bar, U-shaped and ring magnets.
30. **Mention one precaution for handling magnets safely.**
    Answer: Magnets should not be heated, dropped or hammered.

4.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **A metal bar always settles in the north-south direction when freely suspended. What can you infer?**
   Answer: The metal bar is a magnet because a freely suspended magnet aligns itself along the north-south direction.
2. **A bar magnet is broken into three pieces; how many poles will be present altogether?**
   Answer: The three pieces will have six poles altogether because each piece has one North and one South pole.
3. **Can breaking a magnet repeatedly produce an isolated North pole? Give a reason.**
   Answer: No, because North and South poles of a magnet always occur in pairs.
4. **An object is attracted by the North pole of a magnet; can you conclude that it is another magnet?**
   Answer: No, because an ordinary magnetic material such as iron can also be attracted by a magnet.
5. **An unknown metal bar repels the North pole of a known magnet; what can you conclude?**
   Answer: The unknown bar is a magnet and the end facing the known North pole is also a North pole.
6. **Why is repulsion considered a better test for identifying a magnet than attraction?**
   Answer: Repulsion confirms a magnet because an ordinary iron bar is attracted by both poles but does not show magnetic repulsion.
7. **A North pole is brought near an unknown pole and the magnets move apart; which pole is unknown?**
   Answer: The unknown pole is a North pole because like poles repel each other.
8. **Two magnets move towards each other when their ends are brought close; what does this indicate?**
   Answer: It indicates that the facing ends are unlike poles.
9. **Two ring magnets remain separated when placed one above the other on a rod; why?**
   Answer: Their facing surfaces have like poles and therefore repel each other.
10. **How can you make two repelling ring magnets attract each other?**
    Answer: Turn one magnet over so that unlike poles face each other.
11. **A compass needle turns when a bar magnet is brought near it; what does this show?**

Answer: It shows that the compass needle itself behaves as a magnet and interacts with the bar magnet.

12. **What happens when the North pole of a bar magnet is brought close to the North end of a compass needle?**
Answer: The North end of the compass needle moves away because like poles repel each other.
13. **Why can a compass be used to find directions even when the Sun or stars are not visible?**
Answer: A compass can find directions because its magnetic needle settles along the north-south direction.
14. **A plain iron bar does not consistently settle north-south when suspended; what does this suggest?**
Answer: It suggests that the iron bar is not a magnet.
15. **Why are more steel pins attracted near the ends of a bar magnet than at its middle?**
Answer: More pins are attracted at the ends because the magnetic effect is strongest at the poles.
16. **A cardboard sheet is placed between a magnet and a compass needle, but the needle still deflects; what does this prove?**
Answer: It proves that magnetic effect can act through non-magnetic materials.
17. **Can a magnet move a steel object without touching it? Give a reason.**
Answer: Yes, a magnet can move a steel object without touching it because magnetic effect can act from a distance.
18. **How can a steel paper clip be removed from water without putting the magnet into the water?**
Answer: A magnet can be moved near the paper clip from outside the container to attract and lift it.
19. **How can a steel ball be moved through a cardboard maze without touching the ball directly?**
Answer: A magnet can be moved below the cardboard tray to guide the steel ball through the maze.
20. **Why does a magnet placed below cardboard still attract a steel object above it?**
Answer: The magnet attracts the steel object because magnetic effect can pass through non-magnetic cardboard.
21. **A sewing needle does not initially attract iron filings but does so after being repeatedly stroked with a magnet; what happened?**
Answer: The sewing needle became magnetised due to repeated stroking with the magnet.
22. **Why does a magnetised needle floating on a cork act as a simple compass?**
Answer: The magnetised needle is free to rotate and settles along the north-south direction.
23. **A mechanic's steel screws keep falling from a screwdriver; how can magnetism help him?**
Answer: The screwdriver can be magnetised so that it attracts and holds the steel screws.
24. **If a South pole attracts one end of an unknown magnet, what is the polarity of that end?**
Answer: The attracted end is the North pole because unlike poles attract each other.

25. **If the North pole of one magnet repels an end of another magnet, what will the opposite end of the second magnet be?**
    Answer: The opposite end of the second magnet will be its South pole.
26. **Why can an iron bar not be identified as a magnet merely because it is attracted to a magnet?**
    Answer: An ordinary iron bar is attracted by both North and South poles, so attraction alone does not prove that it is a magnet.
27. **A compass needle is disturbed and rotated several times but repeatedly returns to the same direction; what property is demonstrated?**
    Answer: It demonstrates the directional property of a freely suspended magnet.
28. **If wood is replaced by glass between a magnet and a compass, will the magnetic effect disappear?**
    Answer: No, the magnetic effect will still act because glass is a non-magnetic material through which the effect can pass.
29. **Two matchbox cars fitted with magnets move away from each other when brought close; what can you infer about their facing poles?**
    Answer: The facing poles must be like poles because like poles repel each other.
30. **If one end of an unmarked magnet is identified as North, how can you identify its other end?**
    Answer: The other end must be the South pole because every magnet has both North and South poles.

4.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type:

1. **What are magnetic and non-magnetic materials? Give one example of each.**
   Answer:
   1. Materials attracted towards a magnet are called magnetic materials; **iron** is an example.
   2. Materials not attracted towards a magnet are called non-magnetic materials; **wood** is an example.
2. **Name the three magnetic metals mentioned in the chapter. What happens when they are brought near a magnet?**
   Answer:
   1. **Iron, nickel and cobalt** are magnetic metals mentioned in the chapter.
   2. They are attracted towards a magnet.
3. **What are the poles of a magnet? Where are they located in a bar magnet?**
   Answer:
   1. The two poles of a magnet are called the **North pole and South pole**.
   2. In a bar magnet, the poles are located near its two ends.
4. **What happens when iron filings are brought near a bar magnet? What does this show?**
   Answer:
   1. Most iron filings stick near the two ends of the bar magnet, while fewer stick to the remaining part.
   2. This shows that the magnetic effect is maximum near the poles of the magnet.
5. **Can a single magnetic pole exist? Explain briefly.**
   Answer:
   1. No, a single North pole or South pole cannot exist independently.

2. Even when a magnet is broken into smaller pieces, each piece has both North and South poles.

6. **What happens when a bar magnet is freely suspended? Name its two ends.**
   Answer:
   1. A freely suspended bar magnet comes to rest along the **north-south direction**.
   2. The north-pointing end is the North pole and the south-pointing end is the South pole.
7. **Why does a freely suspended magnet rest in the north-south direction? How is this property useful?**
   Answer:
   1. A freely suspended magnet rests north-south because the **Earth itself behaves like a giant magnet**.
   2. This directional property is used to find directions with the help of a magnetic compass.
8. **What is a magnetic compass? What does its needle indicate?**
   Answer:
   1. A magnetic compass is a device containing a freely rotating magnet in the shape of a needle.
   2. Its needle indicates the **north-south direction**.
9. **Describe two features of a magnetic compass.**
   Answer:
   1. A magnetic compass usually consists of a small circular box containing a freely rotating magnetic needle.
   2. It has a dial marked with directions, and the north-pointing end of the needle is usually painted red.
10. **How can an iron sewing needle be magnetised?**
    Answer:
    1. Move one pole of a bar magnet along the length of the iron needle from one end to the other in the same direction.
    2. Repeat this process about **30–40 times** until the needle begins attracting iron filings or steel pins.
11. **How can a simple magnetic compass be made using a magnetised needle?**
    Answer:
    1. Pass the magnetised needle horizontally through a cork and float the cork in a bowl of water.
    2. When the needle comes to rest, it aligns in a particular direction and acts as a simple magnetic compass.
12. **What was the matsya-yantra? How was it used?**
    Answer:
    1. The **matsya-yantra (machchh-yantra)** was an ancient Indian navigation device consisting of a magnetised fish-shaped iron piece.
    2. It was kept in a vessel of oil and was used for navigation at sea.
13. **State the rule of attraction between magnetic poles.**
    Answer:
    1. Unlike poles, that is, the North pole of one magnet and South pole of another, **attract each other**.
    2. Thus, an N–S combination produces attraction.
14. **State the rule of repulsion between magnetic poles.**
    Answer:
    1. Like poles of two magnets **repel each other**.

2. Therefore, N–N and S–S combinations show repulsion.

15. **How can the property of repulsion be used to identify a magnet?**
    Answer:
    1. An iron bar is attracted by both the North and South poles of a magnet.
    2. Since repulsion occurs between like magnetic poles, the property of **repulsion can be used to identify a magnet**.
16. **What happens when the North and South poles of a bar magnet are separately brought near the North pole of a compass needle?**
    Answer:
    1. The North pole of the compass needle moves away when the North pole of the bar magnet is brought near it.
    2. It moves closer when the South pole of the bar magnet is brought near it.
17. **Can magnetic effect act through non-magnetic materials? Give examples.**
    Answer:
    1. Yes, magnetic effect can act through non-magnetic materials without appreciable change in its effect on a nearby compass needle.
    2. Examples tested in the chapter include **wood, cardboard, plastic and glass**.
18. **How can a magnet move an object without touching it? Give one example from the chapter.**
    Answer:
    1. A magnet can exert its magnetic effect on a magnetic object without directly touching it.
    2. For example, steel balls can be moved through a cardboard maze by moving a magnet below the tray.
19. **Mention two precautions that should be taken while handling magnets.**
    Answer:
    1. Magnets should not be **heated, dropped or hammered**.
    2. They should not be kept near **mobile phones or remote controls**.
20. **How should magnets be stored properly?**
    Answer:
    1. Magnets should be stored in pairs with unlike poles on the same side and a piece of wood placed between them.
    2. Two pieces of soft iron should be placed across their ends.
21. **What happens when a magnet is broken into several pieces?**
    Answer:
    1. Each broken piece becomes a smaller magnet having its own North and South poles.
    2. Therefore, breaking a magnet cannot produce an isolated magnetic pole.
22. **How is a freely suspended magnet different from an ordinary iron bar?**
    Answer:
    1. A freely suspended magnet consistently comes to rest along the north-south direction.
    2. An ordinary iron bar may come to rest in any direction.
23. **Name any four shapes of magnets discussed in the chapter.**
    Answer:
    1. Magnets are made in shapes such as **bar, U-shaped, ring and disc**.
    2. They may also be cylindrical or spherical depending on their requirements.
24. **What are artificial magnets? Give two examples of objects in which they are used.**
    Answer:

1. Magnets made by humans from suitable materials are called artificial magnets.
2. They are commonly used in **pencil boxes, stickers and toys**.

25. **What does the chapter conclude about the poles of magnets of different shapes and sizes?**
Answer:
    1. Magnets can be made in different shapes and sizes according to requirements.
    2. Regardless of their shape or size, their North and South poles always occur in pairs.

4.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type

1. **A metal bar always comes to rest in the north-south direction when freely suspended. What can you conclude? Give a reason.**
Answer:
    1. The metal bar can be identified as a magnet.
    2. This is because a freely suspended magnet consistently aligns itself along the north-south direction.
2. **A bar magnet is broken into four pieces. How many poles will be formed and why?**
Answer:
    1. The four pieces will have eight poles in total—four North poles and four South poles.
    2. Each broken piece becomes a magnet having both a North and a South pole.
3. **An unknown metal bar is attracted by both poles of a known magnet. Can you confirm that it is a magnet? Why?**
Answer:
    1. No, attraction by both poles cannot confirm that the unknown bar is a magnet.
    2. An ordinary iron bar is also attracted by both the North and South poles of a magnet.
4. **How would you distinguish a magnet from an ordinary iron bar using a known magnet?**
Answer:
    1. Bring each pole of the known magnet near the ends of the unknown bar and look for repulsion.
    2. If repulsion occurs, the unknown bar is a magnet because repulsion is a sure test of magnetism.
5. **The North pole of a known magnet repels one end of an unknown magnetic bar. Identify both poles of the unknown bar.**
Answer:
    1. The repelled end of the unknown bar is its North pole because like poles repel.
    2. Its opposite end must therefore be the South pole.
6. **Why do more iron filings collect at the ends of a bar magnet than at its centre? What can you infer?**
Answer:
    1. More iron filings collect at the ends because the magnetic effect is strongest there.
    2. Therefore, the ends of the bar magnet are identified as its magnetic poles.

7. **A student suspends an iron bar and a bar magnet separately. How can the student distinguish between them?**
   Answer:
   1. The bar magnet repeatedly comes to rest along the north-south direction when freely suspended.
   2. The ordinary iron bar can come to rest in any direction and does not show this fixed alignment.
8. **A sailor cannot see the Sun or stars because of cloudy weather. How can a magnetic compass help?**
   Answer:
   1. The magnetic compass needle will settle along the north-south direction.
   2. Once North and South are identified, the sailor can determine the other directions from the compass dial.
9. **A student places a piece of cardboard between a bar magnet and a compass needle, but the needle still deflects. What does this demonstrate?**
   Answer:
   1. It demonstrates that magnetic effect can act through cardboard.
   2. Thus, a non-magnetic material placed between a magnet and a magnetic object does not necessarily block the magnetic effect.
10. **How can you move a steel ball through a cardboard maze without touching the ball directly? Explain the principle involved.**
    Answer:
    1. Move a magnet underneath the cardboard tray to guide the steel ball through the maze.
    2. This works because magnetic effect can act through non-magnetic cardboard without direct contact.
11. **Two toy cars fitted with magnets move away from each other when brought close. What can you infer about their poles?**
    Answer:
    1. The facing ends of the magnets must have like poles, either N–N or S–S.
    2. The cars move apart because like magnetic poles repel each other.
12. **Two ring magnets are placed on a vertical support, and the upper magnet remains suspended above the lower one. Why does this happen? How can they be made to touch?**
    Answer:
    1. The facing sides have like poles, so repulsion prevents the upper magnet from moving down.
    2. Turning one magnet over will make unlike poles face each other, causing attraction.
13. **A mechanic finds that steel screws repeatedly fall from his screwdriver. How can the knowledge of magnets solve this problem?**
    Answer:
    1. The screwdriver can be magnetised by repeatedly stroking it with one pole of a magnet in the same direction.
    2. The magnetised screwdriver will then attract and hold the steel screws.
14. **A compass needle moves away when the North pole of a bar magnet is brought near its North end. Why? What would happen if the South pole were brought near instead?**
    Answer:
    1. The North end moves away because the two North poles repel each other.

2. If the South pole were brought near, the North end of the compass needle would move towards it due to attraction.

15. **A student repeatedly strokes an iron needle with one pole of a magnet and then brings it near steel pins. The pins stick to the needle. What can be concluded?**
Answer:
    1. The iron needle has become magnetised after repeated stroking with the magnet.
    2. Its ability to attract the steel pins provides evidence that it has acquired magnetic properties.
16. **Why can a magnet retrieve a steel paper clip from water without itself touching the water?**
Answer:
    1. The magnet can attract the steel paper clip from outside the container without direct contact.
    2. This demonstrates that magnetic force can act at a distance and through non-magnetic material.
17. **A student tries to obtain only a North pole by cutting away the South end of a magnet. Will the attempt succeed? Explain.**
Answer:
    1. No, cutting the magnet will not produce an isolated North pole.
    2. Every newly formed piece will again possess both a North and a South pole because magnetic poles always occur in pairs.
18. **A magnetic compass gives almost the same deflection when wood is replaced by glass between the compass and a nearby magnet. What conclusion can be drawn?**
Answer:
    1. Both wood and glass allow the magnetic effect to act through them without appreciable change in the observed deflection.
    2. Therefore, magnetic effect can act through different non-magnetic materials.
19. **A bar magnet attracts 10 steel clips at each end but only 2 near its middle. What does this observation indicate?**
Answer:
    1. The greater number of clips at the ends indicates that magnetic attraction is stronger near the ends of the magnet.
    2. Hence, the two ends represent the poles, while the middle has a weaker magnetic effect.
20. **How can an unmarked bar magnet's North pole be identified without using another magnet?**
Answer:
    1. Suspend the bar magnet freely using a thread and allow it to come to rest.
    2. The end that repeatedly points towards the North is its North pole.
21. **Why is a magnetised needle floating on a cork suitable for making a simple compass?**
Answer:
    1. Floating the cork allows the magnetised needle to rotate freely with little obstruction.
    2. The needle eventually aligns in the north-south direction and can therefore indicate directions.

22. **Two magnets attract each other when particular ends face one another. What will happen if one magnet is reversed? Explain.**
    Answer:
    1. Reversing one magnet can bring like poles face-to-face instead of unlike poles.
    2. The interaction will then change from attraction to repulsion because like poles repel.
23. **Why should a magnet not be dropped, hammered or heated? What does the chapter advise instead?**
    Answer:
    1. The chapter cautions against heating, dropping or hammering magnets while handling them.
    2. It recommends storing magnets properly in pairs with suitable wooden and soft-iron pieces.
24. **Suppose a compass needle does not change its deflection when a thin plastic sheet is inserted between it and a magnet. What does this tell you?**
    Answer:
    1. The plastic sheet does not appreciably prevent the magnetic interaction between the magnet and compass needle.
    2. This supports the conclusion that magnetic effect can act through non-magnetic materials.
25. **Three identical metal bars include two magnets and one iron bar. Which magnetic property would be most useful for identifying the magnets, and why?**
    Answer:
    1. **Repulsion** would be the most useful property because it occurs between like poles of two magnets.
    2. Attraction alone is insufficient because an ordinary iron bar can also be attracted by a magnet.

4.9. Three-mark questions with Answers of LOTS Type: (18 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:
1. What are magnetic and non-magnetic materials? Give examples.
Answer:
1. Materials that are attracted towards a magnet are called **magnetic materials**.
2. Iron, nickel and cobalt are examples of magnetic materials.
3. Materials that are not attracted towards a magnet are called **non-magnetic materials**, such as wood and plastic.

2. What are the poles of a magnet? Describe their location and strength.
Answer:
1. A magnet has two poles called the **North pole and South pole**.
2. In a bar magnet, these poles are located near its two ends.
3. The magnetic effect is maximum near the poles, so more iron filings collect at the ends.

3. Explain what happens when a bar magnet is broken into smaller pieces.
Answer:
1. When a bar magnet is broken, each smaller piece behaves like a magnet.
2. Every piece has its own North pole and South pole.
3. Thus, an isolated North or South pole cannot be obtained by breaking a magnet.

4. Describe the directional property of a freely suspended magnet.
Answer:
1. A freely suspended magnet always comes to rest along the **north-south direction**.

2. The end pointing towards North is called the North pole, while the other end is called the South pole.
3. This property of magnets can be used for finding directions.

5. What is a magnetic compass? Describe its main features.

Answer:

1. A magnetic compass is a device used for finding directions with the help of a magnetic needle.
2. It contains a freely rotating magnetic needle inside a small circular box.
3. The dial is marked with directions, and the north-pointing end of the needle is usually painted red.

6. Explain how an iron sewing needle can be magnetised.

Answer:

1. Place an iron sewing needle on a flat surface and take one pole of a bar magnet.
2. Move the same pole of the magnet along the needle from one end to the other in the same direction.
3. Repeat this process about 30–40 times until the needle starts attracting iron filings or steel pins.

7. Describe how to make a simple magnetic compass using a magnetised needle.

Answer:

1. Pass a magnetised needle horizontally through a small piece of cork.
2. Float the cork with the needle in a bowl of water and allow it to rotate freely.
3. When the needle comes to rest, it aligns in a particular direction and can be used as a simple compass.

8. State the rules of attraction and repulsion between magnetic poles.

Answer:

1. The North pole of one magnet attracts the South pole of another magnet.
2. Two North poles or two South poles repel each other.
3. Therefore, **unlike poles attract and like poles repel**.

9. How can repulsion be used to identify a magnet?

Answer:

1. An ordinary iron bar is attracted by both the North and South poles of a magnet.
2. Two like poles of magnets, however, repel each other.
3. Therefore, **repulsion is a reliable property for identifying a magnet**.

10. Describe the interaction between a bar magnet and a compass needle.

Answer:

1. When the North pole of a bar magnet is brought near the North end of a compass needle, the needle moves away.
2. When the South pole is brought near the North end of the compass needle, the needle moves towards it.
3. These observations demonstrate that like poles repel and unlike poles attract.

11. Explain how magnetic effect can act through non-magnetic materials.

Answer:

1. A non-magnetic material such as cardboard can be placed between a magnet and a compass needle.
2. The compass needle still shows the effect of the nearby magnet.
3. This demonstrates that magnetic effect can act through non-magnetic materials such as wood, cardboard, plastic and glass.

12. Describe an activity that demonstrates magnetic effect without direct contact.

Answer:

1. Place a steel ball on a cardboard maze and hold a magnet below the cardboard.

2. Move the magnet underneath the cardboard to guide the steel ball along the maze.
3. This activity shows that a magnet can exert its effect on a magnetic object without directly touching it.

13. Write three points about the ancient *matsya-yantra*.

Answer:

1. The **matsya-yantra (machchh-yantra)** was an ancient Indian device used for navigation.
2. It consisted of a magnetised fish-shaped iron piece placed in a vessel of oil.
3. It was used by travellers for navigation at sea.

14. Explain how iron filings can be used to locate the poles of a bar magnet.

Answer:

1. Place a bar magnet in iron filings and observe where the filings collect.
2. A larger number of iron filings stick near the two ends of the magnet.
3. These regions of maximum magnetic effect are identified as the **poles of the magnet**.

15. Mention three precautions to be followed while handling magnets.

Answer:

1. Magnets should not be heated because improper handling can affect them.
2. Magnets should not be dropped or hammered.
3. Magnets should be kept away from devices such as mobile phones and remote controls.

16. Explain the proper method of storing bar magnets.

Answer:

1. Bar magnets should be stored in pairs with unlike poles on the same side.
2. A piece of wood should be placed between the two magnets.
3. Pieces of soft iron should be placed across their ends for proper storage.

17. Differentiate between a freely suspended magnet and an ordinary iron bar.

Answer:

1. A freely suspended magnet consistently comes to rest along the north-south direction.
2. An ordinary iron bar may come to rest in any direction.
3. Thus, the directional property helps distinguish a magnet from an ordinary iron bar.

18. Write three points about magnets of different shapes.

Answer:

1. Magnets can be made in different shapes and sizes according to their requirements.
2. They may be bar-shaped, U-shaped, ring-shaped, disc-shaped, cylindrical or spherical.
3. Regardless of their shape, the North and South poles of magnets always occur in pairs.

4.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:

1. Riya is given an iron bar and a bar magnet of the same size without labels. How can she identify the magnet using another known magnet?

Answer:

1. Riya should bring one pole of the known magnet near both ends of each unknown bar.
2. The ordinary iron bar will show attraction, whereas the magnet can show repulsion when like poles face each other.
3. Therefore, the bar that shows **repulsion** can be identified as the magnet.

2. A bar magnet is broken into three equal pieces. Predict the number and arrangement of poles in the pieces.

Answer:

1. Each broken piece will behave as a complete magnet with a North and a South pole.
2. Thus, the three pieces will have a total of six poles—three North and three South poles.

3. This happens because magnetic poles always occur in pairs and cannot be isolated by breaking a magnet.

3. A student finds that 12 steel pins stick near each end of a bar magnet but only a few near its centre. What conclusions can be drawn?

Answer:

1. The large number of pins at the ends shows that magnetic attraction is strongest there.
2. The two ends can therefore be identified as the magnetic poles of the bar magnet.
3. The fewer pins near the centre indicate that the magnetic effect is weaker there.

4. An unmarked bar magnet is given to you. How would you identify its North and South poles without using another magnet?

Answer:

1. Suspend the bar magnet freely using a thread and allow it to come to rest.
2. The end that repeatedly points towards North is its North pole.
3. The opposite end pointing towards South is its South pole.

5. A student says, "Any metal object attracted by a magnet must itself be a magnet." Do you agree? Justify your answer.

Answer:

1. No, attraction alone does not prove that an object is a magnet.
2. An ordinary iron bar can also be attracted by both poles of a magnet.
3. Repulsion is a better test because it occurs when like poles of two magnets are brought together.

6. A compass needle turns away when the North pole of a bar magnet is brought near its North end. What happens if the bar magnet is reversed? Explain.

Answer:

1. Initially, the North end of the compass needle moves away because like poles repel.
2. After the bar magnet is reversed, its South pole faces the North end of the compass needle.
3. The compass needle then moves towards the bar magnet because unlike poles attract.

7. A steel ball is placed on a cardboard sheet and a magnet is moved below the sheet. Predict what will happen and explain why.

Answer:

1. The steel ball will move as the magnet is moved beneath the cardboard.
2. The magnet attracts the steel ball even though the cardboard separates them.
3. This demonstrates that magnetic effect can act through a non-magnetic material without direct contact.

8. Two ring magnets are placed one above the other on a vertical support, but the upper magnet remains separated from the lower one. Explain this observation and suggest how to make them attract.

Answer:

1. The facing surfaces of the two magnets have like poles, so they repel each other.
2. This repulsion keeps the upper ring magnet separated from the lower one.
3. Turning one ring magnet over will bring unlike poles face-to-face and cause attraction.

9. A student repeatedly strokes an iron needle with one pole of a magnet. How can the student check whether the activity has succeeded?

Answer:

1. The student can bring the treated needle near iron filings or steel pins.
2. If the needle attracts them, it has acquired magnetic properties and has become magnetised.
3. The magnetised needle can also be floated on cork to observe its directional behaviour.

10. During cloudy weather, a traveller cannot use the Sun to determine directions. How can a magnetic compass solve the problem?

Answer:

1. The traveller can place the compass horizontally and allow its magnetic needle to come to rest.
2. The marked end of the needle will indicate North while the opposite end indicates South.
3. The remaining directions can then be identified with the help of the compass markings.

11. A student places wood, cardboard, plastic and glass one at a time between a magnet and a compass. The compass continues to respond. What can the student infer?

Answer:

1. The compass response shows that the magnetic effect is reaching the needle through these materials.
2. Wood, cardboard, plastic and glass are non-magnetic materials tested in the activity.
3. The observations support the conclusion that magnetic effect can act through non-magnetic materials.

12. A mechanic finds it difficult to hold small steel screws on the tip of a screwdriver. How can the concept of magnetism help?

Answer:

1. The screwdriver can be magnetised by stroking it repeatedly with one pole of a magnet in the same direction.
2. After magnetisation, the screwdriver will attract the steel screws.
3. This makes it easier for the mechanic to hold and position the screws while working.

13. Two toy cars fitted with magnets move apart when their magnetic ends face each other. What does this tell you, and how could you make the cars move towards each other?

Answer:

1. The cars move apart because the facing ends of their magnets are like poles.
2. Like poles, either N–N or S–S, repel each other.
3. Reversing one magnet will make unlike poles face each other, causing the cars to attract.

14. A student cuts off the South end of a magnet hoping to obtain a magnet with only a North pole. Will the experiment succeed? Explain.

Answer:

1. No, cutting the magnet will not produce an isolated North pole.
2. The newly cut pieces will each develop both a North and a South pole.
3. This demonstrates that the two magnetic poles always occur together as a pair.

15. An iron bar and a bar magnet are separately suspended by threads. How would their behaviour help you distinguish them?

Answer:

1. The bar magnet will repeatedly settle along the north-south direction when allowed to rotate freely.
2. The ordinary iron bar may come to rest in any direction and will not consistently show north-south alignment.
3. Hence, repeated directional alignment can help identify the bar magnet.

16. A child drops a steel paper clip into water and does not want to put a hand into the water. Suggest a magnetic solution.

Answer:

1. The child can bring a magnet close to the steel paper clip from outside the container.
2. The magnetic attraction can move the clip towards a convenient position without direct contact.

3. This application demonstrates that magnetic effect can act at a distance and through non-magnetic material.

17. A student stores magnets carelessly by repeatedly dropping and hammering them. What advice would you give based on the chapter?

Answer:

1. The student should avoid heating, dropping or hammering magnets.
2. Magnets should also be kept away from devices such as mobile phones and remote controls.
3. Bar magnets should be stored properly in pairs with suitable wood and soft-iron pieces.

18. A magnet of an unusual circular shape has no obvious "ends." Can it still have North and South poles? Explain.

Answer:

1. Yes, magnets can have different shapes such as rings, discs, cylinders and spheres.
2. Their poles need not always appear as the obvious ends seen in a bar magnet.
3. Irrespective of shape or size, the North and South poles of a magnet always occur in pairs.

19. A magnet attracts a steel pin even when a thin plastic sheet is placed between them. What two concepts does this observation demonstrate?

Answer:

1. It demonstrates that a magnet can attract a magnetic material without directly touching it.
2. It also shows that magnetic effect can act through a non-magnetic material such as plastic.
3. Therefore, direct physical contact is not necessary for the magnetic effect to be observed.

20. You are given a magnetised needle, a cork and a bowl of water. How could you use them to determine directions?

Answer:

1. Pass the magnetised needle horizontally through the cork and float the cork on water.
2. Allow the cork and needle to rotate freely until they come to rest.
3. The needle's north-south alignment can then be used to determine the directions.

4.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:

1. Explain magnetic and non-magnetic materials with suitable examples.

Answer:

1. Materials that are attracted towards a magnet are called **magnetic materials**.
2. Iron, nickel and cobalt are examples of magnetic materials.
3. Materials that are not attracted towards a magnet are called **non-magnetic materials**.
4. Wood, plastic, cardboard and glass are examples of non-magnetic materials.
5. Materials can therefore be classified as magnetic or non-magnetic by observing whether they are attracted towards a magnet.

2. Describe the poles of a magnet and their important properties.

Answer:

1. A magnet has two poles called the **North pole and South pole**.
2. In a bar magnet, the poles are located near its two ends.
3. The magnetic effect is strongest near the poles, so more iron filings collect at the ends.
4. The North and South poles of a magnet always occur together as a pair.

5. Even when a magnet is broken into smaller pieces, each piece has both a North and a South pole.

3. Explain the directional property of a magnet and its use in finding directions.

Answer:

1. When a bar magnet is freely suspended, it comes to rest along the **north-south direction**.
2. The end that points towards North is called the **North pole** of the magnet.
3. The opposite end that points towards South is called the **South pole**.
4. The Earth itself behaves like a giant magnet, which is related to this directional behaviour.
5. This property of magnets is used in a magnetic compass to find directions.

4. Describe how to magnetise an iron needle and use it to make a simple magnetic compass.

Answer:

1. Place an iron sewing needle on a flat surface and take one pole of a bar magnet.
2. Move the same pole of the magnet along the length of the needle from one end to the other in the same direction.
3. Repeat this process about **30–40 times** until the needle becomes magnetised.
4. Pass the magnetised needle horizontally through a small piece of cork and float it in a bowl of water.
5. When allowed to rotate freely, the magnetised needle settles in a particular direction and can be used as a simple compass.

5. Explain attraction and repulsion between the poles of magnets.

Answer:

1. When the North pole of one magnet is brought near the South pole of another magnet, they attract each other.
2. Thus, **unlike poles of magnets attract each other**.
3. When two North poles are brought close together, they repel each other.
4. Similarly, two South poles also repel each other.
5. Therefore, the basic rule of magnetic interaction is **like poles repel and unlike poles attract**.

6. Explain how repulsion can be used to identify a magnet.

Answer:

1. An ordinary iron bar is attracted towards both the North and South poles of a magnet.
2. Therefore, attraction alone cannot always be used to confirm whether an object is a magnet.
3. When like poles of two magnets are brought close, they repel each other.
4. An ordinary iron bar does not show such repulsion with a magnet.
5. Hence, **repulsion is a reliable property for identifying a magnet**.

7. Describe an activity to show that magnetic effect can act through non-magnetic materials.

Answer:

1. Place a compass on a table and bring a bar magnet near it so that the compass needle shows deflection.
2. Place a non-magnetic material between the magnet and the compass.
3. Materials such as wood, cardboard, plastic or glass can be tested one by one.
4. The compass needle continues to experience the magnetic effect through these materials.
5. The activity shows that **magnetic effect can act through non-magnetic materials**.

8. Describe the structure and working of a magnetic compass.

Answer:

1. A magnetic compass is a device used to find directions.
2. It consists of a freely rotating magnetic needle placed inside a small circular box.
3. The dial of the compass is marked with different directions.
4. The end of the needle pointing towards North is usually painted red.
5. When the needle comes to rest along the north-south direction, the compass markings help us determine the other directions.

9. Explain the precautions and proper method of storing magnets.
Answer:

1. Magnets should not be **heated, dropped or hammered**.
2. They should be kept away from devices such as mobile phones and remote controls.
3. Bar magnets should be stored in pairs with unlike poles on the same side.
4. A piece of wood should be placed between the two bar magnets.
5. Pieces of soft iron should be placed across their ends while storing them.

10. Describe different shapes of magnets and explain the occurrence of their poles.
Answer:

1. Magnets are made in different shapes and sizes according to their uses.
2. Common shapes include **bar, U-shaped, ring and disc magnets**.
3. Magnets may also be cylindrical or spherical in shape.
4. Regardless of their shape or size, every magnet has a North pole and a South pole.
5. The North and South poles of a magnet always occur together in pairs.

11. Explain how a bar magnet and an ordinary iron bar behave differently.
Answer:

1. A freely suspended bar magnet consistently comes to rest along the north-south direction.
2. An ordinary iron bar may come to rest in any direction when suspended.
3. A magnet has two poles called the North pole and South pole.
4. An ordinary iron bar is attracted by both poles of a magnet.
5. Repulsion and consistent north-south alignment can therefore help in identifying a magnet.

12. Describe some useful applications of magnetic effect discussed in the chapter.
Answer:

1. A magnet can be used to move magnetic objects without touching them directly.
2. A steel ball can be guided through a cardboard maze using a magnet placed below the cardboard.
3. Magnets fitted to toy cars can produce attraction or repulsion depending on the poles facing each other.
4. Magnetic effect can act through non-magnetic materials such as cardboard.
5. These activities demonstrate how magnetic attraction and repulsion can be used in interesting practical applications.

4.12 Five-mark questions with Answers of HOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:
1. You are given an ordinary iron bar and a bar magnet of the same size and appearance. Explain how you would identify the magnet using another known magnet.
Answer:

1. Bring one pole of the known magnet near both ends of each unknown bar and observe their interaction.
2. The ordinary iron bar will be attracted towards both poles of the known magnet.

3. The bar magnet will show repulsion when a like pole of the known magnet is brought near one of its ends.
4. Attraction alone cannot confirm that an object is a magnet because an iron bar can also be attracted.
5. Therefore, **repulsion is the reliable test for identifying the magnet**.

2. A student breaks a bar magnet into four pieces hoping to obtain a separate North pole. Predict the result and explain the scientific reason.

Answer:

1. The student will not obtain an isolated North pole by breaking the magnet.
2. Each of the four pieces will behave as a smaller complete magnet.
3. Every piece will have its own North pole and South pole.
4. Thus, four pieces will have four North poles and four South poles, making eight poles altogether.
5. The experiment demonstrates that the North and South poles of a magnet always occur in pairs.

3. A student is given an unmarked bar magnet and asked to identify its North and South poles without using another magnet. Design a simple experiment.

Answer:

1. Tie a thread around the middle of the bar magnet and suspend it horizontally so that it can rotate freely.
2. Allow the magnet to come to rest and note the direction in which its ends point.
3. Rotate it gently and repeat the observation to confirm the direction.
4. The end that repeatedly points towards North is identified as the North pole.
5. The opposite end is the South pole because a freely suspended magnet consistently aligns itself along the north-south direction.

4. A student observes that many steel pins stick to the ends of a bar magnet but only a few stick near its middle. Analyse the observation.

Answer:

1. The greater number of steel pins at the ends shows that magnetic attraction is stronger there.
2. The regions of maximum magnetic effect are called the poles of the magnet.
3. Therefore, the two ends of the bar magnet can be identified as its magnetic poles.
4. The smaller number of pins near the middle indicates a weaker magnetic effect in that region.
5. Hence, the distribution of attracted pins can be used to locate the strongest regions of a bar magnet.

5. A compass needle deflects even when a thin cardboard sheet is placed between it and a bar magnet. Explain the observation and suggest how you could extend the experiment.

Answer:

1. The compass needle deflects because the magnetic effect of the bar magnet can act through the cardboard.
2. Cardboard is a non-magnetic material and does not prevent the magnetic interaction in this activity.
3. The experiment can be repeated by placing wood, plastic and glass between the magnet and compass.
4. The compass needle can be observed for any change in its deflection with each material.
5. Such observations demonstrate that magnetic effect can act through different non-magnetic materials.

6. Two ring magnets placed on a vertical support remain separated, with the upper magnet appearing to float above the lower one. Explain the observation and suggest how to make them attract.

Answer:

1. The upper magnet remains separated because the facing surfaces of the two magnets have like poles.
2. Like magnetic poles repel each other, producing a repulsive interaction between the ring magnets.
3. This repulsion prevents the upper magnet from moving down and touching the lower magnet.
4. Turn one of the ring magnets over so that unlike poles face each other.
5. The magnets will then attract because unlike poles attract each other.

7. A mechanic wants small steel screws to remain attached to the tip of a screwdriver while working. Use your knowledge of magnets to suggest a solution.

Answer:

1. The mechanic can magnetise the screwdriver using a bar magnet.
2. One pole of the magnet should be stroked repeatedly along the screwdriver in the same direction.
3. Repeating the process allows the screwdriver to acquire magnetic properties.
4. The magnetised screwdriver can then attract and hold small steel screws.
5. Thus, the property of magnetic attraction can be applied to solve the mechanic's practical problem.

8. Two toy cars fitted with magnets move away from each other when brought face-to-face. Analyse what is happening and explain how you could make them move towards each other.

Answer:

1. The cars moving away from each other indicates that the facing magnetic poles are like poles.
2. The facing poles could therefore be N–N or S–S.
3. Like poles repel, producing a force that pushes the cars away from each other.
4. Reverse one of the magnets so that unlike poles face each other.
5. The cars will then move towards each other because unlike poles attract.

9. A traveller loses direction on a cloudy day when the Sun is not visible. Explain how a magnetic compass can help the traveller.

Answer:

1. The traveller should place the magnetic compass horizontally and allow its needle to rotate freely.
2. The compass needle will eventually settle along the north-south direction.
3. The marked end of the needle can be used to identify North.
4. Once North and South are known, the compass markings can be used to identify the remaining directions.
5. Thus, the directional property of a freely rotating magnetic needle enables the traveller to determine directions.

10. A steel ball has to be moved through a cardboard maze without touching it directly. Design a method using a magnet and explain why it works.

Answer:

1. Place the steel ball at the starting point of the maze on the cardboard surface.
2. Hold a magnet underneath the cardboard close to the position of the steel ball.
3. Move the magnet slowly along the required path through the maze.

4. The steel ball will follow the magnet because steel is attracted by the magnet even through the cardboard.
5. The activity demonstrates that magnetic effect can act through a non-magnetic material without direct contact.

11. A student claims that attraction is enough to prove that an unknown metal object is a magnet. Evaluate the claim and suggest a better test.

Answer:

1. The student's claim is incorrect because an ordinary iron object can also be attracted by a magnet.
2. Therefore, observing attraction does not establish that the unknown object itself is a magnet.
3. The unknown object should instead be tested for repulsion using a known magnet.
4. If one of its ends repels a pole of the known magnet, the object can be identified as a magnet.
5. Hence, **repulsion rather than attraction provides a reliable test for magnetism**.

12. A student wants to make a simple direction-finding device using an iron needle, a bar magnet, cork and water. Explain the complete procedure and principle.

Answer:

1. Stroke the iron needle repeatedly in one direction with the same pole of a bar magnet to magnetise it.
2. Pass the magnetised needle horizontally through a small piece of cork.
3. Float the cork carefully on water so that the needle can rotate freely.
4. Allow the needle to settle and observe its final orientation.
5. The needle aligns along the north-south direction and therefore works as a simple magnetic compass.

4.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. A carpenter accidentally drops several small iron nails into a box containing sawdust, paper pieces and wooden chips. How can a magnet help him separate the nails?

Answer:

1. The carpenter can move a strong magnet over the mixture without picking the materials by hand.
2. The iron nails will be attracted towards the magnet because iron is a magnetic material.
3. The sawdust, paper and wooden pieces will not be attracted because they are non-magnetic materials.
4. The attracted nails can be removed from the magnet and collected separately.
5. Thus, the magnetic property of iron can be applied to separate magnetic objects from non-magnetic materials.

2. A student is lost during a nature camp and has a magnetised needle, cork and a bowl of water. Explain how these materials can be used to find directions.

Answer:

1. The student should pass the magnetised needle horizontally through the cork.
2. The cork should then be floated carefully on the surface of water so that it can rotate freely.
3. After some time, the magnetised needle will settle along the north-south direction.
4. The end pointing towards North can be used to identify North, and the opposite end indicates South.

5. Once North and South are known, the student can determine the other directions accordingly.

3. A child has to move a steel ball from the starting point to the finishing point of a cardboard maze without touching the ball. How can this be done?

Answer:

1. The steel ball should be placed at the starting point on the cardboard maze.
2. A magnet should be held underneath the cardboard close to the steel ball.
3. The magnet should then be moved slowly along the correct path towards the finishing point.
4. The steel ball will follow the magnet because steel is attracted towards a magnet.
5. This application demonstrates that magnetic effect can act through a non-magnetic material such as cardboard.

4. A mechanic finds it difficult to keep a small steel screw on the tip of a screwdriver while fixing it in a narrow place. Suggest a magnetic solution.

Answer:

1. The mechanic can magnetise the screwdriver before using it to handle the screw.
2. One pole of a magnet can be moved repeatedly along the screwdriver in the same direction.
3. After repeated stroking, the screwdriver acquires magnetic properties.
4. The magnetised screwdriver can attract and hold the small steel screw at its tip.
5. Thus, magnetisation provides a practical way of handling small steel screws while working.

5. Two children make toy cars with magnets attached to their fronts. The cars move away from each other when brought close. Explain how they can make the cars move towards each other instead.

Answer:

1. The cars move away because like poles of the attached magnets are facing each other.
2. Like magnetic poles, N–N or S–S, repel each other.
3. One child should reverse the magnet fixed to one of the cars.
4. This will make a North pole face a South pole, producing attraction.
5. The two cars will then move towards each other because unlike magnetic poles attract.

6. A steel paper clip falls into a container of water, and you do not want to put your hand into the water. How can you retrieve it using a magnet?

Answer:

1. Bring a magnet close to the steel paper clip from outside the container.
2. Move the magnet slowly along the outside surface towards the top of the container.
3. The steel paper clip will be attracted towards the magnet because steel is a magnetic material.
4. The magnetic effect can act without direct contact and through a suitable non-magnetic barrier.
5. The paper clip can therefore be guided to a convenient position and removed without putting a hand into the water.

7. You are given two identical-looking bars, one an iron bar and the other a magnet, along with a known bar magnet. Explain how you would identify the unknown magnet.

Answer:

1. Bring one pole of the known magnet close to both ends of each unknown bar.
2. The ordinary iron bar will be attracted by either pole of the known magnet.
3. The unknown magnet will show repulsion when like poles are brought close together.
4. Attraction alone cannot identify a magnet because an iron bar also shows attraction.
5. Therefore, the bar that shows **repulsion** can be confidently identified as the magnet.

8. During a school activity, a student is given an unmarked bar magnet and asked to mark its North and South poles. How should the student proceed?

Answer:

1. The student should tie a thread around the middle of the magnet and suspend it horizontally.
2. The magnet should be allowed to rotate freely until it comes to rest.
3. The experiment can be repeated after gently rotating the magnet to confirm its direction.
4. The end that repeatedly points towards North should be marked **N**.
5. The opposite end should be marked **S**, as a freely suspended magnet aligns itself along the north-south direction.

9. A student wants to determine whether wood, cardboard, plastic and glass block the effect of a magnet. Design an investigation.

Answer:

1. Place a compass near a bar magnet and first observe the deflection of its needle.
2. Place a piece of wood between the magnet and compass and observe the needle again.
3. Repeat the experiment separately using cardboard, plastic and glass.
4. Compare the compass needle's response with each material placed between the magnet and compass.
5. The observations can be used to conclude that magnetic effect can act through these non-magnetic materials.

10. A child has two ring magnets that remain separated when placed one above the other on a vertical support. Explain the observation and suggest how the child can make the magnets come together.

Answer:

1. The ring magnets remain separated because like magnetic poles are facing each other.
2. Like poles exert a repulsive effect and therefore push the magnets away from each other.
3. The child should remove the upper ring magnet and turn it over.
4. This arrangement will bring unlike poles of the two magnets face-to-face.
5. The magnets will then attract and come together because unlike poles attract each other.

4.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

Below are **30 MCQs** designed to test conceptual understanding, application, observation, reasoning, and logical thinking based on the uploaded chapter.

1. A student brings a magnet near four objects. Which object is most likely to be attracted?

A. Wooden block
B. Iron nail
C. Plastic ruler
D. Glass marble

Answer: B. Iron nail

2. Which group contains only magnetic metals mentioned in the chapter?

A. Iron, nickel and cobalt
B. Iron, copper and aluminium
C. Nickel, silver and gold
D. Cobalt, copper and zinc

Answer: A. Iron, nickel and cobalt

3. A bar magnet is rolled in iron filings. Where will the maximum number of filings collect?

A. Only at the centre
B. Near both ends
C. Uniformly everywhere
D. At one end only
Answer: B. Near both ends
4. A bar magnet is broken into five pieces. How many magnetic poles will be present altogether?
A. 2
B. 5
C. 10
D. 20
Answer: C. 10
Each piece has one North and one South pole.
5. Which experiment provides the strongest evidence that an unknown bar is a magnet?
A. It attracts an iron nail.
B. It attracts a steel pin.
C. It repels one pole of a known magnet.
D. It is made of metal.
Answer: C. It repels one pole of a known magnet.
6. A freely suspended bar magnet will finally settle approximately in which direction?
A. East-West
B. North-South
C. North-East to South-West
D. Any random direction
Answer: B. North-South
7. An ordinary iron bar and a magnet are suspended separately. Which observation helps distinguish them?
A. Both are metallic.
B. Both have two ends.
C. The magnet repeatedly settles north-south.
D. The iron bar is heavier.
Answer: C. The magnet repeatedly settles north-south.
8. The North pole of magnet X repels one end P of magnet Y. What must P be?
A. North pole
B. South pole
C. Non-magnetic end
D. Either North or South
Answer: A. North pole
9. If the North pole of magnet A attracts end X of another magnet, end X must be:
A. North
B. South
C. Either North or South
D. Non-magnetic
Answer: B. South
10. Which arrangement will produce repulsion?
A. N–S
B. S–N
C. N–N
D. Both A and B
Answer: C. N–N

11. Two ring magnets placed on a vertical support remain separated. What is the most likely reason?
A. Their facing poles are unlike.
B. Their facing poles are like.
C. Ring magnets have no poles.
D. Gravity does not act on magnets.
Answer: B. Their facing poles are like.
12. If one of the repelling ring magnets in Question 11 is turned over, what is most likely to happen?
A. They may attract each other.
B. They will lose magnetism immediately.
C. They will continue to repel in every orientation.
D. Both magnets will break.
Answer: A. They may attract each other.
13. Which statement is scientifically correct?
A. Every metallic object is a magnet.
B. Every object attracted by a magnet must itself be a magnet.
C. Repulsion can be used to identify a magnet.
D. A magnet can possess only a North pole.
Answer: C. Repulsion can be used to identify a magnet.
14. A student places cardboard between a bar magnet and a compass. The compass needle still responds. This demonstrates that:
A. cardboard becomes a magnet.
B. magnetic effect can act through cardboard.
C. the compass does not contain a magnet.
D. cardboard is a magnetic metal.
Answer: B. Magnetic effect can act through cardboard.
15. Which set contains materials through which magnetic effect was explored in the chapter?
A. Wood, cardboard, plastic and glass
B. Iron, nickel, cobalt and steel
C. Gold, silver, copper and iron
D. Water, oil, salt and sugar
Answer: A. Wood, cardboard, plastic and glass
16. A steel ball is placed on top of a cardboard maze. Which method can move it without directly touching it?
A. Move a magnet below the cardboard.
B. Place a wooden block below it.
C. Place a plastic sheet above it.
D. Blow gently under the cardboard.
Answer: A. Move a magnet below the cardboard.
17. The North end of a compass needle moves away when the North pole of a bar magnet is brought close. Which principle explains this?
A. Unlike poles repel.
B. Like poles repel.
C. Like poles attract.
D. All magnetic poles attract.
Answer: B. Like poles repel.
18. A South pole is now brought near the North end of the same compass needle. What will happen?

A. The needle's North end moves towards it.
B. The needle's North end moves away.
C. Nothing happens.
D. The compass permanently loses magnetism.
Answer: A. The needle's North end moves towards it.
19. Which procedure is suitable for magnetising an iron sewing needle?
A. Stroke it repeatedly in the same direction with one pole of a magnet.
B. Heat it strongly.
C. Drop it repeatedly.
D. Stroke it with a wooden stick.
Answer: A. Stroke it repeatedly in the same direction with one pole of a magnet.
20. After magnetising a needle, which observation would best show that the process has worked?
A. It changes colour.
B. It becomes longer.
C. It attracts steel pins.
D. It becomes lighter.
Answer: C. It attracts steel pins.
21. A magnetised needle is passed through cork and floated on water. What is its main purpose?
A. To measure temperature
B. To determine direction
C. To measure the depth of water
D. To detect light
Answer: B. To determine direction
22. Consider the following statements:
I. Like poles repel each other.
II. Unlike poles attract each other.
III. An isolated magnetic pole can be obtained by breaking a magnet.
Which option is correct?
A. I only
B. I and II only
C. II and III only
D. I, II and III
Answer: B. I and II only
23. Three pieces P, Q and R are obtained by breaking one bar magnet. Which statement must be true?
A. P has only a North pole.
B. Q has only a South pole.
C. Each piece has both North and South poles.
D. Only the largest piece remains magnetic.
Answer: C. Each piece has both North and South poles.
24. A mechanic wants a screwdriver to hold small steel screws. Which property should the screwdriver acquire?
A. Transparency
B. Elasticity
C. Magnetism
D. Solubility
Answer: C. Magnetism

25. Four positions P, Q, R and S are marked along a bar magnet, with P and S at the two ends and Q and R closer to the middle. Where would the greatest number of steel pins most likely be attracted?
A. P and S
B. Q and R
C. Only Q
D. Equally at all four positions
Answer: A. P and S
Magnetic effect is strongest near the poles.
26. Which sequence gives the best method for identifying the North pole of an unmarked bar magnet without another magnet?
A. Heat → cool → observe
B. Suspend freely → allow to settle → observe the north-pointing end
C. Break → compare pieces → observe
D. Immerse in water → remove → observe
Answer: B. Suspend freely → allow to settle → observe the north-pointing end
27. Which statement about magnets of different shapes is correct?
A. Only bar magnets possess poles.
B. Ring magnets possess only one pole.
C. Every magnet has North and South poles occurring in pairs.
D. Spherical magnets have no poles.
Answer: C. Every magnet has North and South poles occurring in pairs.
28. Which of the following is NOT recommended for proper care of magnets?
A. Storing bar magnets properly
B. Avoiding hammering them
C. Avoiding heating them
D. Repeatedly dropping them to test their strength
Answer: D. Repeatedly dropping them to test their strength
29. An unknown bar attracts the South pole of a known magnet at one end. Which conclusion is safest?
A. The unknown bar is definitely a magnet.
B. The unknown bar is definitely an iron bar.
C. Attraction alone is insufficient to decide whether it is a magnet.
D. The unknown bar has no magnetic material.
Answer: C. Attraction alone is insufficient to decide whether it is a magnet.
30. Four observations are made about an unknown object:
1. It attracts iron pins.
2. It has two ends.
3. It consistently aligns north-south when freely suspended.
4. One end repels the North pole of a known magnet.

Which observations provide the strongest evidence that the object is a magnet?
A. 1 and 2
B. 2 and 3
C. 3 and 4
D. 1 and 2 only
Answer: C. 3 and 4
A magnet shows directional behaviour when freely suspended, while repulsion provides a reliable test of magnetism.

4.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

Best Practices for Teaching Chapter 4 – *Exploring Magnets*

The following best practices are closely aligned with the activities, observations, experiments, and applications presented in the uploaded chapter.

(1) **Activity-Based Learning with Real Materials:**
Provide students with bar magnets and common classroom objects such as iron pins, wooden pieces, plastic objects, cardboard and other safe materials. Ask them to test, observe and classify the objects into **magnetic and non-magnetic materials**, followed by a discussion of their observations.

(2) **Iron-Filings Investigation of Magnetic Poles:**
Allow students to observe how iron filings or small steel objects are attracted at different parts of a bar magnet. Guide them to discover that more filings collect near the ends, helping them understand experimentally that the magnetic effect is strongest near the **poles**.

(3) **Learning Directions through a Freely Suspended Magnet:**
Suspend a bar magnet horizontally with a thread and allow students to observe its resting direction several times. Students can mark North and South and relate the experiment to the working principle of a **magnetic compass**.

(4) **Make-and-Learn Simple Compass Activity:**
Let students magnetise an iron sewing needle by repeatedly stroking it with one pole of a magnet, place it through a cork, and float it on water. This hands-on activity connects **magnetisation, magnetic poles and direction finding** in a memorable way.

(5) **Prediction–Observation–Explanation for Attraction and Repulsion:**
Before bringing two magnets together, ask students to predict what will happen with N–N, S–S and N–S combinations. They should then perform the activity, record their observations and formulate the rule: **like poles repel and unlike poles attract**.

(6) **Inquiry-Based "Is It Really a Magnet?" Challenge:**
Give students a magnet and an ordinary iron bar and ask them to determine how they can distinguish between them. Lead them towards recognising that attraction alone is insufficient and that **repulsion is a reliable test for identifying a magnet**.

(7) **Experimenting with Magnetic Effect through Materials:**
Students can place wood, cardboard, plastic or glass between a magnet and compass and observe the compass response. Encourage them to record their observations in a table and infer that magnetic effect can act through these **non-magnetic materials**.

(8) **Magnetic Maze as a Learning Game:**
Create a simple cardboard maze and ask students to guide a steel ball through it using a magnet underneath. This converts the chapter concept into a game while demonstrating magnetic action **without direct contact**.

(9) **Toy-Car Challenge for Application Learning:**
Attach magnets to toy cars and let students investigate how changing the orientation of the magnets changes the cars' movement. Students can use their observations to explain attraction and repulsion between magnetic poles.

(10) **Think–Predict–Test–Explain Approach:**
For every experiment, follow the sequence **Question → Prediction → Experiment → Observation → Explanation → Conclusion**. For example, students can predict whether cardboard will block magnetic effect, test it with a compass, and then explain the result using evidence from their observation.

(11) **Connect Magnetism with Everyday Problem-Solving:**
Give students practical situations such as retrieving a steel object, holding a steel screw with a screwdriver, or identifying an unknown magnet. Asking students to propose magnetic solutions helps move learning from simple recall to real-life application.

(12) Safety and Proper Magnet-Care Routine:
End practical sessions by teaching students the correct handling and storage of magnets. Reinforce the chapter's precautions, such as avoiding heating, dropping or hammering magnets and storing them appropriately.

These practices make *Exploring Magnets* particularly suitable for a **"learn by doing, observe, question, infer and apply"** approach rather than teaching the chapter mainly through definitions and memorisation.

4.16 Innovations Opportunity List from the Chapter: (12 Ideas)

Innovations in Teaching–Learning Chapter 4 – *Exploring Magnets*

For **7th Standard students**, the chapter can be extended beyond routine demonstrations through creative, inquiry-driven and technology-supported activities while keeping the core concepts from the uploaded chapter.

(1) Magnetic Escape-Room Challenge:
Create learning stations where students solve magnetic puzzles to obtain clues—for example, identifying an unknown magnet, determining its poles, predicting attraction or repulsion, and guiding a steel ball through a maze. Each correctly solved concept unlocks the next task, turning revision into collaborative problem-solving.

(2) Design Your Own Magnetic Maze:
Instead of only performing the textbook maze activity, groups can design their own cardboard mazes with different levels of difficulty and challenge classmates to move a steel ball using a magnet underneath. Students can then explain how magnetic effect acts through the non-magnetic cardboard without direct contact.

(3) DIY Compass Engineering Challenge:
Students can magnetise a needle, float it using cork, and develop their own simple direction-finding device. They can compare different designs and discuss which arrangement allows the needle to rotate and settle most effectively.

(4) Magnetic Toy-Car Innovation Lab:
Teams can attach magnets to toy cars in different orientations and predict whether the cars will move towards or away from one another. They can redesign the arrangements to demonstrate **attraction, repulsion and pole orientation** through a mini magnetic-car challenge.

(5) Mystery Magnet Detective Game:
Give students identical-looking magnetic and non-magnetic bars and ask them to act as "magnet detectives." They must develop a test based on evidence and discover that **repulsion**, rather than attraction alone, provides reliable evidence for identifying a magnet.

(6) Magnetic Barrier Investigation:
Students can investigate whether magnetic effect is observed through wood, cardboard, plastic and glass. Groups can create an observation chart, compare the compass response and present an evidence-based conclusion about magnetic effect through non-magnetic materials.

(7) "Find the Hidden Magnet" Challenge:
Hide a magnet behind or beneath a suitable non-magnetic barrier and ask students to locate it using a compass needle. Students must use the compass response as evidence to determine the magnet's approximate position, creatively applying the chapter's compass and magnetic-effect concepts.

(8) Student-Made Magnetic Games:

Ask groups to create simple games based on chapter concepts—for example, magnetic fishing, magnetic racing, maze navigation or attraction-versus-repulsion challenges. Each group should also explain the magnetic principle responsible for making its game work.

(9) Magnet Innovation Design Sprint:
Present a real-life problem such as "How can we pick up steel objects without touching them?" or "How can a screwdriver hold a small steel screw?" Students can sketch and demonstrate a simple magnetic solution, connecting classroom concepts with practical problem-solving.

(10) Student-Generated Video Experiment:
Small groups can record a 1–2 minute demonstration of one chapter concept—**like poles repel, unlike poles attract; making a compass; identifying a magnet; or magnetic effect through cardboard**. Students should explain the prediction, experiment, observation and conclusion in their own words.

(11) Magnet Concept QR Trail:
The teacher can place QR codes at different classroom stations containing questions or instructions such as "Find the magnetic material," "Identify the North pole," or "Make these two magnets repel." Students move through the stations in teams, perform the task and record their evidence.

(12) Young Inventor Exhibition – "Magnetism at Work":
As a culminating activity, students can create a simple working model applying concepts from the chapter, such as a magnetic maze, compass, magnetic toy or screw-holder. Each student/group can present the **problem, magnetic principle, design, demonstration and practical use**, converting the chapter into an innovation-oriented learning experience.

These innovations can shift the chapter from **"learning about magnets" to "learning, experimenting, designing and solving problems with magnets,"** while retaining the chapter's core ideas of magnetic materials, poles, attraction and repulsion, direction finding, and magnetic action through non-magnetic materials.

4.17: Practicing Questions/Question Bank :

A. Fill in the Blanks:

1. Naturally occurring magnets are known as ________.
   Answer: Lodestones

2. Magnets made by humans are called ________ magnets.
   Answer: Artificial

3. Materials that are attracted towards a magnet are called ________ materials.
   Answer: Magnetic

4. Materials that are not attracted towards a magnet are called ________ materials.
   Answer: Non-magnetic

5. Iron, nickel and ________ are magnetic metals.
   Answer: Cobalt

6. The two ends of a magnet are called its ________.
   Answer: Poles

7. The two poles of a magnet are called the ________ pole and ________ pole.
Answer: North, South

8. Maximum iron filings stick near the ________ of a bar magnet.
Answer: Poles

9. A single North pole or South pole of a magnet ________ exist independently.
Answer: Cannot

10. A freely suspended magnet always comes to rest in the ________ direction.
Answer: North–south

11. The Earth itself behaves like a giant ________.
Answer: Magnet

12. A ________ compass is used to find directions.
Answer: Magnetic

13. The needle of a magnetic compass is itself a ________.
Answer: Magnet

14. The North-pointing end of a compass needle is usually painted ________.
Answer: Red

15. Like poles of magnets ________ each other.
Answer: Repel

16. Unlike poles of magnets ________ each other.
Answer: Attract

17. North pole and South pole are ________ poles.
Answer: Unlike

18. North pole and North pole are ________ poles.
Answer: Like

19. A magnet can be identified by its property of ________.
Answer: Repulsion

20. Magnetic effect can act through ________ materials.
Answer: Non-magnetic

21. The ancient Indian navigation device containing a magnetised fish-shaped iron piece was called ________.
Answer: Matsya-yantra (or machchh-yantra)

22. A magnet should not be heated, dropped or ________.
Answer: Hammered

23. A magnet should not be kept near mobile phones or ________.
Answer: Remote controls

24. Bar, U-shaped and ring are different ________ of magnets.
Answer: Shapes

25. The end of a freely suspended magnet pointing north is called its ________ pole.
Answer: North pole

The chapter explains that iron, nickel and cobalt are magnetic, while materials not attracted by magnets are classified as non-magnetic.

B. One-Mark Questions with Answers:

1. What is a magnet?

Answer: A magnet is an object that attracts magnetic materials.

2. What are lodestones?

Answer: Lodestones are naturally occurring magnets.

3. What are artificial magnets?

Answer: Magnets made by humans from suitable materials are called artificial magnets.

4. Name three shapes of magnets.

Answer: Bar magnet, U-shaped magnet and ring magnet.

5. What are magnetic materials?

Answer: Materials attracted towards a magnet are called magnetic materials.

6. Give three examples of magnetic metals.

Answer: Iron, nickel and cobalt.

7. What are non-magnetic materials?

Answer: Materials that are not attracted towards a magnet are called non-magnetic materials.

8. What are the poles of a magnet?

Answer: The two ends of a magnet where magnetic attraction is strongest are called its poles.

9. Name the two poles of a magnet.

Answer: North pole and South pole.

10. Where do maximum iron filings stick on a bar magnet?

Answer: Near its two ends or poles.

11. Can a magnet have only one pole?

Answer: No. The poles of a magnet always exist in pairs.

12. In which direction does a freely suspended magnet come to rest?

Answer: North–south direction.

13. Why does a freely suspended magnet point north–south?

Answer: Because the Earth itself behaves like a giant magnet.

14. What is a magnetic compass?

Answer: A magnetic compass is a device used to find directions using a freely rotating magnetic needle.

15. What does the needle of a magnetic compass indicate?

Answer: The north–south direction.

16. What happens when two North poles are brought close together?

Answer: They repel each other.

17. What happens when a North pole and South pole are brought close together?

Answer: They attract each other.

18. Which property can be used as a sure test of a magnet?

Answer: Repulsion.

19. Can magnetic effect act through wood?

Answer: Yes.

20. What was the *matsya-yantra*?

Answer: It was an ancient Indian navigation device containing a magnetised fish-shaped iron piece kept in a vessel of oil.

C. Two-Mark Descriptive Questions with Answers:

1. Differentiate between magnetic and non-magnetic materials.

Answer:

1. Magnetic materials are attracted towards a magnet.
2. Non-magnetic materials are not attracted towards a magnet.

2. What happens when iron filings are brought near a bar magnet?

Answer:

1. Iron filings are attracted towards the magnet.
2. Maximum iron filings collect near the two poles of the magnet.

3. Why are the ends of a magnet called poles?

Answer:

1. The magnetic attraction is strongest near the two ends of a magnet.
2. These ends are called the North and South poles.

4. What happens when a magnet is broken into two pieces?

Answer:

1. Each piece develops its own North and South poles.
2. Therefore, a single isolated magnetic pole cannot be obtained.

5. How can a freely suspended magnet help us find directions?

Answer:

1. A freely suspended magnet always settles along the north–south direction.
2. Its North-seeking end points towards north and the other end towards south.

6. State the rule of attraction and repulsion between magnetic poles.

Answer:

1. Like poles—N-N or S-S—repel each other.
2. Unlike poles—N-S—attract each other.

7. Why is repulsion considered a test for identifying a magnet?

Answer:

1. An iron object can be attracted by both poles of a magnet.
2. Repulsion occurs between like poles of magnets, so it can be used to identify a magnet.

8. Describe two important parts of a magnetic compass.

Answer:

1. It contains a magnetic needle that can rotate freely.
2. It has a dial on which different directions are marked.

9. What happens when wood is placed between a magnet and a compass needle?

Answer:

1. There is no appreciable change in the deflection of the compass needle.
2. This shows that magnetic effect can act through non-magnetic materials.

10. Mention two precautions for taking care of magnets.

Answer:

1. Magnets should not be heated, dropped or hammered.
2. They should not be kept near mobile phones or remote controls.

D. Three-Mark Descriptive Questions with Answers:

1. Explain an activity to distinguish magnetic and non-magnetic materials.

Answer:

1. Collect objects made of materials such as iron, wood, plastic, rubber and glass.
2. Bring a magnet close to each object and observe whether it is attracted.
3. Objects that are attracted are classified as magnetic, while those not attracted are non-magnetic.

2. Describe an experiment to locate the poles of a bar magnet.

Answer:

1. Spread iron filings on a sheet of paper and place a bar magnet over them.
2. Tap the paper gently and observe the distribution of iron filings.
3. Maximum filings collect near the two ends, showing that magnetic attraction is strongest at the poles.

3. Explain why a magnet cannot have a single pole.

Answer:

1. Every magnet has a North pole and a South pole.
2. If a magnet is broken into smaller pieces, each piece still has both poles.
3. Therefore, a single North pole or South pole cannot exist independently.

4. Explain how a freely suspended magnet helps in finding directions.

Answer:

1. Suspend a bar magnet freely using a thread.
2. Allow it to come to rest; it aligns itself in the north–south direction.
3. The North-seeking pole indicates north and the other pole indicates south.

5. Explain the working of a magnetic compass.

Answer:

1. A magnetic compass contains a freely rotating magnetic needle.
2. When allowed to settle, the needle points in the north–south direction.
3. The compass dial can then be aligned with the needle to determine all directions.

6. Explain attraction and repulsion between magnets.

Answer:

1. When the North pole of one magnet is brought near the South pole of another, they attract.
2. When two North poles or two South poles are brought together, they repel.
3. Thus, unlike poles attract and like poles repel.

7. How can you prove that magnetic effect can act through non-magnetic materials?

Answer:

1. Place a compass near a bar magnet and observe the deflection of its needle.
2. Place wood, cardboard, plastic or glass between the magnet and compass.
3. The needle continues to show magnetic effect, proving that magnetic effect can act through these materials.

8. How can an iron sewing needle be made into a magnet?

Answer:

1. Place the needle on a table and stroke it from one end to the other using one pole of a bar magnet.
2. Lift the magnet after each stroke and repeat the process in the same direction 30–40 times.
3. The needle becomes magnetised and can attract iron filings or steel pins.

9. How can you make a simple magnetic compass?

Answer:

1. Magnetise an iron sewing needle by repeatedly stroking it with one pole of a magnet.
2. Pass the magnetised needle through a cork and float the cork on water.
3. Allow it to settle; the needle aligns itself approximately along the north–south direction.

10. Explain how magnets should be stored safely.

Answer:

1. Bar magnets should be stored in pairs with unlike poles on the same side.
2. A wooden piece should be placed between the magnets and soft iron pieces across their ends.
3. Magnets should be protected from heating, hammering and dropping.

E. Five-Mark Descriptive Questions with Answers:

1. Explain magnetic and non-magnetic materials with an activity.

Answer:

1. Collect objects made of iron, wood, plastic, rubber, glass and other materials.
2. Predict which objects will be attracted by a magnet.
3. Bring a magnet near each object and record the observations.
4. Objects attracted by the magnet are made of magnetic materials; iron, nickel and cobalt are examples.
5. Materials not attracted by the magnet are called non-magnetic materials.

2. Describe the poles of a magnet and explain their important properties.

Answer:

1. Every magnet has two poles called the North pole and South pole.
2. Magnetic attraction is strongest near these poles.
3. Like poles, N-N and S-S, repel each other.
4. Unlike poles, N-S, attract each other.
5. The poles always occur in pairs, even when a magnet is broken into smaller pieces.

3. Describe an experiment to show that a freely suspended magnet points in the north–south direction.

Answer:

1. Tie a thread around the middle of a bar magnet and suspend it horizontally.
2. Rotate the magnet gently and allow it to come to rest.
3. Mark the directions towards which its two ends point.
4. Rotate it again and observe that it settles along the same direction.
5. The magnet repeatedly aligns north–south, with one end being its North pole and the other its South pole.

4. Explain the construction and use of a magnetic compass.

Answer:

1. A magnetic compass is generally a small circular box with a transparent cover.
2. It contains a magnetic needle mounted on a pin so that it can rotate freely.
3. The North-pointing end of the needle is usually painted red.
4. A dial below the needle has different directions marked on it.
5. When the needle settles along north–south, the dial is aligned with it to determine the other directions.

5. Describe an experiment to demonstrate attraction and repulsion between magnets.

Answer:

1. Take two bar magnets with their North and South poles marked.
2. Bring the North pole of one magnet near the South pole of the other and observe attraction.
3. Bring the North pole of one near the North pole of the other and observe repulsion.
4. Similarly, two South poles repel each other.
5. The experiment demonstrates that unlike poles attract while like poles repel.

6. Explain how a simple magnetic compass can be constructed at home or in the classroom.

Answer:

1. Take an iron sewing needle, bar magnet, cork, bowl and water.
2. Stroke the needle repeatedly in one direction with the same pole of the magnet about 30–40 times.
3. Test the needle with iron filings or steel pins to confirm that it has become magnetic.
4. Pass the needle horizontally through a cork and float the cork on water.
5. When it stops rotating, the magnetised needle settles along the north–south direction and acts as a simple compass.

7. Explain how magnetic effect can act through non-magnetic materials.

Answer:

1. Place a magnetic compass on a horizontal surface and bring a bar magnet near it.

2. Observe the deflection of the compass needle.
3. Place a piece of wood between the magnet and compass without changing their positions.
4. Repeat using cardboard, plastic and glass sheets.
5. Since there is no appreciable change in the needle's deflection, magnetic effect can act through these non-magnetic materials.

8. Explain the proper care and storage of magnets.

Answer:

1. Magnets should be stored properly to protect their magnetic properties.
2. Bar magnets can be stored in pairs with unlike poles on the same side.
3. A piece of wood is placed between them and soft iron pieces are placed across their ends.
4. Magnets should not be heated, hammered or repeatedly dropped.
5. They should also not be kept close to devices such as mobile phones and remote controls.

F. Additional Application/HOTS Questions for the Question Bank:

1. Reshma has three identical metal bars—two magnets and one iron bar. How can she identify the two magnets without using any other material?
2. A mechanic's steel screws repeatedly fall from his screwdriver. Using your knowledge of magnets, suggest a solution.
3. Two ring magnets placed on a vertical rod remain separated from each other. Explain why.
4. A bar magnet has no N or S markings. How can you identify its North pole without using another magnet?
5. Why is attraction alone not a reliable test for identifying whether an unknown object is a magnet?
6. A steel paper clip falls into a glass of water. How can it be removed without putting the magnet or your fingers into the water?
7. How could you move a steel ball through a cardboard maze without touching the ball?
8. Two toy cars have magnets attached with like poles facing each other. Predict what will happen when they are brought close and explain why.
9. Why does an ordinary iron bar not necessarily settle in the north–south direction when freely suspended, while a magnet does?
10. If a bar magnet is broken into four pieces, how many North and South poles will be present altogether? Explain.

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6th Standard Science Book Chapter 5

Chapter 5: Measurement of Length and Motion

5.1 Summary of the Chapter:

Chapter 5: Measurement of Length and Motion — Summary

(1) **Measurement of length** helps us determine how long, tall, wide, or far an object or place is. In earlier times, people used body parts such as the **handspan, foot, fingers, and strides** for measuring length.

(2) Measurements made using body parts may differ from person to person because the sizes of their hands, feet, fingers, and strides are different. Therefore, **standard units of measurement** are necessary to obtain uniform and reliable measurements.

(3) The internationally accepted system of measurement is called the **International System of Units (SI)**. The SI unit of length is the **metre (m)**.

(4) Different units are used depending on the size of the length being measured. The important relationships are: **1 km = 1000 m, 1 m = 100 cm, and 1 cm = 10 mm**. Kilometres are suitable for large distances, while centimetres and millimetres are useful for smaller lengths.

(5) The **appropriate measuring instrument** should be selected according to the object. A ruler can measure small objects, a metre scale can measure larger straight lengths, and a flexible measuring tape is suitable for curved objects or measurements such as the girth of a tree.

(6) For **accurate measurement**, the scale should be placed in contact with and along the length of the object. The eye should be positioned directly above the point whose reading is being taken to avoid an incorrect reading.

(7) Even if the **zero end of a scale is broken**, it can still be used. Start from another complete marking and subtract the initial reading from the final reading to obtain the actual length.

(8) The length of a **curved line** can be measured using a flexible measuring tape or a thread. The thread is placed along the curve, straightened afterwards, and its length is measured using a scale.

(9) The position or distance of an object should be described with respect to a fixed object or point called a **reference point**. Using a common reference point helps different people describe positions consistently.

(10) An object is said to be **in motion** when its position changes with respect to a reference point over time. If its position does not change with respect to that reference point over time, the object is said to be **at rest**.

(11) Motion can be classified into different types. **Linear motion** occurs along a straight line, **circular motion** occurs along a circular path, and **oscillatory motion** involves repeated to-and-fro movement about a fixed position.

(12) A motion that **repeats itself after a fixed interval of time** is called periodic motion. Circular and oscillatory motions can be periodic because their paths or movements repeat again and again.

5.2 Important Formulas:

Important Formulas and Conversions — Chapter 5: Measurement of Length and Motion

The chapter mainly involves **measurement and conversion of units of length** rather than complex mathematical formulas. The following are the important relations required for solving quantitative problems.

A. Basic Unit Conversions:

1. **Kilometre to metre**

1 km = 1000 m
Therefore:
Distance in m = Distance in km × 1000

2. **Metre to kilometre**

1 m = 1/1000 km = 0.001 km
Distance in km = Distance in m ÷ 1000

3. **Metre to centimetre**

1 m = 100 cm
Length in cm = Length in m × 100

4. **Centimetre to metre**

1 cm = 1/100 m = 0.01 m
Length in m = Length in cm ÷ 100

5. **Centimetre to millimetre**

1 cm = 10 mm
Length in mm = Length in cm × 10

6. **Millimetre to centimetre**

1 mm = 0.1 cm
Length in cm = Length in mm ÷ 10
These are the principal conversion relationships explicitly given in the chapter.
B. Combined Unit Conversions
From the above relationships:
1 km = 1000 m = 100,000 cm = 1,000,000 mm
1 m = 100 cm = 1000 mm
Therefore:
Metres → millimetres:
mm = m × 1000
Millimetres → metres:
m = mm ÷ 1000
The chapter specifically asks students to express measurements such as height in metres, centimetres and millimetres, making these conversions important for quantitative exercises.
C. Inch–Centimetre Conversion
The chapter also introduces:
1 inch = 2.54 cm
Therefore:
Length in cm = Length in inches × 2.54
Length in inches = Length in cm ÷ 2.54
D. Length Using Scale Readings
When an object does not begin at the zero mark of a scale:
Length of object = Final scale reading − Initial scale reading
For example, if:
Initial reading = 1.0 cm
Final reading = 10.4 cm
Then:
Length = 10.4 − 1.0 = 9.4 cm
This method is particularly useful when the zero end of a scale is broken or unclear.
E. Measuring Distance Using Wheel Revolutions
The chapter's bicycle activity provides another useful quantitative relationship:
Distance travelled = Length of outer boundary of wheel × Number of revolutions
or

D = C × N
where:

- **D** = distance travelled
- **C** = length of the outer boundary/circumference of the wheel
- **N** = number of complete turns of the wheel.

From this relationship, we can also derive:
Number of revolutions = Distance travelled ÷ Circumference of wheel
N = D ÷ C

F. Estimating Number of Equal Objects Needed to Cover a Length
Based on the chapter's coin-and-notebook activity:
Number of objects required ≈ Total length ÷ Length of one object
For example:
Number of coins ≈ Length of notebook ÷ Diameter/length of one coin
This relationship is useful when identical objects are placed one after another without gaps.

G. Finding Thickness of One Page
The chapter asks students to devise a method for finding the thickness of a single page. A practical quantitative relationship is:
Thickness of one page = Total thickness of pages ÷ Number of pages
For example, if 100 pages together are 10 mm thick:
Thickness of one page = 10 ÷ 100 = 0.1 mm
The chapter proposes measuring the thickness of a single notebook/textbook page as a learning activity.

Quick Formula Sheet

Purpose	Formula / Relation
km → m	**m = km × 1000**
m → km	**km = m ÷ 1000**
m → cm	**cm = m × 100**
cm → m	**m = cm ÷ 100**
cm → mm	**mm = cm × 10**
mm → cm	**cm = mm ÷ 10**
m → mm	**mm = m × 1000**
mm → m	**m = mm ÷ 1000**
inch → cm	**cm = inch × 2.54**
Actual length from scale	**Final reading − Initial reading**
Distance by wheel	**D = C × N**
Number of wheel turns	**N = D ÷ C**
Number of equal objects	**Total length ÷ Length of one object**
Thickness of one page	**Total thickness ÷ Number of pages**

Most important for Grade 6: Students should especially remember **1 km = 1000 m, 1 m = 100 cm, and 1 cm = 10 mm**, as these are the core numerical relationships explicitly emphasized in the chapter summary.

5.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

LOTS – Fill in the Blanks with Answers:

1. The SI unit of length is __________.
   Answer: metre
2. The symbol used for metre is __________.
   Answer: m
3. One kilometre is equal to __________ metres.
   Answer: 1000
4. One metre is equal to __________ centimetres.
   Answer: 100
5. One centimetre is equal to __________ millimetres.
   Answer: 10
6. One millimetre is equal to __________ centimetre.
   Answer: 0.1
7. The symbol for kilometre is __________.
   Answer: km
8. The symbol for centimetre is __________.
   Answer: cm
9. The symbol for millimetre is __________.
   Answer: mm
10. The internationally accepted system of units is called the __________ System of Units.
    Answer: International
11. A handspan is an example of a __________ unit of measurement.
    Answer: non-standard
12. Handspans cannot give uniform measurements because their sizes __________ from person to person.
    Answer: differ
13. A __________ measuring tape is suitable for measuring the girth of a tree.
    Answer: flexible
14. While measuring the length of an object, the scale should be placed in __________ with the object along its length.
    Answer: contact
15. While reading a scale, the eye should be positioned directly __________ the point whose reading is being taken.
    Answer: above
16. If the zero mark of a scale is broken, the length of an object can be found by subtracting the __________ reading from the final reading.
    Answer: initial
17. A curved line can be measured with the help of a flexible measuring tape or a __________.
    Answer: thread
18. A fixed object or point with respect to which distance is stated is called a __________ point.
    Answer: reference
19. An object is said to be in __________ if its position changes with respect to a reference point with time.
    Answer: motion
20. An object is said to be at __________ if its position does not change with respect to a reference point with time.
    Answer: rest

21. Motion along a straight line is called __________ motion.
    Answer: linear
22. Motion along a circular path is called __________ motion.
    Answer: circular
23. The to-and-fro motion of an object about a fixed position is called __________ motion.
    Answer: oscillatory
24. The motion of a swing is an example of __________ motion.
    Answer: oscillatory
25. The motion of an object moving along a straight road is an example of __________ motion.
    Answer: linear
26. The motion of an object moving around a circular path is called __________ motion.
    Answer: circular
27. If an object repeats its path after a fixed interval of time, its motion is called __________ motion.
    Answer: periodic
28. Circular and oscillatory motions can both be __________ in nature.
    Answer: periodic
29. In the example of kilometre stones showing the distance to Delhi, __________ acts as the reference point.
    Answer: Delhi
30. A measurement of length consists of two parts—a number and a __________.
    Answer: unit

5.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS – Fill in the Blanks with Answers

1. Riya measures a table using her handspan and gets 12 handspans, while her friend gets 14. The difference occurs because their __________ are of different sizes.
   Answer: handspans
2. If the same table is measured by different students using a standard metre scale correctly, their measurements should be approximately __________.
   Answer: the same
3. A road distance of 3 km is equal to __________ m.
   Answer: 3000
4. A ribbon measuring 2.5 m has a length of __________ cm.
   Answer: 250
5. The thickness of an object is 7 mm. In centimetres, its thickness is __________ cm.
   Answer: 0.7
6. A pencil begins at the 2.0 cm mark and ends at the 15.5 cm mark of a scale. Its actual length is __________ cm.
   Answer: 13.5
7. If the zero mark of a scale is damaged, an object can still be measured by finding the difference between the __________ and __________ readings.
   Answer: final, initial
8. A student looks at a scale from the side instead of directly above the reading. The measurement may become __________.
   Answer: incorrect

9. To measure the curved boundary of a leaf accurately, a student can first place a __________ along the curve and then straighten it for measurement.
   Answer: thread
10. If a thread placed along a curved line measures 18 cm after being straightened, the length of the curved line is approximately __________.
    Answer: 18 cm
11. A bus passenger appears at rest with respect to another passenger sitting beside them but is in __________ with respect to a building outside.
    Answer: motion
12. A book kept on a table does not change its position with respect to the table. Therefore, the book is said to be at __________ with respect to the table.
    Answer: rest
13. If the distance of a moving bus from Delhi changes from 70 km to 60 km, the bus is moving __________ Delhi.
    Answer: towards
14. Two students give different descriptions of the position of the same object because they have selected different __________ points.
    Answer: reference
15. A child walking along a perfectly straight corridor demonstrates __________ motion.
    Answer: linear
16. An eraser tied to a thread and whirled around the hand demonstrates __________ motion.
    Answer: circular
17. A suspended eraser repeatedly moving to and fro about its fixed position demonstrates __________ motion.
    Answer: oscillatory
18. A swing that repeatedly moves to and fro after equal intervals exhibits both __________ and periodic motion.
    Answer: oscillatory
19. An object moving repeatedly around the same circular path exhibits __________ motion that is also periodic in nature.
    Answer: circular
20. If a bicycle wheel has an outer boundary length of 2 m and completes 50 turns, the bicycle travels __________ m.
    Answer: 100
21. A bicycle travels 120 m and its wheel covers 2 m in each complete turn. The wheel completes __________ turns.
    Answer: 60
22. If 10 identical coins placed without gaps cover a length of 25 cm, the length occupied by each coin is __________ cm.
    Answer: 2.5
23. A 15 cm scale has each centimetre divided into 10 equal parts. Therefore, the smallest length measurable with it is __________.
    Answer: 1 mm
24. A school is 1.5 km from a student's home. The same distance expressed in metres is __________ m.
    Answer: 1500
25. If a student writes the length of a pencil simply as "12" without writing cm, the measurement is __________ because a measurement must contain both a number and

a unit.
Answer: incomplete

26. A tailor chooses a flexible measuring tape instead of a rigid metre scale to measure a person's chest because the surface being measured is __________.
Answer: curved
27. A child sitting in a moving bus is at rest relative to the __________ but in motion relative to objects outside the bus.
Answer: bus
28. If an object changes its position with time relative to a chosen reference point, it must be classified as being in __________.
Answer: motion
29. A merry-go-round repeats its circular path again and again. Therefore, its motion can be classified as both circular and __________.
Answer: periodic
30. If the outer boundary of a bicycle wheel is 1.5 m and the wheel makes 100 complete turns, the distance travelled is __________ m.
Answer: 150

5.5 One-mark questions with Answers of LOTS Type: (35 Questions)

LOTS – One-Mark Descriptive Questions with Answers

1. **What is measurement?**
Answer: Measurement is the process of comparing an unknown quantity with a known standard unit.
2. **What is a unit of measurement?**
Answer: A unit is a fixed quantity used as a standard for expressing a measurement.
3. **Why are handspans not suitable as standard units of length?**
Answer: Handspans are not suitable as standard units because their sizes differ from person to person.
4. **What is the International System of Units commonly called?**
Answer: The International System of Units is commonly called the SI system.
5. **What is the SI unit of length?**
Answer: The SI unit of length is the metre (m).
6. **How many centimetres are there in one metre?**
Answer: There are 100 centimetres in one metre.
7. **How many millimetres are there in one centimetre?**
Answer: There are 10 millimetres in one centimetre.
8. **How many metres are there in one kilometre?**
Answer: There are 1000 metres in one kilometre.
9. **What is the smallest length that can be measured using the 15-cm scale shown in the chapter?**
Answer: The smallest length that can be measured using the scale is 1 millimetre.
10. **Which instrument is suitable for measuring the girth of a tree?**
Answer: A flexible measuring tape is suitable for measuring the girth of a tree.
11. **How should a scale be placed while measuring the length of an object?**
Answer: The scale should be placed in contact with the object along its length.
12. **Where should the eye be positioned while reading a scale?**
Answer: The eye should be positioned directly above the point whose reading is being taken.

13. **How can a scale with a broken zero end be used for measurement?**
    Answer: The object's length can be found by subtracting the initial scale reading from the final scale reading.
14. **How can the length of a curved line be measured?**
    Answer: The length of a curved line can be measured using a flexible measuring tape or a thread.
15. **What are the two parts of a measurement of length?**
    Answer: A measurement of length consists of a number and a unit.
16. **What is a reference point?**
    Answer: A reference point is a fixed object or point with respect to which the distance or position of an object is stated.
17. **When is an object said to be in motion?**
    Answer: An object is said to be in motion when its position changes with respect to a reference point with time.
18. **When is an object said to be at rest?**
    Answer: An object is said to be at rest when its position does not change with respect to a reference point with time.
19. **What is linear motion?**
    Answer: Motion of an object along a straight line is called linear motion.
20. **What is circular motion?**
    Answer: Motion of an object along a circular path is called circular motion.
21. **What is oscillatory motion?**
    Answer: The to-and-fro motion of an object about a fixed position is called oscillatory motion.
22. **Give one example of linear motion.**
    Answer: A heavy box moving along a straight line when pushed is an example of linear motion.
23. **Give one example of circular motion.**
    Answer: An eraser tied to a thread and whirled around moves in circular motion.
24. **Give one example of oscillatory motion.**
    Answer: The to-and-fro movement of a swing is an example of oscillatory motion.
25. **What is periodic motion?**
    Answer: Motion that repeats its path after a fixed interval of time is called periodic motion.
26. **Which two types of motion discussed in the chapter are periodic in nature?**
    Answer: Circular motion and oscillatory motion are periodic in nature.
27. **What does a kilometre stone indicate?**
    Answer: A kilometre stone indicates the distance of a place from a specified reference point.
28. **What is the relation between one inch and centimetres?**
    Answer: One inch is equal to 2.54 centimetres.
29. **Name one ancient Indian unit of length mentioned in the chapter.**
    Answer: Angula is one ancient Indian unit of length mentioned in the chapter.
30. **What is meant by angula?**
    Answer: Angula refers to the width of a finger and was traditionally used as a unit of length.

5.6 One-mark questions with Answers of HOTS Type: (30 Questions)

HOTS – One-Mark Descriptive Questions with Answers:

1. **Why can two students get different measurements of the same table when using their handspans?**
   Answer: They may get different measurements because the sizes of their handspans are different.
2. **Why are standard units preferred over body parts for measuring length?**
   Answer: Standard units give uniform measurements because body-part sizes differ from person to person.
3. **A student wants to measure the distance between two cities; which unit should be chosen and why?**
   Answer: The student should use kilometres because kilometre is suitable for measuring large distances.
4. **Why is millimetre more suitable than metre for measuring the thickness of a small object?**
   Answer: Millimetre is more suitable because it is a smaller unit and can express very small lengths conveniently.
5. **If a pencil starts at 2 cm and ends at 12 cm on a scale, what is its length?**
   Answer: The pencil is 10 cm long because its length is obtained by subtracting 2 cm from 12 cm.
6. **Why should the scale be kept in contact with the object while measuring its length?**
   Answer: Keeping the scale in contact and along the object's length helps obtain the correct measurement.
7. **Why should your eye be directly above the scale marking while taking a reading?**
   Answer: The eye should be directly above the marking so that the scale reading is observed correctly.
8. **How would you measure an object if the zero end of your scale were broken?**
   Answer: I would start from another complete mark and subtract the initial reading from the final reading.
9. **Why is a flexible measuring tape better than a metre scale for measuring the girth of a tree?**
   Answer: A flexible measuring tape can bend around the curved surface of the tree whereas a rigid metre scale cannot.
10. **How can you measure the length of a curved line if a flexible measuring tape is unavailable?**
    Answer: I can place a thread along the curved line, straighten it, and measure the thread using a scale.
11. **Why must a unit always be written along with the numerical value of a length?**
    Answer: A unit must be written because a measurement is meaningful only when both its numerical value and unit are stated.
12. **Why did Deepa and her friends have different opinions about whether the school or garden was nearer?**
    Answer: They had different opinions because they were comparing the distances from their respective houses rather than from a common reference point.
13. **Why is a reference point necessary for describing the position of an object?**
    Answer: A reference point is necessary because the position or distance of an object is described with respect to a fixed point.
14. **A kilometre stone changes from “Delhi 70 km” to “Delhi 60 km”; what can you infer?**
    Answer: We can infer that the traveller has moved 10 km closer to Delhi.

15. **How can you decide whether an object is in motion?**
    Answer: An object is in motion if its position changes with respect to a chosen reference point with time.
16. **Why can a passenger sitting in a moving bus be considered both at rest and in motion?**
    Answer: The passenger is at rest relative to the bus but in motion relative to objects outside the bus.
17. **A fruit falls vertically from a tree; what type of motion does it show?**
    Answer: The falling fruit shows linear motion because it moves along a straight-line path.
18. **Why is the motion of an eraser whirled using a thread classified as circular motion?**
    Answer: It is circular motion because the eraser moves along a circular path around the hand.
19. **Why is the motion of a swing classified as oscillatory motion?**
    Answer: A swing shows oscillatory motion because it moves repeatedly to and fro about a fixed position.
20. **How is the motion of a merry-go-round different from that of a swing?**
    Answer: A merry-go-round shows circular motion whereas a swing shows oscillatory motion.
21. **Why can circular motion also be periodic motion?**
    Answer: Circular motion can be periodic because the object repeatedly follows the same circular path.
22. **Why can oscillatory motion be considered periodic in many situations?**
    Answer: Oscillatory motion can be periodic because the object repeatedly performs the same to-and-fro movement.
23. **A metal strip fixed at one end moves repeatedly up and down when released; what type of motion does its free end show?**
    Answer: The free end of the metal strip shows oscillatory motion.
24. **If a school is 1.5 km from a student's home, what is the distance in metres?**
    Answer: The distance is 1500 m because 1 km equals 1000 m.
25. **A scale has ten equal subdivisions between two consecutive centimetre marks; what is the value of each subdivision?**
    Answer: Each subdivision represents 1 mm because 1 cm is divided into 10 equal parts.
26. **Why would stretchable rubber be unsuitable for making a metre scale?**
    Answer: Stretchable rubber would be unsuitable because its length can change, preventing consistent measurement.
27. **How can you estimate the thickness of one notebook page when it is too thin to measure directly with a scale?**
    Answer: The thickness of one page can be estimated by measuring several pages together and dividing the total thickness by the number of pages.
28. **If a bicycle wheel covers 2 m in one complete turn and makes 20 turns, how far does the bicycle travel?**
    Answer: The bicycle travels 40 m because the distance equals the wheel's outer-boundary length multiplied by the number of turns.
29. **How can the same object appear at rest to one observer but moving to another?**
    Answer: The object's state can appear different because motion or rest depends on the reference point chosen by each observer.

30. **A ball moves through both straight and circular portions of a rollercoaster track; can its motion have more than one type?**
    Answer: Yes, its motion can change from linear to circular depending on the shape of the portion of the track through which it moves.

5.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

LOTS – Two-Mark Descriptive Questions with Answers:

1. **What are standard units of measurement? Why are they needed?**
   Answer:
   1. Standard units are universally accepted units used for measuring quantities such as length.
   2. They are needed because non-standard units such as handspan, foot and finger vary from person to person.
2. **What is the International System of Units? State the SI unit of length.**
   Answer:
   1. The International System of Units (SI) is the internationally adopted system of standard units of measurement.
   2. The SI unit of length is the **metre**, represented by the symbol **m**.
3. **State any two relationships among the standard units of length.**
   Answer:
   1. One kilometre is equal to 1000 metres (**1 km = 1000 m**).
   2. One metre is equal to 100 centimetres (**1 m = 100 cm**).
4. **Differentiate between kilometre and millimetre based on their uses.**
   Answer:
   1. Kilometre (km) is used for measuring large distances, such as distances between places.
   2. Millimetre (mm) is used for measuring very small lengths or thicknesses.
5. **Mention two precautions to be followed while measuring length with a scale.**
   Answer:
   1. The scale should be placed in contact with the object and along its length.
   2. The eye should be positioned directly above the point whose reading is being taken.
6. **How can the length of an object be measured using a scale with a broken zero end?**
   Answer:
   1. Place one end of the object at any complete marking on the scale and note the readings at both ends.
   2. Subtract the initial reading from the final reading to obtain the length of the object.
7. **How can the length of a curved line be measured using a thread?**
   Answer:
   1. Place a thread carefully along the entire curved line and mark its two ends.
   2. Straighten the thread and measure its length using a metre scale.
8. **What are the two parts of a measurement? Give an example.**
   Answer:
   1. A measurement consists of a **numerical value** and a **unit of measurement**.
   2. For example, in **15 cm**, 15 is the numerical value and cm is the unit.
9. **What is a reference point? Why is it useful?**
   Answer:

1. A reference point is a fixed object or point with respect to which the distance or position of another object is stated.
2. It helps us describe and compare the positions of objects clearly.

10. **What information do kilometre stones provide to travellers?**
Answer:
    1. Kilometre stones indicate the distance of a traveller from a particular place taken as a reference point.
    2. A decreasing distance on successive kilometre stones indicates that the traveller is getting closer to the destination.
11. **Define motion and rest with respect to a reference point.**
Answer:
    1. An object is in motion if its position changes with respect to a reference point with time.
    2. An object is at rest if its position does not change with respect to that reference point with time.
12. **What is linear motion? Give one example.**
Answer:
    1. Motion of an object along a straight-line path is called **linear motion**.
    2. A heavy box moving along a straight line when pushed is an example of linear motion.
13. **What is circular motion? Give one example.**
Answer:
    1. Motion of an object along a circular path is called **circular motion**.
    2. An eraser tied to a thread and whirled around the hand shows circular motion.
14. **What is oscillatory motion? Give one example.**
Answer:
    1. The to-and-fro motion of an object about a fixed position is called **oscillatory motion**.
    2. The movement of a swing is an example of oscillatory motion.
15. **What is periodic motion? Name two types of motion that can be periodic.**
Answer:
    1. Motion that repeats its path after a fixed interval of time is called **periodic motion**.
    2. Circular motion and oscillatory motion can be periodic in nature.
16. **Explain how the state of motion of a passenger in a moving bus depends on the reference point.**
Answer:
    1. A seated passenger is at rest when the bus or another seated passenger is taken as the reference point.
    2. The same passenger is in motion when a stationary object outside the bus is taken as the reference point.
17. **Why are flexible measuring tapes useful? Give one application.**
Answer:
    1. Flexible measuring tapes can bend around curved or irregular surfaces.
    2. They can be used to measure the girth of a tree or the size of a person's chest.
18. **How are visually challenged students able to measure lengths using a scale?**
Answer:
    1. Visually challenged students can use scales provided with raised markings.
    2. They can identify these markings by touching and feeling them.

19. **Mention two traditional units of length used in ancient India.**
    Answer:
    1. **Angula**, which refers to finger width, was used as a traditional unit of length.
    2. **Dhanusa** and **yojana** are other units mentioned in ancient Indian literature.
20. **State two rules for correctly writing units of length.**
    Answer:
    1. Symbols such as km, m, cm and mm are written in lowercase and are not followed by 's' in the plural.
    2. A space should always be left between the numerical value and the unit, as in **15 cm**.
21. **What happens when a thin metal strip fixed at one end is pressed and released? What type of motion is it?**
    Answer:
    1. The free end of the metal strip moves repeatedly up and down when it is released.
    2. This movement is an example of **oscillatory motion**.
22. **How can a bicycle be used to measure the distance travelled?**
    Answer:
    1. Count the number of complete turns made by the bicycle wheel and measure the length of its outer boundary.
    2. Multiplying the outer-boundary length by the number of wheel turns gives the distance travelled.
23. **What is the relationship between centimetre and millimetre? Explain using the markings on a scale.**
    Answer:
    1. One centimetre is equal to 10 millimetres (**1 cm = 10 mm**).
    2. On the scale shown in the chapter, each 1 cm interval is divided into ten equal parts, with each part representing 1 mm.
24. **Why is a common reference point important while comparing distances?**
    Answer:
    1. Distances measured from different reference points may lead to different descriptions of an object's position.
    2. Using the same reference point allows different people to compare positions consistently.
25. **Differentiate between linear motion and circular motion.**
    Answer:
    1. In linear motion, an object moves along a straight-line path.
    2. In circular motion, an object moves along a circular path.

5.8. Two-mark questions with Answers of HOTS Type: (15 Questions)

HOTS – Two-Mark Descriptive Questions with Answers:

1. **Ravi measures a desk using his handspan and gets 10 handspans, while Rohan gets 12. Why are their answers different? Which method would give a reliable result?**
   Answer:
   1. Their answers differ because the sizes of their handspans are different.
   2. Using a standard measuring instrument such as a metre scale or measuring tape would give a reliable result.

2. **A student measures a pencil from the 2 cm mark to the 14 cm mark of a scale. What is its actual length? Explain.**
   Answer:
   1. The actual length of the pencil is **14 − 2 = 12 cm**.
   2. When measurement does not start from zero, the initial reading must be subtracted from the final reading.
3. **The zero end of a ruler is broken. Can the ruler still be used accurately? How?**
   Answer:
   1. Yes, the ruler can still be used by placing one end of the object at another complete scale mark.
   2. The object's length is obtained by subtracting the initial reading from the final reading.
4. **Why may a student obtain an incorrect reading if the eye is kept to one side while reading a scale? How can this be avoided?**
   Answer:
   1. Looking from the side may cause the student to read a different scale marking from the correct one.
   2. This can be avoided by keeping the eye directly above the point whose reading is being taken.
5. **A tailor wants to measure the waist of a person. Why would a flexible measuring tape be more suitable than a metre scale?**
   Answer:
   1. The waist has a curved surface, so a rigid metre scale cannot be placed properly around it.
   2. A flexible measuring tape can follow the curved surface and measure it conveniently.
6. **You have only a thread and a metre scale. How would you measure the length of a curved line?**
   Answer:
   1. Place the thread carefully along the curved line and mark the points corresponding to its two ends.
   2. Straighten the marked portion of the thread and measure it using the metre scale.
7. **A student says that 2 km and 2000 m represent different distances because the numbers are different. Is the student correct? Explain.**
   Answer:
   1. No, the student is not correct because **1 km = 1000 m**.
   2. Therefore, **2 km = 2 × 1000 = 2000 m**, so both represent the same distance.
8. **A pencil is 15 cm long. Express its length in millimetres and explain the conversion.**
   Answer:
   1. The pencil is **150 mm** long because 1 cm equals 10 mm.
   2. Therefore, 15 cm × 10 = 150 mm.
9. **A student writes the length of a table as simply "2". Why is this answer incomplete?**
   Answer:
   1. A measurement must contain both a numerical value and a unit.
   2. Therefore, "2" is incomplete unless the appropriate unit, such as metre, is also stated.

10. **Two friends say that the same building is at rest and in motion at the same time. Can both statements be correct? Explain.**
    Answer:
    1. Yes, motion or rest is determined with respect to a chosen reference point.
    2. An object may be at rest relative to one reference point while appearing to move relative to another.
11. **A passenger is sitting in a moving bus. Describe the passenger's state with respect to the bus and a building outside.**
    Answer:
    1. The passenger is at rest with respect to the bus because the passenger's position inside the bus does not change.
    2. The passenger is in motion with respect to the building because the passenger's position relative to it changes with time.
12. **A traveller first sees a milestone showing "Delhi 70 km" and later another showing "Delhi 60 km." What can be concluded?**
    Answer:
    1. The traveller has moved **10 km closer to Delhi**.
    2. Delhi acts as the reference point for describing the traveller's changing position.
13. **A ball falls vertically from a height. What type of motion does it show and why?**
    Answer:
    1. The falling ball shows **linear motion**.
    2. This is because it moves along a straight-line path as it falls.
14. **An eraser tied to a thread is whirled around the hand. Identify its motion and justify your answer.**
    Answer:
    1. The eraser shows **circular motion**.
    2. It is classified as circular motion because it moves along a circular path around the hand.
15. **A child moves repeatedly forward and backward on a swing. What type of motion is this and why?**
    Answer:
    1. The swing shows **oscillatory motion**.
    2. It is oscillatory because it moves repeatedly to and fro about a fixed position.
16. **How can the motion of a swing be both oscillatory and periodic?**
    Answer:
    1. It is oscillatory because the swing moves to and fro about a fixed position.
    2. It can also be periodic because this movement repeats after fixed intervals of time.
17. **A toy car first moves along a straight track and then enters a circular track. How would you classify its motion?**
    Answer:
    1. The toy car shows linear motion while travelling along the straight part of the track.
    2. It shows circular motion when it travels along the circular part.
18. **A thin metal strip is fixed at one end, bent slightly and released. What will you observe and how will you classify its motion?**
    Answer:
    1. The free end of the strip moves repeatedly up and down about its fixed position.

2. Hence, the free end of the strip exhibits oscillatory motion.

19. **A notebook page is too thin to measure directly with an ordinary scale. How can you estimate its thickness?**
Answer:
    1. Measure the total thickness of a large number of notebook pages together.
    2. Divide this total thickness by the number of pages to estimate the thickness of one page.
20. **A bicycle wheel covers 2 m in one complete turn and makes 30 turns. Calculate the distance travelled.**
Answer:
    1. Distance travelled = length covered in one turn × number of turns = **2 × 30**.
    2. Therefore, the bicycle travels **60 m**.
21. **A bicycle travels 100 m while its wheel makes 50 complete turns. What distance does the wheel cover in one turn?**
Answer:
    1. Distance covered in one turn = total distance ÷ number of turns = **100 ÷ 50**.
    2. Therefore, the wheel covers **2 m per complete turn**.
22. **Why would a stretchable material be unsuitable for making a measuring scale?**
Answer:
    1. A stretchable material can change its length when pulled or handled.
    2. Therefore, its markings would not maintain fixed distances and could give inconsistent measurements.
23. **A student uses a rigid scale to measure the boundary of a circular plate. Why may the method fail, and what should be used instead?**
Answer:
    1. A rigid scale cannot follow the curved boundary of the circular plate accurately.
    2. A flexible measuring tape or thread can be placed along the curved boundary to measure it.
24. **Why is it necessary to specify a reference point when saying that an object has changed its position?**
Answer:
    1. The position of an object is described relative to a fixed reference point.
    2. A change in position can therefore be identified by comparing the object's location with respect to that reference point over time.
25. **A wheel rotating repeatedly about its centre shows circular as well as periodic motion. Explain why.**
Answer:
    1. It shows circular motion because points on the wheel move along circular paths.
    2. The motion is periodic because it repeats after fixed intervals of time.

5.9. Three-mark questions with Answers of LOTS Type: (10 Questions)

LOTS – Three-Mark Descriptive Questions with Answers

1. Why do we need standard units for measuring length?

Answer:

1. Earlier, people used body parts such as handspan, foot and arm length for measurement.
2. These measurements differed from person to person because the sizes of their body parts were not the same.

3. Therefore, standard units are needed to obtain uniform and reliable measurements.

2. Explain the SI unit of length and its commonly used multiples and submultiples.

Answer:

1. The SI unit of length is the **metre (m)**.
2. For larger distances, kilometre is used, where **1 km = 1000 m**.
3. For smaller lengths, centimetre and millimetre are used, where **1 m = 100 cm** and **1 cm = 10 mm**.

3. State three precautions to be followed while measuring length using a scale.

Answer:

1. Choose a scale of suitable size and range for the object to be measured.
2. Place the scale along the length of the object and keep it in contact with the object.
3. Keep the eye directly above the point on the scale whose reading is being taken.

4. Explain how to measure an object when the zero mark of a scale is broken.

Answer:

1. Place one end of the object at another complete mark on the scale instead of the damaged zero mark.
2. Note the initial reading and the final reading corresponding to the two ends of the object.
3. Subtract the initial reading from the final reading to obtain the object's length.

5. Explain how to measure the length of a curved line using a thread.

Answer:

1. Place a thread carefully along the curved line from one end to the other.
2. Mark the points on the thread corresponding to the two ends of the curved line and then straighten the thread.
3. Measure the marked portion of the thread with a metre scale to find the length of the curved line.

6. Explain the importance of a reference point in describing the position of an object.

Answer:

1. The position of an object is described with respect to a fixed object or point called a **reference point**.
2. The distance of an object from the reference point helps us describe its position clearly.
3. A common reference point allows different people to describe and compare positions consistently.

7. Explain how kilometre stones help us understand position and distance.

Answer:

1. A kilometre stone shows the distance of a place from a particular reference point.
2. For example, if a stone shows "Delhi 70 km," Delhi is taken as the reference point.
3. If the next stone shows "Delhi 60 km," the traveller has moved 10 km closer to Delhi.

8. Explain the meaning of motion and rest with respect to a reference point.

Answer:

1. An object is said to be in **motion** if its position changes with respect to a reference point with time.
2. An object is said to be at **rest** if its position does not change with respect to a reference point with time.
3. Thus, deciding whether an object is moving or at rest depends on the reference point chosen.

9. Explain how a passenger in a moving bus can be both at rest and in motion.

Answer:

1. A seated passenger does not change position with respect to the bus or another seated passenger.
2. Therefore, the passenger is considered at rest with respect to the bus.

3. However, the passenger changes position with respect to buildings outside and is therefore in motion relative to them.

10. What is linear motion? Explain with examples.

Answer:

1. Motion of an object along a straight-line path is called **linear motion**.
2. A heavy box pushed along a straight line shows linear motion.
3. Objects moving along other straight paths can also be described as showing linear motion.

11. What is circular motion? Explain with an example.

Answer:

1. Motion of an object along a circular path is called **circular motion**.
2. An eraser tied to a thread can be made to move around the hand along a circular path.
3. Hence, the motion of the whirling eraser is an example of circular motion.

12. What is oscillatory motion? Explain with examples.

Answer:

1. The to-and-fro motion of an object about a fixed position is called **oscillatory motion**.
2. The movement of a swing to and fro about its mean position is an example of oscillatory motion.
3. The free end of a fixed metal strip moving repeatedly up and down also shows oscillatory motion.

13. What is periodic motion? How is it related to circular and oscillatory motion?

Answer:

1. Motion that repeats itself after a fixed interval of time is called **periodic motion**.
2. Circular motion can be periodic when the object repeatedly follows the same circular path.
3. Oscillatory motion can also be periodic when the to-and-fro movement repeats at fixed intervals.

14. Explain the correct way of expressing a measurement of length.

Answer:

1. A measurement of length consists of a **numerical value and a unit**.
2. Standard symbols such as m, cm, mm and km are used to represent units of length.
3. A space is left between the numerical value and the unit, for example, **15 cm**.

15. Explain how a bicycle wheel can be used to determine the distance travelled.

Answer:

1. First, measure the length of the outer boundary of the bicycle wheel using a string.
2. Count the number of complete turns made by the wheel while the bicycle travels the required distance.
3. Multiply the wheel's outer-boundary length by the number of complete turns to determine the distance travelled.

5.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

HOTS – Three-Mark Descriptive Questions with Answers:

1. Meena and Ravi measure the same table using their handspans and obtain different results. Explain why and suggest a better method.

Answer:

1. Meena and Ravi obtain different results because the sizes of their handspans are different.
2. Body parts such as handspans are therefore not reliable for obtaining uniform measurements.

3. They should measure the table using a standard measuring instrument and express the result in a standard unit.

2. A pencil is placed from the 2.5 cm mark to the 15.5 cm mark on a scale. Calculate its length and explain the method.

Answer:

1. The initial reading is 2.5 cm and the final reading is 15.5 cm.
2. Length of the pencil = Final reading − Initial reading = 15.5 − 2.5 cm.
3. Therefore, the length of the pencil is **13 cm**.

3. A ruler has its zero mark damaged. How can a student still use it to measure the length of an object accurately?

Answer:

1. The student should place one end of the object at an undamaged complete mark, such as the 1 cm mark.
2. The readings corresponding to both ends of the object should then be noted carefully.
3. The object's length is obtained by subtracting the initial reading from the final reading.

4. A student places a scale correctly but observes the reading from the side. Why can this produce an incorrect measurement, and how should the reading be taken?

Answer:

1. Looking at the scale from the side can make the student observe a marking different from the correct one.
2. This can result in an incorrect measurement even when the scale is properly placed.
3. The student's eye should be positioned directly above the point whose reading is being taken.

5. You are given a thread and a metre scale to measure the curved edge of an object. Describe how you would determine its length.

Answer:

1. Place the thread carefully along the curved edge from its starting point to its ending point.
2. Mark the corresponding points on the thread and then straighten the marked portion.
3. Measure this portion with the metre scale to determine the length of the curved edge.

6. A student says that "1.5 km is smaller than 1500 m because 1.5 is smaller than 1500." Analyse the statement.

Answer:

1. The statement is incorrect because quantities expressed in different units must first be converted into the same unit.
2. Since **1 km = 1000 m**, 1.5 km = 1.5 × 1000 = 1500 m.
3. Therefore, **1.5 km and 1500 m represent exactly the same distance**.

7. A traveller sees a milestone showing "Delhi 70 km" and later sees "Delhi 60 km." What can you infer from these observations?

Answer:

1. Delhi is being used as the reference point for describing the traveller's position.
2. The distance from Delhi has decreased from 70 km to 60 km.
3. Therefore, the traveller has moved **10 km towards Delhi**.

8. Two passengers are sitting next to each other in a moving bus. Explain their state of motion with respect to each other and a building outside.

Answer:

1. The passengers are at rest with respect to each other because their relative positions inside the bus do not change.
2. Both passengers are in motion with respect to the building outside because their positions relative to it change with time.

3. Thus, whether an object is at rest or in motion depends on the reference point chosen.

9. A toy car moves first on a straight track and then enters a circular track. Analyse the types of motion shown by the car.

Answer:

1. On the straight portion of the track, the toy car shows **linear motion**.
2. On the circular portion, it shows **circular motion**.
3. Thus, the same object can exhibit different types of motion when the nature of its path changes.

10. A child on a swing moves repeatedly forward and backward. Classify the motion and explain its nature.

Answer:

1. The swing shows **oscillatory motion** because it moves to and fro about a fixed position.
2. The movement repeats again and again in a similar manner.
3. Therefore, the motion of the swing can also be periodic when it repeats after fixed intervals of time.

11. A notebook page is too thin to measure accurately using an ordinary scale. Suggest a method to estimate its thickness.

Answer:

1. Take a large number of notebook pages together and measure their total thickness.
2. Count the number of pages included in the measured thickness.
3. Divide the total thickness by the number of pages to estimate the thickness of one page.

12. A bicycle wheel covers 1.5 m in one complete turn and makes 40 complete turns. Calculate the distance travelled.

Answer:

1. Distance travelled can be found by multiplying the wheel's outer-boundary length by the number of complete turns.
2. Distance travelled = 1.5 m × 40 = 60 m.
3. Therefore, the bicycle travels a distance of **60 m**.

13. A bicycle travels 120 m while its wheel makes 60 complete turns. Determine the length of the wheel's outer boundary.

Answer:

1. Length covered in one wheel turn = Total distance travelled ÷ Number of turns.
2. Therefore, length of outer boundary = 120 m ÷ 60 = 2 m.
3. Hence, the outer boundary of the bicycle wheel measures **2 m**.

14. A student wants to make a measuring scale from an elastic strip. Explain why this is not a good idea.

Answer:

1. An elastic strip can stretch or contract when force is applied to it.
2. The distances between its markings would therefore not remain fixed during measurement.
3. Hence, it would not provide consistent measurements and is unsuitable for making a standard scale.

15. A student wants to measure the girth of a tree using only a rigid metre scale. Identify the difficulty and suggest a solution.

Answer:

1. A rigid metre scale cannot bend around the curved surface of the tree.
2. A flexible measuring tape can be wrapped around the trunk to measure its girth conveniently.
3. Alternatively, a thread can be wrapped around the trunk, straightened, and then measured with the scale.

16. An eraser tied to a thread is whirled repeatedly around the hand. Explain how its motion can be classified.

Answer:

1. The eraser shows **circular motion** because it moves along a circular path around the hand.
2. If it repeatedly completes the same path at fixed intervals, its motion is also periodic.
3. Thus, the motion may be described as both circular and periodic.

17. A metal strip fixed at one end is pressed downward and released. Predict what will happen and classify its motion.

Answer:

1. After being released, the free end of the strip moves repeatedly up and down.
2. It moves to and fro about its fixed position.
3. Therefore, the free end of the strip exhibits **oscillatory motion**.

18. A student writes the length of a classroom as "8" without mentioning a unit. Explain why this is scientifically incomplete.

Answer:

1. A measurement of length must contain both a numerical value and a unit.
2. The number 8 alone does not indicate whether the length is 8 m, 8 cm, or another quantity.
3. Therefore, the appropriate unit must be written with the numerical value to make the measurement meaningful.

19. A student has to measure the thickness of a coin and the distance between two cities. Should the same unit be used for both? Explain.

Answer:

1. Very small lengths such as the thickness of a coin are conveniently expressed in **millimetres**.
2. Large distances such as those between cities are conveniently expressed in **kilometres**.
3. Therefore, an appropriate unit should be selected according to the magnitude of the length being measured.

20. A person standing beside a road observes a moving bus, while a passenger inside observes another seated passenger. How will their observations differ?

Answer:

1. The person beside the road observes the passengers changing position and therefore considers them to be in motion.
2. A seated passenger observes another seated passenger at an unchanged position and therefore considers that passenger to be at rest.
3. This demonstrates that motion and rest are described with respect to a chosen reference point.

5.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

LOTS – Five-Mark Descriptive Questions with Answers

1. Explain the need for standard units of measurement and describe the commonly used units of length.

Answer:

1. In earlier times, people used body parts such as handspan, foot and arm length to measure lengths.
2. Such measurements could differ from person to person because the sizes of their body parts were different.

3. Therefore, standard units were introduced so that measurements could be expressed uniformly.
4. The SI unit of length is the **metre (m)**, while kilometre, centimetre and millimetre are also commonly used.
5. Their relationships are **1 km = 1000 m, 1 m = 100 cm, and 1 cm = 10 mm**.

2. Explain the correct procedure and precautions for measuring the length of an object using a scale.

Answer:

1. Select a suitable scale according to the size and length of the object to be measured.
2. Place the scale along the length of the object and keep it in proper contact with the object.
3. Align one end of the object with the zero mark of the scale whenever the zero mark is available.
4. Position the eye directly above the point on the scale where the reading is to be taken.
5. Note the reading carefully and express the measured length using the appropriate standard unit.

3. Describe how an object can be measured using a scale whose zero mark is broken or damaged.

Answer:

1. A scale with a damaged zero mark can still be used to measure the length of an object.
2. Place one end of the object at another complete scale marking, such as the 1 cm mark.
3. Note this value as the initial reading and note the reading corresponding to the other end as the final reading.
4. Subtract the initial reading from the final reading to obtain the actual length of the object.
5. For example, if the readings are 1.0 cm and 10.4 cm, the object's length is **10.4 − 1.0 = 9.4 cm**.

4. Explain how the length of a curved line can be measured.

Answer:

1. A curved line cannot be measured conveniently by placing a rigid scale directly along it.
2. A flexible measuring tape can be used because it can follow the shape of the curved line.
3. Alternatively, a thread can be carefully placed along the entire curved line.
4. The points on the thread corresponding to the beginning and end of the curved line should be marked and the thread straightened.
5. The marked portion of the straightened thread is then measured with a metre scale to obtain the length of the curved line.

5. Explain the concept of a reference point and its importance in describing the position of an object.

Answer:

1. The position of an object is described in relation to another fixed object or point.
2. Such a fixed object or point is called a **reference point**.
3. The distance of an object from the reference point helps us describe its position clearly.
4. For example, in a kilometre stone showing “Delhi 70 km,” Delhi serves as the reference point.
5. Therefore, selecting a suitable reference point is important for describing and comparing the positions of objects.

6. Explain the concepts of motion and rest with suitable examples.

Answer:

1. An object is said to be in **motion** when its position changes with respect to a reference point with time.
2. An object is said to be at **rest** when its position does not change with respect to a reference point with time.
3. A passenger sitting in a moving bus is at rest with respect to another passenger sitting in the same bus.
4. The same passenger is in motion with respect to a stationary building outside the bus.
5. Thus, whether an object is considered at rest or in motion depends on the reference point chosen.

7. Describe linear, circular and oscillatory motion with suitable examples.

Answer:

1. **Linear motion** is the motion of an object along a straight-line path.
2. A heavy box moving along a straight line when pushed is an example of linear motion.
3. **Circular motion** is the motion of an object along a circular path, such as an eraser tied to a thread and whirled around.
4. **Oscillatory motion** is the to-and-fro motion of an object about a fixed position.
5. A swing moving repeatedly to and fro is an example of oscillatory motion.

8. Explain periodic motion and its relationship with circular and oscillatory motion.

Answer:

1. A motion that repeats itself after a fixed interval of time is called **periodic motion**.
2. In periodic motion, the same pattern of movement occurs repeatedly.
3. Circular motion can be periodic when an object repeatedly moves around the same circular path.
4. Oscillatory motion can also be periodic when an object repeatedly moves to and fro about a fixed position.
5. Thus, both circular and oscillatory motions can be periodic in nature.

9. Explain how measurements of length should be expressed and written correctly.

Answer:

1. A measurement of length consists of a **numerical value and a unit**.
2. The metre is represented by **m**, centimetre by **cm**, millimetre by **mm**, and kilometre by **km**.
3. Unit symbols are written in lowercase letters as specified for these units.
4. A space should be left between the numerical value and the unit, as in **25 cm**.
5. Unit symbols are not changed to plural forms; for example, we write **5 km**, not "5 kms."

10. Describe how a bicycle wheel can be used to determine the distance travelled by a bicycle.

Answer:

1. First, mark a point on the bicycle wheel so that complete rotations can be counted.
2. Measure the length of the outer boundary of the wheel using a string.
3. Move the bicycle over the required path and count the number of complete turns made by the wheel.
4. Multiply the length of the wheel's outer boundary by the number of complete turns.
5. The resulting value gives the distance travelled by the bicycle.

5.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

HOTS – Five-Mark Descriptive Questions with Answers

1. Two students measure the same table using their handspans and obtain different results. Analyse the reason and explain how they can obtain a reliable measurement.

Answer:

1. The students obtain different results because the size of a handspan varies from one person to another.
2. Hence, body parts such as handspan are not suitable for obtaining uniform measurements.
3. They should use a standard measuring instrument such as a metre scale or measuring tape.
4. The scale should be placed properly along the object, and the reading should be observed with the eye directly above the required mark.
5. The result should be expressed using a standard unit such as metre or centimetre so that the measurement can be understood and compared by everyone.

2. A ruler has its zero end broken. A pencil extends from the 2.0 cm mark to the 16.5 cm mark. Explain how you would determine its correct length.

Answer:

1. A ruler with a broken zero end can still be used by starting the measurement from another complete marking.
2. Here, the initial reading of the pencil is **2.0 cm** and the final reading is **16.5 cm**.
3. The actual length is calculated as **Final reading − Initial reading**.
4. Therefore, length = 16.5 cm − 2.0 cm = **14.5 cm**.
5. Thus, the pencil is **14.5 cm long**, showing that a damaged zero mark does not make the entire scale unusable.

3. You are asked to measure the curved boundary of an irregular object, but you have only a thread and a metre scale. Describe how you would solve the problem.

Answer:

1. A rigid metre scale cannot be placed accurately along the entire curved boundary.
2. I would place the thread carefully along the curve from its starting point to its ending point.
3. I would mark the two points on the thread corresponding to the beginning and end of the curved boundary.
4. I would then straighten the marked portion of the thread and measure it using the metre scale.
5. The measured length of the marked thread would give the approximate length of the curved boundary.

4. A passenger says, "I am at rest," while a person standing beside the road says, "The passenger is moving." Analyse how both statements can be correct.

Answer:

1. Motion and rest are described with respect to a chosen reference point.
2. The passenger does not change position with respect to the seat or other seated passengers and is therefore at rest relative to the bus.
3. However, the passenger's position changes continuously with respect to a stationary person or building beside the road.
4. Therefore, the roadside observer correctly describes the passenger as being in motion.
5. Thus, the same person can be at rest relative to one reference point and in motion relative to another.

5. A traveller first observes a kilometre stone showing "Delhi 70 km" and later another showing "Delhi 60 km." Analyse what these observations tell us.

Answer:

1. Delhi is the fixed reference point used for describing the traveller's position.
2. At the first kilometre stone, the traveller is 70 km away from Delhi.
3. At the second kilometre stone, the distance from Delhi has decreased to 60 km.
4. Therefore, the traveller has moved **70 − 60 = 10 km towards Delhi**.

5. This example shows how a reference point and changes in distance can be used to describe the position and motion of an object.

6. A toy car first travels on a straight track and then enters a circular track that it repeatedly goes around. Analyse the different types of motion involved.

Answer:

1. On the straight portion of the track, the toy car shows **linear motion** because it travels along a straight line.
2. When it enters the circular track, it shows **circular motion** because its path is circular.
3. If it repeatedly completes the circular path, the movement also repeats itself.
4. Such repeating motion can be classified as **periodic motion** when it repeats after fixed intervals of time.
5. Thus, the same object can exhibit different types of motion depending on its path and the manner in which its movement repeats.

7. A child observes a swing and an eraser tied to a thread and whirled around a hand. Compare and classify their motions.

Answer:

1. The swing moves repeatedly to and fro about a fixed position and therefore shows **oscillatory motion**.
2. The eraser moves around the hand along a circular path and therefore shows **circular motion**.
3. The paths followed by the two objects are different: the swing moves to and fro, while the eraser follows a circle.
4. When these movements repeat after fixed intervals, they can also be considered periodic.
5. Therefore, oscillatory and circular motions are different in their paths, although both can be periodic in nature.

8. A notebook page is too thin to measure directly with an ordinary scale. Devise a method to estimate the thickness of one page.

Answer:

1. A single page is too thin to be measured accurately using an ordinary scale.
2. A large number of pages should therefore be kept together and their total thickness measured.
3. The number of pages included in the measured bundle should then be counted.
4. The thickness of one page can be estimated by dividing the total measured thickness by the number of pages.
5. Measuring many pages together makes the very small thickness of a single page easier to estimate.

9. A bicycle wheel has an outer-boundary length of 2 m and makes 75 complete turns. Calculate the distance travelled and explain the method.

Answer:

1. The distance covered in one complete turn of the wheel is equal to its outer-boundary length, which is **2 m**.
2. The wheel makes **75 complete turns** during the journey.
3. Distance travelled = outer-boundary length × number of turns.
4. Therefore, distance travelled = 2 × 75 = **150 m**.
5. Hence, the bicycle travels **150 m**, illustrating how wheel rotations can be used to determine distance travelled.

10. A bicycle travels 180 m while its wheel makes 90 complete turns. Determine the outer-boundary length of the wheel and explain your reasoning.

Answer:

1. The total distance travelled is **180 m**, and the wheel makes **90 complete turns**.
2. Each complete turn covers a distance equal to the outer-boundary length of the wheel.
3. Therefore, outer-boundary length = total distance ÷ number of turns.
4. Outer-boundary length = 180 ÷ 90 = **2 m**.
5. Hence, the length of the outer boundary of the bicycle wheel is **2 m**.

11. A student proposes making a measuring scale from an elastic strip. Evaluate the idea and suggest what property a good measuring scale should have.

Answer:

1. An elastic strip can stretch when pulled and return towards its original length when released.
2. Therefore, the distances between its measurement markings may change during use.
3. This would cause the same object to appear to have different lengths under different amounts of stretching.
4. A suitable measuring scale should maintain fixed distances between its markings during measurement.
5. Hence, an elastic or easily stretchable material is unsuitable for making a reliable measuring scale.

12. A student needs to measure the thickness of a coin, the length of a classroom and the distance between two cities. Explain how suitable units should be selected.

Answer:

1. The unit chosen should be appropriate to the size of the length or distance being measured.
2. A small thickness such as that of a coin can conveniently be expressed in **millimetres (mm)**.
3. The length of a classroom can conveniently be expressed in **metres (m)**.
4. The large distance between two cities is more conveniently expressed in **kilometres (km)**.
5. Thus, selecting a suitable unit makes measurements easier to express, understand and compare.

5.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Applied Type – Five-Mark Descriptive Questions with Answers

1. Your classroom needs a new curtain for a window. Explain how you would measure the window correctly before buying the cloth.

Answer:

1. I would select a suitable measuring tape because the dimensions of a window may be too large for a short ruler.
2. I would place the measuring tape straight and in contact with the window while measuring its length and width.
3. I would ensure that the measurement begins from the zero mark of the measuring tape.
4. I would keep my eye directly above the required marking while taking each reading to avoid an incorrect observation.
5. I would record the measurements with appropriate units, such as centimetres or metres, before deciding the amount of cloth required.

2. You have to measure the curved boundary of a circular flower bed, but only a long thread and a metre scale are available. Describe how you would do it.

Answer:

1. I would place the thread carefully along the entire curved boundary of the flower bed.

2. I would mark on the thread the points corresponding to the beginning and end of the measured boundary.
3. I would remove the thread and straighten the marked portion without stretching it.
4. I would measure the marked thread using the metre scale, repeating the scale placement if the thread is longer than one metre.
5. The total measured length of the thread would give an estimate of the length of the curved boundary.

3. During a school activity, your ruler is broken at the zero end. An object extends from the 3.2 cm mark to the 17.8 cm mark. Explain how you would find its length.

Answer:

1. I can still use the ruler because measurement need not necessarily begin from the zero mark.
2. I would note **3.2 cm** as the initial reading and **17.8 cm** as the final reading.
3. The object's length is calculated using **Final reading − Initial reading**.
4. Therefore, length = 17.8 cm − 3.2 cm = **14.6 cm**.
5. Hence, the actual length of the object is **14.6 cm**.

4. You are travelling in a moving bus with your friend. Explain how you can use your friend, the bus and a roadside building to demonstrate the concepts of rest, motion and reference point.

Answer:

1. While both of us remain seated, my position does not change with respect to my friend, so I am at rest relative to my friend.
2. My position also remains unchanged with respect to my seat in the bus, so I am at rest relative to the bus.
3. However, my position continuously changes with respect to a stationary building beside the road.
4. Therefore, I am in motion when the roadside building is chosen as the reference point.
5. This demonstrates that whether an object is described as being at rest or in motion depends on the reference point chosen.

5. During a bicycle activity, the outer boundary of a bicycle wheel is measured as 1.8 m. If the wheel makes 50 complete turns, calculate the distance travelled and explain the procedure.

Answer:

1. First, the length of the outer boundary of the bicycle wheel is measured, which is **1.8 m**.
2. The number of complete turns made by the wheel is counted as **50**.
3. Distance travelled = length of outer boundary × number of complete turns.
4. Therefore, distance travelled = 1.8 × 50 = **90 m**.
5. Hence, the bicycle has travelled a total distance of **90 m**.

6. A student wants to estimate the thickness of one page of a science textbook, but the page is too thin to measure directly. Suggest a practical method.

Answer:

1. The student should take a large number of pages together because a single page is too thin to measure conveniently.
2. The total thickness of these pages should be measured carefully with a suitable scale.
3. The number of pages included in the measured thickness should be counted.
4. The thickness of one page can then be estimated as **total thickness ÷ number of pages**.
5. Thus, measuring several pages together makes it possible to estimate the very small thickness of one page.

7. While travelling towards Delhi, you observe one kilometre stone showing "Delhi 70 km" and later another showing "Delhi 60 km." Use this situation to explain reference point and motion.

Answer:

1. In this situation, **Delhi** is taken as the fixed reference point.
2. At the first kilometre stone, your position is 70 km away from Delhi.
3. Later, your position is only 60 km away from the same reference point.
4. Your distance from Delhi has therefore changed by **70 − 60 = 10 km**, showing that you have moved 10 km towards Delhi.
5. This demonstrates that motion can be identified by observing a change in position with respect to a reference point over time.

8. During a playground activity, you observe a child walking along a straight path, another child moving on a swing and another moving around on a circular ride. Classify and explain their motions.

Answer:

1. The child walking along the straight path shows **linear motion** because the path is a straight line.
2. The child on the swing shows **oscillatory motion** because the swing moves to and fro about a fixed position.
3. The child on the circular ride shows **circular motion** because the path followed is circular.
4. The circular and oscillatory motions may also be periodic when they repeat after fixed intervals of time.
5. Thus, the type of motion of an object can be identified by observing the nature of its path and movement.

9. Your friend suggests using an elastic strip marked in centimetres to measure the length of a table. Evaluate the idea and suggest a better solution.

Answer:

1. An elastic strip is unsuitable for accurate measurement because it can stretch when pulled.
2. When it stretches, the distances between its centimetre markings can change.
3. Consequently, the same table may give different measurements depending on how much the strip is stretched.
4. A proper measuring instrument should maintain fixed distances between its markings while being used.
5. Therefore, a non-stretchable metre scale or measuring tape should be used instead of an elastic strip.

10. You need to record the thickness of a small object, the length of your classroom and the distance from your town to another city. Explain how you would choose suitable units.

Answer:

1. The size of the quantity being measured should be considered while choosing an appropriate unit.
2. A very small thickness can conveniently be expressed in **millimetres (mm)**.
3. The length of a classroom can conveniently be expressed in **metres (m)**.
4. The large distance between two cities can conveniently be expressed in **kilometres (km)**.
5. Selecting units according to the magnitude of the length makes measurements easier to record, communicate and compare.

6.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions

1. Four students measure the same desk using their handspans and obtain different values. What is the most appropriate reason?
A. The desk changes its length
B. Their handspans are of different sizes
C. The students use different SI units
D. Handspan is smaller than centimetre
Answer: B. Their handspans are of different sizes

2. Which of the following is the SI unit of length?
A. Kilometre
B. Centimetre
C. Metre
D. Millimetre
Answer: C. Metre

3. A road is 2.75 km long. What is its length in metres?
A. 275 m
B. 2,750 m
C. 27,500 m
D. 275,000 m
Answer: B. 2,750 m

4. Which of the following represents the greatest length?
A. 1 km
B. 950 m
C. 99,000 cm
D. 900,000 mm
Answer: A. 1 km
(1 km = 1000 m; 99,000 cm = 990 m; 900,000 mm = 900 m.)

5. A pencil begins at the 1.5 cm mark and ends at the 13.8 cm mark of a ruler. What is its length?
A. 12.3 cm
B. 15.3 cm
C. 13.8 cm
D. 11.3 cm
Answer: A. 12.3 cm
(13.8 − 1.5 = 12.3 cm)

6. The zero end of a scale is broken. Which method gives the correct length of an object?
A. Use only the final reading
B. Add the initial and final readings
C. Subtract the initial reading from the final reading
D. Multiply the two readings
Answer: C. Subtract the initial reading from the final reading

7. A student reads a ruler by looking at it from the side. What should the student do to obtain a more accurate reading?
A. Hold the scale vertically
B. Keep the eye directly above the reading
C. Start measuring from the 5 cm mark
D. Turn the object upside down
Answer: B. Keep the eye directly above the reading

8. Which instrument would be most suitable for measuring the girth of a tree?

A. Rigid metre scale
B. Flexible measuring tape
C. Small ruler only
D. Kilometre stone
Answer: B. Flexible measuring tape
9. You have only a thread and a ruler. How should you measure a curved line?
A. Stretch the ruler along the curve
B. Measure only the distance between the ends
C. Place the thread along the curve, straighten it, and measure it
D. Fold the ruler around the curve
Answer: C. Place the thread along the curve, straighten it, and measure it
10. Which of the following is correctly matched?
A. 1 m = 10 cm
B. 1 km = 100 m
C. 1 cm = 100 mm
D. 1 m = 1000 mm
Answer: D. 1 m = 1000 mm
(Derived from 1 m = 100 cm and 1 cm = 10 mm.)
11. A student's height is 1.45 m. What is the height in centimetres?
A. 14.5 cm
B. 145 cm
C. 1,450 cm
D. 0.145 cm
Answer: B. 145 cm
12. Which is the most suitable unit for expressing the distance between two cities?
A. Millimetre
B. Centimetre
C. Metre
D. Kilometre
Answer: D. Kilometre
13. A kilometre stone first shows "Delhi 70 km" and later "Delhi 60 km." What can be concluded?
A. The traveller moved 10 km away from Delhi
B. Delhi moved 10 km
C. The traveller moved 10 km towards Delhi
D. The traveller did not move
Answer: C. The traveller moved 10 km towards Delhi
14. In the statement "The school is 500 m from the bus stand," if the position of the school is being described relative to the bus stand, the bus stand acts as the:
A. Measuring unit
B. Reference point
C. Standard scale
D. Moving object
Answer: B. Reference point
15. A passenger sitting inside a moving bus is:
A. At rest with respect to the bus and at rest with respect to a building outside
B. In motion with respect to the bus and at rest with respect to a building outside
C. At rest with respect to the bus but in motion with respect to a building outside
D. In motion with respect to both the bus and another seated passenger
Answer: C. At rest with respect to the bus but in motion with respect to a building outside

16. Which statement best describes an object in motion?
A. Its size changes with time
B. Its position changes with respect to a reference point with time
C. Its mass changes with time
D. Its colour changes with time
Answer: B. Its position changes with respect to a reference point with time
17. A ball rolls along a straight corridor. Which type of motion does it primarily show?
A. Circular motion
B. Oscillatory motion
C. Linear motion
D. Periodic motion
Answer: C. Linear motion
18. An eraser tied to a thread is whirled around the hand. Its motion is primarily:
A. Linear
B. Circular
C. Oscillatory
D. At rest
Answer: B. Circular
19. Which situation best represents oscillatory motion?
A. A car travelling on a straight road
B. A child moving to and fro on a swing
C. A train travelling between two cities
D. A ball rolling down a straight slope
Answer: B. A child moving to and fro on a swing
20. A motion repeats itself after a fixed interval of time. It is called:
A. Random motion
B. Linear motion
C. Periodic motion
D. Translatory motion
Answer: C. Periodic motion
21. Which pair of motions can be periodic in nature according to the chapter?
A. Linear and random
B. Circular and oscillatory
C. Linear and stationary
D. Stationary and oscillatory
Answer: B. Circular and oscillatory
22. A bicycle wheel covers 2.5 m in one complete turn. How far will the bicycle travel in 40 complete turns?
A. 16 m
B. 42.5 m
C. 100 m
D. 250 m
Answer: C. 100 m
(Distance = 2.5 × 40 = 100 m.)
23. A bicycle travels 120 m while its wheel makes 60 complete turns. What is the length of the outer boundary of the wheel?
A. 0.5 m
B. 2 m
C. 60 m
D. 180 m

Answer: B. 2 m
(120 ÷ 60 = 2 m.)
24. Which material would be least suitable for making an accurate measuring scale?
A. Rigid plastic
B. Metal
C. Wood
D. Stretchable elastic
Answer: D. Stretchable elastic
25. A book contains 200 pages whose total thickness is 10 mm. What is the estimated thickness of one page?
A. 0.05 mm
B. 0.5 mm
C. 5 mm
D. 20 mm
Answer: A. 0.05 mm
(10 ÷ 200 = 0.05 mm.)
26. Which sequence is arranged from the smallest unit to the largest unit?
A. km → m → cm → mm
B. mm → cm → m → km
C. cm → mm → km → m
D. m → mm → cm → km
Answer: B. mm → cm → m → km
27. Which of the following represents the same length as 2.5 m?
A. 25 cm
B. 250 cm
C. 2500 cm
D. 0.25 cm
Answer: B. 250 cm
28. A toy moves repeatedly along the same circular path. Which combination best describes its motion?
A. Linear only
B. Oscillatory only
C. Circular and periodic
D. Linear and oscillatory
Answer: C. Circular and periodic
29. Which statement about motion and rest is scientifically correct?
A. An object can never be both at rest and in motion
B. Motion is independent of a reference point
C. Rest and motion can depend on the reference point chosen
D. Every moving object must follow a circular path
Answer: C. Rest and motion can depend on the reference point chosen
30. Consider the following statements:
I. A swing can show oscillatory motion.
II. A whirling eraser can show circular motion.
III. Circular and oscillatory motions can be periodic.
Which option is correct?
A. Only I is correct
B. Only I and II are correct
C. Only II and III are correct
D. I, II and III are correct

Answer: D. I, II and III are correct

5.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
Based on the activities and concepts presented in the uploaded chapter, the following best practices can make teaching more **experiential, student-centred, activity-based, and competency-oriented**. The chapter itself strongly encourages learning through measurement activities and observation.

(1) **Learning by Doing – Measurement Lab:** Create small classroom stations where students measure a desk, book, classroom door, pencil, and other objects using handspans first and standard scales later. Ask them to compare the results so that they discover why standard units are necessary rather than merely memorising the concept.

(2) **Demonstrate Correct vs. Incorrect Measurement:** Let students intentionally measure objects by keeping the scale tilted, viewing the reading from the side, and then using the correct procedure. Comparing the readings helps them understand the importance of keeping the scale along the object and positioning the eye directly above the reading.

(3) **Broken-Ruler Problem-Solving Activity:** Give students a ruler whose zero end is hidden or marked as "broken" and ask them to find the length of different objects. Students learn practically that **Length = Final reading − Initial reading**, strengthening both measurement and subtraction skills.

(4) **Curved-Line Measurement Challenge:** Provide leaves, curved drawings, circular objects, or other curved outlines and ask students to measure them using thread and a scale. This converts the chapter's method for measuring curved lines into a hands-on investigation.

(5) **Reference-Point Role Play:** Use the classroom or playground to demonstrate reference points—for example, one student remains stationary while another changes position relative to a chair, tree, door, or other fixed object. Students can then describe who is at rest and who is in motion with respect to different reference points, reinforcing the chapter's central idea that motion and rest depend on the chosen reference point.

(6) **Motion Classification through Observation:** Ask students to observe everyday examples such as a child walking straight, a swing moving to and fro, and an object moving around a circular path. They can classify each as **linear, circular, or oscillatory motion** and explain the reason for their classification.

(7) **Think–Pair–Share on Periodic Motion:** Show or demonstrate circular and oscillatory movements and ask students individually whether the motions repeat, then discuss their answers with a partner before sharing with the class. This helps students connect circular and oscillatory motion with the concept of periodic motion.

(8) **Bicycle-Wheel Outdoor Investigation:** Conduct the bicycle-wheel activity described in the chapter by measuring the wheel's outer boundary, counting its complete rotations, and estimating the distance travelled. This integrates observation, measurement, multiplication and real-life application of science.

(9) **Peer Measurement and Error Checking:** Organise students into pairs, with one student taking a measurement and the other checking scale placement, eye position, unit and recording. They can then exchange roles, encouraging peer learning and helping students identify common measurement errors.

(10) **Exit Ticket for Conceptual Assessment:** At the end of the lesson, give three short situations—for example, choosing a unit for city-to-city distance, identifying the motion of a swing, and explaining whether a bus passenger is at rest or in motion. Such

questions assess whether students can apply the chapter concepts rather than simply reproduce definitions.

Suggested Best-Practice Theme: *"Measure, Observe, Compare, Classify and Explain"*—students should experience each major concept through an activity before formal definitions and rules are consolidated.

5.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for 6th Standard Students:

The chapter provides excellent scope for innovative learning because its concepts—measurement, reference points, and types of motion—can be explored through practical observation and experimentation.

(1) **"Smart Measurement Hunt" around the School:** Organise students into teams and give them a challenge card containing objects such as a classroom door, playground boundary, tree trunk, notebook and curved object. Students must select the appropriate measuring instrument and unit, measure each item, and justify their choices. This turns measurement into an inquiry-based learning activity.

(2) **DIY Measurement Toolkit:** Ask students to create their own simple measurement kit containing a paper ruler, non-stretchable thread, marked strip and conversion chart. They can test their homemade instruments against a standard scale and identify possible sources of error, strengthening understanding of standard measurement.

(3) **"Broken Ruler Detective" Challenge:** Provide worksheets showing objects placed at different starting points on damaged rulers. Students act as measurement detectives and calculate the actual lengths using **final reading − initial reading**, making the chapter's broken-scale concept into a problem-solving game.

(4) **Motion Video Laboratory:** Students can record short videos of everyday movements—a rolling ball, moving bicycle, rotating object, swing, or vibrating strip—and classify them as **linear, circular or oscillatory motion**. They can replay the videos in slow motion and explain the path followed by each object. The classifications are directly grounded in the chapter.

(5) **"Who Is Moving?" Reference-Point Game:** Arrange students as passengers in an imaginary moving bus while other students represent trees, buildings or people outside. Change the reference point and ask students to decide whether a particular person is at rest or in motion. This makes the relative nature of motion visually memorable.

(6) **Curved-Line Design Challenge:** Give groups maps, leaf outlines, circular drawings and irregular curves and challenge them to determine their lengths using thread. Students can compare methods and results, transforming the chapter's curved-line measurement technique into a collaborative STEM challenge.

(7) **Bicycle as a "Distance Measuring Machine":** Students can measure the outer boundary of a bicycle wheel, mark a reference point on the wheel and count its rotations over a known path. They then calculate the distance using **wheel outer-boundary length × number of rotations** and compare the result with direct measurement. This extends the practical investigation suggested in the chapter.

(8) **Measurement Escape Room:** Create stations containing puzzles such as converting 2.5 km into metres, identifying an incorrect scale-reading technique, measuring a curved path, and identifying types of motion. Each correct answer provides a clue for reaching the next station, introducing gamification while revising the chapter's major concepts.

(9) **Student-Created Motion Museum:** Groups can construct simple working models demonstrating different motions—for example, a straight-track toy for linear motion, a

rotating wheel for circular motion and a simple swing for oscillatory motion. Each model can carry a QR code linking to a short student-recorded explanation of the scientific concept.

(10) **“Measure the Invisible” Investigation:** Challenge students to estimate quantities that are difficult to measure directly, such as the thickness of one textbook page. Students can measure many pages together and divide the total thickness by the number of pages, encouraging indirect measurement and mathematical reasoning.

(11) **Digital Motion Storyboard:** Students can create a digital or paper storyboard showing one person's journey—walking straight, travelling around a circular track, sitting in a moving bus and playing on a swing. At each stage, they label the type of motion and identify the relevant reference point, integrating creativity with conceptual understanding.

(12) **Student Innovation Challenge – “Invent a Measuring Device”:** Ask teams to design a simple device for measuring a difficult quantity such as the circumference of a tree, curved path, playground distance or very small thickness. Students should present the device, explain the unit used, demonstrate its working and discuss possible measurement errors.

Suggested innovation theme: “Measure It – Move It – Observe It – Explain It.” This approach can turn the chapter into a mini STEM learning module combining experimentation, gamification, collaborative problem-solving, model-making and real-life application.

5.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. The SI unit of length is ________.
   Answer: metre

2. The symbol of metre is ________.
   Answer: m

3. One kilometre is equal to ________ metres.
   Answer: 1000

4. One metre is equal to ________ centimetres.
   Answer: 100

5. One centimetre is equal to ________ millimetres.
   Answer: 10

6. The smallest division on a commonly used 15-cm scale is ________.
   Answer: 1 mm

7. The International System of Units is commonly abbreviated as ________.
   Answer: SI

8. Handspan is not a ________ unit of length.
   Answer: standard

9. A flexible ________ can be used to measure the girth of a tree.
   Answer: measuring tape

10. The length of a curved line can be measured with the help of a ________.
    Answer: thread / flexible measuring tape

11. A fixed point with respect to which position or distance is described is called a ________.
Answer: reference point

12. An object whose position changes with respect to a reference point with time is said to be in ________.
Answer: motion

13. An object whose position does not change with respect to a reference point with time is said to be at ________.
Answer: rest

14. Motion along a straight line is called ________ motion.
Answer: linear

15. Motion along a circular path is called ________ motion.
Answer: circular

16. The to-and-fro motion of an object about a fixed position is called ________ motion.
Answer: oscillatory

17. The motion of a swing is an example of ________ motion.
Answer: oscillatory

18. The motion of an object on a merry-go-round is an example of ________ motion.
Answer: circular

19. While reading a scale, the eye should be positioned directly ________ the point whose reading is being taken.
Answer: above

20. A measurement of length must contain a number and a ________.
Answer: unit

The chapter specifically explains why body-based measures such as handspan vary between people and why standard units are necessary.

B. One-Mark Questions with Answers:

1. **What is measurement?**
Answer: Measurement is the process of comparing an unknown quantity with a known standard unit.

2. **What is the SI unit of length?**
Answer: Metre (m).

3. **How many centimetres make one metre?**
Answer: 100 cm.

4. **How many millimetres make one centimetre?**
Answer: 10 mm.

5. **How many metres make one kilometre?**
Answer: 1000 m.

6. **Name a suitable unit for measuring the distance between two cities.**
Answer: Kilometre (km).

7. **Which instrument would you use to measure the girth of a tree?**
   Answer: A flexible measuring tape.

8. **Why is handspan not a standard unit?**
   Answer: The size of a handspan differs from person to person.

9. **What is a reference point?**
   Answer: A fixed object or point with respect to which distance or position is stated.

10. **What is motion?**
    Answer: An object is in motion when its position changes with respect to a reference point with time.

11. **What is rest?**
    Answer: An object is at rest when its position does not change with respect to a reference point with time.

12. **Define linear motion.**
    Answer: Motion of an object along a straight line is called linear motion.

13. **Define circular motion.**
    Answer: Motion of an object along a circular path is called circular motion.

14. **Define oscillatory motion.**
    Answer: To-and-fro motion of an object about a fixed position is called oscillatory motion.

15. **Give one example of linear motion.**
    Answer: A car moving along a straight road.

16. **Give one example of circular motion.**
    Answer: A child moving on a merry-go-round.

17. **Give one example of oscillatory motion.**
    Answer: A child moving on a swing.

18. **How can a curved line be measured?**
    Answer: Using a flexible measuring tape or a thread.

19. **What should be done if the zero end of a scale is broken?**
    Answer: Start from another full mark and subtract the initial reading from the final reading.

20. **What type of motion does a falling object generally show?**
    Answer: Linear motion.

C. Two-Mark Descriptive Questions with Answers:

1. Why are standard units necessary?

Answer:

- Body-based units such as handspan and foot vary from person to person.
- Standard units provide uniform and comparable measurements everywhere.

2. Differentiate between centimetre and millimetre.

Answer:

- Centimetre is a larger unit than millimetre.
- 1 cm = 10 mm.

3. State two precautions to be taken while measuring length using a scale.

Answer:

- Keep the scale in contact with and along the length of the object.
- Keep the eye directly above the point where the reading is taken.

4. How can you measure a curved line?

Answer:

- Place a thread carefully along the curved line.
- Straighten the thread and measure its length using a scale.

5. What is the difference between motion and rest?

Answer:

- An object is in motion if its position changes with respect to a reference point with time.
- It is at rest if its position does not change with respect to that reference point.

6. Why is a reference point important?

Answer:

- It helps us describe the position of an object.
- It also helps us decide whether an object is at rest or in motion.

7. Differentiate between linear and circular motion.

Answer:

- In linear motion, an object moves along a straight line.
- In circular motion, an object moves along a circular path.

8. Differentiate between circular and oscillatory motion.

Answer:

- Circular motion takes place along a circular path.
- Oscillatory motion involves repeated to-and-fro movement about a fixed position.

9. Why is a measuring tape preferred for measuring the girth of a tree?

Answer:

- The surface around a tree trunk is curved.
- A flexible measuring tape can bend around the trunk and measure its girth.

10. How can a scale with a broken zero end still be used?

Answer:

- Place one end of the object at another clear mark on the scale.
- Subtract the starting reading from the final reading to obtain the object's length.

D. Three-Mark Descriptive Questions with Answers:

1. Explain why handspan cannot be used as a standard unit.

Answer:

1. Handspans differ in size from person to person.
2. Different people may therefore obtain different measurements for the same object.
3. Standard units such as metre and centimetre give consistent measurements.

2. Explain the correct method of measuring the length of a pencil with a scale.

Answer:

1. Place the scale along and in contact with the pencil.
2. Align one end of the pencil with the zero mark of the scale.
3. Keep the eye directly above the other end and note the reading.

3. Explain how to measure a curved line using a thread.

Answer:

1. Place a thread carefully along the entire curved line.
2. Mark the beginning and end points on the thread and straighten it.
3. Measure the marked length of thread using a scale.

4. Explain the role of a reference point in determining motion.

Answer:

1. A reference point is a fixed point used to describe position.
2. If an object's position changes relative to it with time, the object is in motion.
3. If its position does not change, the object is at rest.

5. Explain linear motion with examples.

Answer:

1. Linear motion occurs when an object moves along a straight-line path.
2. A falling fruit can show linear motion.
3. Students marching along a straight path are another example.

6. Explain circular motion with examples.

Answer:

1. Circular motion occurs when an object moves along a circular path.

2. A whirled eraser tied to a thread shows circular motion.
3. A merry-go-round also demonstrates circular motion.

7. Explain oscillatory motion with examples.

Answer:

1. Oscillatory motion is to-and-fro motion about a fixed position.
2. A swing shows oscillatory motion.
3. The free end of a flexible metal strip moving up and down also shows oscillatory motion.

8. A passenger sitting in a moving bus can be considered both at rest and in motion. Explain.

Answer:

1. With respect to the bus, the passenger's position does not change, so the passenger is at rest.
2. With respect to a building outside, the passenger's position changes, so the passenger is in motion.
3. Thus, motion and rest depend on the reference point.

9. Explain the relationship among kilometre, metre, centimetre and millimetre.

Answer:

1. 1 kilometre = 1000 metres.
2. 1 metre = 100 centimetres.
3. 1 centimetre = 10 millimetres.

10. Why should we choose an appropriate measuring instrument?

Answer:

1. Different objects have different sizes and shapes.
2. A scale is suitable for small straight objects, while a measuring tape is useful for larger or curved objects.
3. Choosing the correct instrument makes measurement easier and more appropriate.

E. Five-Mark Descriptive Questions with Answers:

1. Explain standard units of length and their importance.

Answer:

1. In earlier times, people used body parts such as handspan, foot and fingers to measure length.
2. Such measurements differed because people's body parts are of different sizes.
3. Countries therefore adopted standard units under the International System of Units (SI).
4. The SI unit of length is metre (m).

5. Kilometre, centimetre and millimetre are used conveniently for larger and smaller lengths, with 1 km = 1000 m, 1 m = 100 cm and 1 cm = 10 mm.

2. Describe the precautions to be followed while measuring length.

Answer:

1. Select an appropriate measuring instrument for the object.
2. Place the scale in contact with and along the object's length.
3. Align the object's end properly with the zero mark whenever possible.
4. Keep the eye directly above the point where the reading is being taken.
5. If the zero end is broken, start at another clear mark and subtract the initial reading from the final reading.

3. Explain the three main types of motion discussed in the chapter.

Answer:

1. Motion can be classified according to the path followed by an object.
2. **Linear motion** occurs when an object moves along a straight line.
3. **Circular motion** occurs when an object moves along a circular path.
4. **Oscillatory motion** occurs when an object moves to and fro about a fixed position.
5. A falling object, merry-go-round and swing are examples of linear, circular and oscillatory motion respectively.

4. Explain motion, rest and reference point with the example of passengers in a moving bus.

Answer:

1. Motion and rest are determined with respect to a reference point.
2. A seated passenger does not change position relative to the bus.
3. Therefore, the passenger is at rest when the bus is taken as the reference point.
4. The passenger changes position relative to buildings and trees outside the moving bus.
5. Therefore, the same passenger is in motion when an outside object is taken as the reference point.

5. Explain how different instruments and units are selected for measuring different lengths.

Answer:

1. A small scale can be used to measure objects such as pencils and erasers.
2. A metre scale or long measuring tape can be used for larger objects or distances.
3. A flexible tape is suitable for measuring curved objects or girths.
4. Millimetres and centimetres are useful for small lengths, while metres are suitable for larger everyday lengths.
5. Kilometres are suitable for long distances such as the distance between cities.

Additional Higher-Order Questions for the Question Bank

1. Why would five students using their own handspans obtain different measurements for the same table?
2. A scale has its zero mark broken. How would you accurately measure the length of an eraser?
3. Why is kilometre more suitable than centimetre for expressing the distance between two cities?
4. Why would a rigid metre scale not be convenient for measuring the circumference of a bottle?
5. A child is sitting in a moving train. Is the child at rest or in motion? Explain using two reference points.
6. A ball moves down a straight slope and then enters a circular loop. Identify the types of motion in the two portions.
7. Why can a swing be classified as both oscillatory and periodic motion?
8. How could you estimate the thickness of one sheet of paper when it is too thin to measure directly with a ruler?
9. A student writes the length of a pencil simply as “15.” Why is the answer incomplete?
10. Design a simple activity to identify linear, circular and oscillatory motions in a children's park.

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6th Standard Science Book Chapter 6

Chapter 6: Materials Around Us

6.1 Summary of the Chapter:

(1) **Objects and Materials:** All objects around us are made from materials such as paper, wood, cloth, glass, metal, plastic and clay. A substance used to create an object is called a **material**.

(2) **Different Materials for Objects:** An object may be made from one material or a combination of materials. The same material can also be used to make many different objects.

(3) **Choice of Materials:** Materials are selected for making objects according to their **properties** and the purpose of the object. For example, a tumbler must be made from a material capable of holding water.

(4) **Classification of Materials:** Arranging objects into groups according to common properties is called **classification**. Materials can be classified based on similarities and differences in their properties.

(5) **Lustrous and Non-lustrous Materials:** Materials having shiny surfaces are called **lustrous**. Metals such as iron, copper, zinc, aluminium and gold are generally lustrous, while materials such as paper, wood, rubber and jute are generally **non-lustrous**.

(6) **Hard and Soft Materials:** Materials that can be compressed or scratched easily are called **soft**, whereas those that are difficult to compress or scratch are called **hard**. Hardness and softness are relative properties; for example, rubber is harder than sponge but softer than iron.

(7) **Transparent, Translucent and Opaque Materials: Transparent** materials such as clear glass allow objects to be seen clearly through them. **Translucent** materials such as butter paper and frosted glass allow objects to be seen, but not clearly, while **opaque** materials such as wood, cardboard and metals do not allow us to see through them.

(8) **Soluble and Insoluble Materials:** Materials that dissolve completely in water are called **soluble**, while materials that do not dissolve in water are called **insoluble**. Sugar and salt dissolve in water, whereas materials such as sand and sawdust do not.

(9) **Solubility of Liquids and Gases:** Some liquids mix completely with water, while others form a separate layer. Some gases are also soluble in water; for example, dissolved oxygen is essential for aquatic plants and animals.

(10) **Mass:** The property used to describe how heavy or light an object is is called **mass**. A heavier object has more mass, while a lighter object has less mass.

(11) **Volume:** Every material occupies space. The amount of space occupied by matter is called its **volume**; commonly used units include litre (L) and millilitre (mL).

(12) **Matter:** Anything that **occupies space and has mass is called matter**. Thus, water, sand, pebbles, air and the materials used to make objects are examples of matter. Mass and volume are fundamental properties possessed by materials.

6.2 Important Formulas:

This chapter is mainly conceptual and activity-based, so it contains **very few mathematical formulas**. The following relationships and units are the important ones for quantitative or measurement-based questions.

No.	Formula / Relationship	Use
1	**Mass = Quantity of matter in an object**	Used to compare how heavy or light objects are.

No.	Formula / Relationship	Use
2	**1 kilogram (kg) = 1000 grams (g)**	Conversion between kilogram and gram.
3	**Mass in kg = Mass in g ÷ 1000**	Converts grams to kilograms.
4	**Mass in g = Mass in kg × 1000**	Converts kilograms to grams.
5	**Volume = Space occupied by matter**	Used to describe the amount of space occupied by a material.
6	**1 litre (L) = 1000 millilitres (mL)**	Conversion between litre and millilitre.
7	**Volume in L = Volume in mL ÷ 1000**	Converts millilitres to litres.
8	**Volume in mL = Volume in L × 1000**	Converts litres to millilitres.
9	**1 cubic metre (m^3) = 1000 litres (L)**	Conversion between cubic metre and litre.
10	**Volume in m^3 = Volume in L ÷ 1000**	Converts litres into cubic metres.
11	**Volume in L = Volume in m^3 × 1000**	Converts cubic metres into litres.
12	**Matter → has mass + occupies space (volume)**	Key relationship used to identify whether something is matter.

The chapter specifically defines **matter as anything that occupies space and has mass**, with gram (g) and kilogram (kg) used for mass and litre (L) and millilitre (mL) used for volume. It also states the conversion **1 m^3 = 1000 L**.

Important Quantitative Facts to Remember

- **SI unit of mass:** kilogram (**kg**)
- **SI unit of volume:** cubic metre (**m^3**)
- Common smaller unit of mass: **gram (g)**
- Common units for liquid volume: **litre (L)** and **millilitre (mL)**
- Correct notation: **7 kg**, not *7 kgs*
- Correct notation: **500 mL**
- A **heavier object has more mass**, while a lighter object has less mass.
- A larger quantity of liquid occupying more space has a **greater volume**.

Note: The uploaded Chapter 6 does **not introduce formulas for density, weight, force, or concentration**. Therefore, these should not be included as chapter-based formulas unless the question bank is intentionally extended beyond the textbook.

6.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

The chapter emphasizes classification and properties such as lustre, hardness, transparency, solubility, mass and volume.

1. Any substance that is used to create an object is referred to as a __________.
   Answer: Material
2. The method of arranging objects into groups is called __________.
   Answer: Classification
3. Objects can be classified on the basis of a __________ property that they have.
   Answer: Common
4. Materials having shiny surfaces are said to have a __________ appearance.
   Answer: Lustrous
5. Iron, copper, zinc and aluminium are examples of __________.
   Answer: Metals
6. Materials that do not have a shiny surface are called __________ materials.
   Answer: Non-lustrous

7. Paper, wood, rubber and jute are examples of __________ materials.
   Answer: Non-lustrous
8. Materials that can be compressed or scratched easily are called __________.
   Answer: Soft
9. Materials that are difficult to compress or scratch are called __________.
   Answer: Hard
10. Rubber is harder than __________ but softer than iron.
   Answer: Sponge
11. Materials through which things can be seen clearly are called __________ materials.
   Answer: Transparent
12. Glass, water and air are examples of __________ materials.
   Answer: Transparent
13. Materials through which we cannot see at all are called __________ materials.
   Answer: Opaque
14. Wood, cardboard and metals are examples of __________ materials.
   Answer: Opaque
15. Materials through which objects can be seen, but not clearly, are called __________ materials.
   Answer: Translucent
16. Butter paper and frosted glass are examples of __________ materials.
   Answer: Translucent
17. Materials that completely disappear when mixed in water are said to be __________ in water.
   Answer: Soluble
18. Materials that do not dissolve in water are called __________ materials.
   Answer: Insoluble
19. Sugar and __________ dissolve in water.
   Answer: Salt
20. __________ gas dissolves in water and is important for the survival of aquatic plants and animals.
   Answer: Oxygen
21. The property used to measure whether an object is heavier or lighter is called __________.
   Answer: Mass
22. A heavier object has __________ mass than a lighter object.
   Answer: More
23. The space occupied by matter is called its __________.
   Answer: Volume
24. Anything that occupies space and has mass is called __________.
   Answer: Matter
25. The units used in the chapter for measuring mass are gram and __________.
   Answer: Kilogram
26. Kilogram is abbreviated as __________.
   Answer: kg
27. The commonly used units for measuring liquid volume are litre and __________.
   Answer: Millilitre
28. Millilitre is abbreviated as __________.
   Answer: mL
29. The SI unit of volume is __________.
   Answer: Cubic metre (m^3)

30. One cubic metre is equal to __________ litres.
    Answer: 1000
31. Mass and __________ are the two properties possessed by all materials.
    Answer: Volume
32. Materials are types of __________ used in making objects.
    Answer: Matter
33. The choice of material for making an object depends on its properties and its __________.
    Answer: Purpose
34. A pen may be made from plastic, metal and __________.
    Answer: Ink
35. The baked clay used for making pottery is called __________.
    Answer: Terracotta

6.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

The following questions require students to **apply, compare, analyse, infer, and reason** using the properties of materials discussed in this chapter.

1. Riya wants to make a window through which she can clearly see the garden. She should use a __________ material.
   Answer: Transparent
2. If a sheet allows light to pass through but objects behind it cannot be seen clearly, the sheet is __________.
   Answer: Translucent
3. A student hides behind a wooden board and cannot be seen from the other side because wood is __________.
   Answer: Opaque
4. If material A can be scratched easily but material B cannot, material A is relatively __________ than material B.
   Answer: Softer
5. A metal spoon looks dull after long exposure to air and moisture, but its freshly cut surface may appear __________.
   Answer: Lustrous
6. A shiny object is found to be coated with wax. We cannot conclude that the object is a __________ merely because it shines.
   Answer: Metal
7. If an object must be used to hold water, the material selected should have properties suitable for its intended __________.
   Answer: Purpose
8. A cloth tumbler would not be suitable for storing water because the __________ of a material determine its suitability for making an object.
   Answer: Properties
9. Sugar disappears completely after stirring in water; therefore, sugar is __________ in water.
   Answer: Soluble
10. Sand remains visible even after being stirred in water for a long time; therefore, sand is __________ in water.
    Answer: Insoluble
11. When oil does not mix completely with water and forms a separate layer, it shows that not all __________ mix completely with water.
    Answer: Liquids

12. Fish can survive in water partly because __________ gas dissolves in water.
    Answer: Oxygen
13. Two identical cups contain different materials. If cup A is heavier than cup B, cup A has __________ mass.
    Answer: More
14. If two identical tumblers contain different amounts of water, the tumbler containing more water has a __________ volume of water.
    Answer: Greater
15. A bottle labelled 500 mL contains information about the __________ of the liquid inside it.
    Answer: Volume
16. A stone has mass and occupies space; therefore, it is an example of __________.
    Answer: Matter
17. Although air cannot normally be seen, it is considered __________ because it has mass and occupies space.
    Answer: Matter
18. If one container holds 1 m^3 of water, its volume is equivalent to __________ L.
    Answer: 1000
19. A student writes the mass of an object as "7 kgs." According to the correct SI notation given in the chapter, it should be written as __________.
    Answer: 7 kg
20. A student writes "500 ml" for the volume of water. According to the notation used in the chapter, it should be written as __________.
    Answer: 500 mL
21. A glass tumbler and a steel tumbler perform a similar function even though they are made from __________ materials.
    Answer: Different
22. A pen contains plastic, metal and ink. This shows that a single object may be made from a __________ of different materials.
    Answer: Combination
23. If objects are separated into groups according to hardness, colour and appearance, the process is called __________.
    Answer: Classification
24. Grouping materials according to their properties helps us observe __________ in their properties more easily.
    Answer: Patterns
25. A material that is harder than sponge but softer than iron demonstrates that hardness is a __________ property.
    Answer: Relative
26. If a shopkeeper wants customers to identify the contents of a closed container without opening it, a __________ container would be most suitable.
    Answer: Transparent
27. If material X is rigid and difficult to compress while material Y changes shape easily when pressed, X is __________ and Y is soft.
    Answer: Hard
28. A material that cannot be seen through but has a shiny surface may be both __________ and opaque.
    Answer: Lustrous

29. If an unknown substance occupies space but a student wants to confirm that it is matter, the other property to check is whether it has __________.
    Answer: Mass
30. Water, sand, pebbles and a cup can all be grouped together as __________ because each has mass and occupies space.
    Answer: Matter

6.5 One-mark questions with Answers of LOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type

1. **What is a material?**
   Answer: Any substance that is used to create an object is called a material.
2. **What is classification?**
   Answer: Classification is the method of arranging objects into groups based on common properties.
3. **On what basis can materials be classified?**
   Answer: Materials can be classified on the basis of their properties.
4. **Why are different materials chosen for making different objects?**
   Answer: Different materials are chosen according to their properties and the purpose for which the objects are used.
5. **What are lustrous materials?**
   Answer: Materials that typically have shiny surfaces are called lustrous materials.
6. **Name any two lustrous metals.**
   Answer: Iron and copper are two examples of lustrous metals.
7. **What are non-lustrous materials?**
   Answer: Materials that do not have a shiny surface are called non-lustrous materials.
8. **Give two examples of non-lustrous materials.**
   Answer: Paper and wood are examples of non-lustrous materials.
9. **What are soft materials?**
   Answer: Materials that can be compressed or scratched easily are called soft materials.
10. **What are hard materials?**
    Answer: Materials that are difficult to compress or scratch are called hard materials.
11. **What are transparent materials?**
    Answer: Materials through which things can be seen clearly are called transparent materials.
12. **Give two examples of transparent materials.**
    Answer: Glass and water are examples of transparent materials.
13. **What are opaque materials?**
    Answer: Materials through which we cannot see at all are called opaque materials.
14. **Give two examples of opaque materials.**
    Answer: Wood and cardboard are examples of opaque materials.
15. **What are translucent materials?**
    Answer: Materials through which objects can be seen but not clearly are called translucent materials.
16. **Give two examples of translucent materials.**
    Answer: Butter paper and frosted glass are examples of translucent materials.
17. **What are soluble materials?**
    Answer: Materials that dissolve in water are called soluble materials.
18. **What are insoluble materials?**
    Answer: Materials that do not dissolve in water are called insoluble materials.

19. **Name two materials that dissolve in water.**
    Answer: Sugar and salt dissolve in water.
20. **Name a gas that dissolves in water.**
    Answer: Oxygen is a gas that dissolves in water.
21. **What is mass?**
    Answer: Mass is the property that gives the quantity of matter present in an object.
22. **Which object has more mass—a heavier object or a lighter object?**
    Answer: A heavier object has more mass than a lighter object.
23. **What is volume?**
    Answer: Volume is the space occupied by matter.
24. **What is matter?**
    Answer: Anything that occupies space and has mass is called matter.
25. **Name the units used to measure mass in the chapter.**
    Answer: Gram (g) and kilogram (kg) are used to measure mass.
26. **What is the SI unit of mass?**
    Answer: Kilogram (kg) is the SI unit of mass.
27. **What are the commonly used units of liquid volume mentioned in the chapter?**
    Answer: Litre (L) and millilitre (mL) are commonly used units of liquid volume.
28. **What is the SI unit of volume?**
    Answer: Cubic metre (m^3) is the SI unit of volume.
29. **How many litres are equal to one cubic metre?**
    Answer: One cubic metre is equal to 1000 litres.
30. **Name the two properties possessed by all materials.**
    Answer: Mass and volume are the two properties possessed by all materials.
31. **Is air considered matter?**
    Answer: Yes, air is considered matter.
32. **What are materials in relation to matter?**
    Answer: Materials are types of matter used in the creation or making of objects.
33. **Why is grouping of materials useful?**
    Answer: Grouping helps us study and observe patterns in the properties of things.
34. **Name two examples of matter mentioned in the chapter.**
    Answer: Water and sand are two examples of matter.
35. **What is terracotta?**
    Answer: Baked clay is called terracotta.

6.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type

1. **Why is glass preferred for a window when we want to see outside clearly?**
   Answer: Glass is preferred because it is transparent and allows objects to be seen clearly through it.
2. **Why would a wooden sheet not be suitable for making a transparent window?**
   Answer: A wooden sheet is unsuitable because wood is opaque and does not allow us to see through it.
3. **Why is frosted glass useful when clear visibility is not required?**
   Answer: Frosted glass is translucent, so objects can be seen through it but not clearly.
4. **A material shines when light falls on it; can you definitely conclude that it is a metal? Why?**
   Answer: No, because non-metallic materials can also appear shiny due to polishing or coating.

5. **Why may an old metal object appear dull even though metals are usually lustrous?**
   Answer: A metal may lose its lustre because of the effects of air and moisture.
6. **How would you distinguish a hard material from a soft material using a simple test?**
   Answer: A material that is difficult to compress or scratch is hard, while one that is easily compressed or scratched is soft.
7. **Why can rubber not simply be classified as hard or soft without comparison?**
   Answer: Hardness is relative because rubber is harder than sponge but softer than iron.
8. **Why would cloth generally be unsuitable for making a tumbler for storing water?**
   Answer: Cloth does not have the properties required for a tumbler to hold water properly.
9. **Why can different materials be used to make the same type of object?**
   Answer: Different materials can have suitable properties for performing the same required function.
10. **Why can a single object such as a pen contain several different materials?**
    Answer: Different parts of an object may require different materials according to their functions.
11. **Sugar disappears after being stirred in water; what can you infer?**
    Answer: We can infer that sugar is soluble in water.
12. **Sand remains visible after prolonged stirring in water; what does this indicate?**
    Answer: It indicates that sand is insoluble in water.
13. **What can you infer if a liquid forms a separate layer when mixed with water and left undisturbed?**
    Answer: We can infer that the liquid does not mix completely with water.
14. **Why is dissolved oxygen important in water?**
    Answer: Dissolved oxygen is important for the survival of animals and plants living in water.
15. **Two identical cups contain different substances, and cup A is heavier; what can you infer about its mass?**
    Answer: Cup A has more mass than the lighter cup.
16. **Two identical tumblers contain different amounts of water; which water sample has greater volume?**
    Answer: The water sample occupying more space in its tumbler has greater volume.
17. **Why does a fully filled tumbler contain a greater volume of water than a half-filled identical tumbler?**
    Answer: The water in the fully filled tumbler occupies more space and therefore has greater volume.
18. **A stone occupies space and has mass; what can you conclude about it?**
    Answer: The stone is matter because anything that occupies space and has mass is called matter.
19. **Air cannot normally be seen; can it still be considered matter?**
    Answer: Yes, air is matter because it has mass and occupies space.
20. **If an unknown substance occupies space and has mass, how should it be classified?**
    Answer: It should be classified as matter.
21. **A student writes "7 kgs" for the mass of an object; how should it be corrected?**
    Answer: It should be written as **7 kg** because the SI symbol does not take a plural form.

22. **How should a student correctly write a volume of five hundred millilitres?**
    Answer: The volume should be written as **500 mL**.
23. **A container has a volume of 1 m^3; what is its volume in litres?**
    Answer: Its volume is **1000 L**.
24. **Why is classification useful when studying a large number of materials?**
    Answer: Classification makes it easier to study and observe patterns in the properties of materials.
25. **If two objects have different shapes but are both made of iron, on what basis can they be grouped together?**
    Answer: They can be grouped together on the basis of the material from which they are made.
26. **If objects are grouped as lustrous and non-lustrous, which property is being considered?**
    Answer: Their appearance or presence of lustre is being considered.
27. **If glass, water and air are placed in the same group, which common property can justify the grouping?**
    Answer: They can be grouped together because they are transparent.
28. **Why might a plastic chair and a wooden chair belong to the same functional group despite being made of different materials?**
    Answer: They can belong to the same functional group because different materials can be used to make objects with similar functions.
29. **Material X is rigid and dissolves completely in water; which two properties can you assign to it?**
    Answer: Material X can be described as **hard and soluble**.
30. **Material Y changes shape easily when pressed and does not dissolve in water; how can it be described?**
    Answer: Material Y can be described as **soft and insoluble**.

6.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type

1. **What is a material? Give two examples of materials.**
   Answer:
   1. Any substance that is used to create an object is referred to as a material.
   2. Paper and wood are two examples of materials.
2. **What is classification? On what basis can objects be classified?**
   Answer:
   1. Classification is the method of arranging objects into groups.
   2. Objects can be classified on the basis of common properties such as shape, colour, hardness, softness or the materials they are made of.
3. **How do the properties of a material influence its use?**
   Answer:
   1. Materials have different properties that make them suitable for different purposes.
   2. We choose a material for making an object depending on its properties and the purpose for which the object is used.
4. **What are lustrous materials? Give two examples.**
   Answer:
   1. Materials that typically have shiny surfaces are said to have a lustrous appearance.

    2. Iron and copper are examples of metals that are usually lustrous.

5. **What are non-lustrous materials? Give two examples.**
   Answer:
    1. Materials that do not have a shiny surface are called non-lustrous materials.
    2. Paper and wood are examples of non-lustrous materials.
6. **What are hard and soft materials?**
   Answer:
    1. Materials that are difficult to compress or scratch are called hard materials.
    2. Materials that can be compressed or scratched easily are called soft materials.
7. **Why are hardness and softness considered relative properties? Give an example.**
   Answer:
    1. Hardness and softness are relative because a material may be harder than one material but softer than another.
    2. For example, rubber is harder than sponge but softer than iron.
8. **What are transparent materials? Give two examples.**
   Answer:
    1. Materials through which things can be seen clearly are called transparent materials.
    2. Glass and water are examples of transparent materials.
9. **What are opaque materials? Give two examples.**
   Answer:
    1. Materials through which we are not able to see at all are called opaque materials.
    2. Wood and cardboard are examples of opaque materials.
10. **What are translucent materials? Give two examples.**
    Answer:
    1. Materials through which objects can be seen but not clearly are called translucent materials.
    2. Butter paper and frosted glass are examples of translucent materials.
11. **Differentiate between soluble and insoluble materials.**
    Answer:
    1. Materials that dissolve or completely disappear when mixed in water are called soluble materials.
    2. Materials that do not mix with water and remain visible even after stirring are called insoluble materials.
12. **What happens when sugar and salt are mixed with water?**
    Answer:
    1. Sugar dissolves in water and disappears after stirring.
    2. Salt also dissolves in water and is therefore soluble in water.
13. **What is the importance of oxygen dissolved in water?**
    Answer:
    1. Oxygen is one of the gases that dissolves in water.
    2. Dissolved oxygen is important for the survival of animals and plants living in water.
14. **What is mass? How does mass differ between heavier and lighter objects?**
    Answer:
    1. Mass is the property used to measure whether an object is heavier or lighter.
    2. A heavier object has more mass, whereas a lighter object has less mass.
15. **What is volume? Name two commonly used units for measuring liquid volume.**
    Answer:

1. The space occupied by matter is called its volume.
2. Litre (L) and millilitre (mL) are commonly used units for measuring liquid volume.

16. **What is matter? Give two examples.**
Answer:
1. Anything that occupies space and has mass is called matter.
2. Water and sand are examples of matter.

17. **Name the two properties possessed by all materials and explain them briefly.**
Answer:
1. Mass gives the quantity of matter present in an object.
2. Volume is the space occupied by matter.

18. **Mention the units used for measuring mass. What is its SI unit?**
Answer:
1. Gram (g) and kilogram (kg) are units used for measuring mass.
2. Kilogram (kg) is the SI unit of mass.

19. **What is the SI unit of volume? State the relationship between cubic metre and litre.**
Answer:
1. The SI unit of volume is cubic metre (m^3).
2. One cubic metre is equal to 1000 litres ($1\ m^3 = 1000\ L$).

20. **Why is grouping or classification of materials useful?**
Answer:
1. Grouping helps us organise materials according to similarities or differences in their properties.
2. It helps us study and observe patterns in the properties of things.

21. **Can one object be made from different materials? Give an example.**
Answer:
1. Yes, different materials may be used for making different parts of a single object.
2. For example, a pen may contain plastic, metal and ink.

22. **Can the same type of object be made from different materials? Explain.**
Answer:
1. Yes, different materials can be used to make objects having similar functions.
2. The material is selected according to the properties required for the object's purpose.

23. **How do some liquids behave when mixed with water?**
Answer:
1. Some liquids mix completely with water.
2. Other liquids do not mix with water and form a separate layer when left undisturbed.

24. **What is ORS, and how can it be prepared at home according to the chapter?**
Answer:
1. ORS stands for Oral Rehydration Solution and is used to treat dehydration due to diarrhoea or other illnesses.
2. It can be prepared by mixing six teaspoons of sugar and half a teaspoon of common salt in one litre of boiled and cooled water.

25. **What is terracotta? Mention one use of pottery described in the chapter.**
Answer:
1. Clay that has been baked in a kiln is called terracotta.

2. Pottery was used for purposes such as cooking and storing food grains, oil and ghee.

6.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type

1. **A student wants to make a container for storing water. Why should the properties of the material be considered before selecting it?**
   Answer:
   1. The material must have suitable properties that enable the container to hold water properly.
   2. Materials are selected according to their properties and the purpose for which the object is used.
2. **A wooden board and clear glass are placed between you and an object. How will your ability to see the object differ in the two cases?**
   Answer:
   1. The object can be seen clearly through glass because glass is transparent.
   2. It cannot be seen through the wooden board because wood is opaque.
3. **Why would frosted glass be more suitable than clear glass when privacy is required?**
   Answer:
   1. Frosted glass is translucent, so objects cannot be seen clearly through it.
   2. Clear glass is transparent and allows objects to be seen clearly.
4. **An object has a shiny surface. Can you conclude that it is made of metal? Give reasons.**
   Answer:
   1. No, a shiny object need not necessarily be made of metal.
   2. Some non-metallic surfaces can be made shiny by polishing or coating them with plastic, wax or another material.
5. **An old iron object appears dull, but its freshly cut surface appears shiny. Why?**
   Answer:
   1. Metals may lose their lustre because of the effects of air and moisture.
   2. Therefore, their lustrous appearance may be more clearly visible on freshly cut surfaces.
6. **Rubber is described as harder than sponge but softer than iron. What does this tell you about hardness?**
   Answer:
   1. It shows that hardness and softness are relative properties.
   2. The same material can be harder than one material but softer than another.
7. **Sugar disappears when stirred in water, while sand remains visible. What can you infer from this observation?**
   Answer:
   1. Sugar is soluble because it dissolves in water.
   2. Sand is insoluble because it does not dissolve in water even after stirring.
8. **A liquid forms a separate layer when mixed with water and left undisturbed. What can you conclude?**
   Answer:
   1. The liquid does not mix completely with water.
   2. This shows that all liquids do not behave in the same way when mixed with water.

9. **Why is the solubility of oxygen in water important for aquatic life?**
   Answer:
   1. Oxygen gas can dissolve in water.
   2. This dissolved oxygen is important for the survival of plants and animals living in water.
10. **Two identical cups contain different materials, and cup A is heavier than cup B. What can you infer about their masses?**
    Answer:
    1. Cup A and its contents have more mass than cup B and its contents.
    2. This is because the heavier object has more mass and the lighter object has less mass.
11. **Two identical tumblers are half-filled and fully filled with water respectively. Compare the volumes of water in them.**
    Answer:
    1. The fully filled tumbler contains a greater volume of water because the water occupies more space.
    2. The half-filled tumbler contains a smaller volume because its water occupies less space.
12. **A student says that air cannot be matter because it cannot be seen. Is the student correct? Explain.**
    Answer:
    1. No, visibility is not the condition used in the chapter to define matter.
    2. Air is matter because it has mass and occupies space.
13. **A stone and water look completely different. Why can both still be classified as matter?**
    Answer:
    1. Both stone and water have mass.
    2. Both occupy space, so they satisfy the definition of matter.
14. **A student has 1 m^3 of a material. Express its volume in litres and explain the conversion.**
    Answer:
    1. The volume is **1000 L**.
    2. This follows from the relationship **1 m^3 = 1000 L** given in the chapter.
15. **Why is "500 mL" correct while "500 ml" does not follow the notation given in the chapter?**
    Answer:
    1. Millilitre is abbreviated as **mL**, with a lowercase 'm' and uppercase 'L'.
    2. Therefore, the correct way of writing the quantity is **500 mL**.
16. **A student groups iron, copper and aluminium together instead of grouping them by colour. Is this classification valid? Why?**
    Answer:
    1. Yes, classification can be based on any suitable common property of materials.
    2. Iron, copper and aluminium can be grouped together because they are metals and generally show lustre.
17. **Why can a pen be considered an example of an object made from a combination of materials?**
    Answer:
    1. Different parts of a pen perform different functions and may therefore require different materials.

2. The chapter gives plastic, metal and ink as materials that may be present in a pen.

18. **A shopkeeper wants customers to identify items without opening their containers. Which type of material should be selected and why?**
Answer:
    1. The shopkeeper should select a transparent material for the containers.
    2. Transparent materials allow the contents to be seen clearly through them.
19. **Material X cannot be compressed easily but dissolves completely in water. How would you classify it using two properties?**
Answer:
    1. Material X can be classified as **hard** because it is difficult to compress.
    2. It can also be classified as **soluble** because it dissolves completely in water.
20. **Material Y is easily compressed and remains unchanged after stirring in water. What two properties does it possess?**
Answer:
    1. Material Y is **soft** because it can be compressed easily.
    2. It is **insoluble** because it does not dissolve in water.
21. **Why are different types of balls made from different materials even when they may be similar in size?**
Answer:
    1. Different sports require balls to possess different properties, such as texture and bouncing behaviour.
    2. Therefore, suitable materials are selected according to the specific purpose of each ball.
22. **A transparent material and an opaque material are placed in the same group because both are hard. Is this classification acceptable? Explain.**
Answer:
    1. Yes, the classification is acceptable if hardness is the property chosen for grouping.
    2. Materials can be classified in different ways depending on the common property being considered.
23. **Why does classification make the study of materials easier?**
Answer:
    1. Classification brings materials with similar or different properties into meaningful groups.
    2. This helps us study and observe patterns in their properties more easily.
24. **A chair must be strong but also easy to move. Which two properties should be considered while selecting its material?**
Answer:
    1. The material should have sufficient **hardness** so that the chair does not bend or shake during use.
    2. It should also be **lightweight** so that the chair can be moved easily.
25. **A student says that objects made from different materials cannot have the same function. How would you correct this statement?**
Answer:
    1. Different materials can be used to make objects that perform similar functions.
    2. The choice depends on whether the material possesses properties suitable for the intended use.

6.9. Three-mark questions with Answers of LOTS Type: (18 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type

1. What is classification? Explain its importance with an example.

Answer:

1. Classification is the method of arranging objects into groups based on their properties.
2. Objects can be grouped according to properties such as shape, colour, hardness, softness, appearance or material.
3. Classification makes it easier to study objects and observe patterns in their properties.

2. What are lustrous and non-lustrous materials? Give examples.

Answer:

1. Materials that typically have shiny surfaces are called lustrous materials.
2. Metals such as iron, copper, zinc, aluminium and gold are generally lustrous.
3. Materials such as paper, wood, rubber and jute do not have shiny surfaces and are non-lustrous.

3. Explain hard and soft materials with examples.

Answer:

1. Materials that can be compressed or scratched easily are called soft materials.
2. Materials that are difficult to compress or scratch are called hard materials.
3. Hardness is relative; for example, rubber is harder than sponge but softer than iron.

4. Explain transparent, translucent and opaque materials with examples.

Answer:

1. Transparent materials such as glass and water allow us to see objects clearly through them.
2. Translucent materials such as butter paper and frosted glass allow objects to be seen but not clearly.
3. Opaque materials such as wood, cardboard and metals do not allow us to see through them.

5. Differentiate between soluble and insoluble materials with examples.

Answer:

1. Materials that dissolve or disappear when mixed with water are called soluble materials.
2. Sugar and salt are examples of materials that are soluble in water.
3. Materials such as sand that do not dissolve in water are called insoluble materials.

6. What is mass? Mention its units.

Answer:

1. Mass gives the quantity of matter present in an object.
2. A heavier object has more mass, while a lighter object has less mass.
3. Mass is commonly measured in grams (g) and kilograms (kg), and kilogram is its SI unit.

7. What is volume? Mention the units used for measuring it.

Answer:

1. Volume is the space occupied by matter.
2. Litre (L) and millilitre (mL) are commonly used units for measuring liquid volume.
3. The SI unit of volume is cubic metre (m^3), and 1 m^3 is equal to 1000 L.

8. Define matter and explain its two main properties.

Answer:

1. Anything that occupies space and has mass is called matter.
2. Mass indicates the quantity of matter present in an object.
3. Volume indicates the amount of space occupied by the matter.

9. Explain why the properties of materials are important while making objects.

Answer:

1. Different materials possess different properties that make them suitable for particular purposes.
2. A material is selected according to the function that the object is expected to perform.
3. Different parts of the same object may also be made from different materials according to their required properties.

10. Explain how the same material and different materials can be used to make objects.
Answer:
1. A single material can be used to make many different objects.
2. The same type of object can also be made using different materials.
3. Materials are chosen according to their properties and the intended purpose of the object.

11. What happens when different solid materials are mixed with water?
Answer:
1. Some solid materials, such as sugar and salt, dissolve when mixed and stirred in water.
2. Such materials are classified as soluble in water.
3. Materials such as sand that remain undissolved are classified as insoluble in water.

12. Describe how liquids and gases behave when mixed with water.
Answer:
1. Some liquids mix completely with water, whereas others form a separate layer.
2. Some gases are also soluble in water.
3. Oxygen dissolves in water and is important for aquatic plants and animals.

13. What is ORS? How can it be prepared at home?
Answer:
1. ORS stands for Oral Rehydration Solution.
2. It can be prepared by mixing six teaspoons of sugar and half a teaspoon of common salt in one litre of boiled and cooled water.
3. ORS is used to treat dehydration caused by diarrhoea or other illnesses.

14. Explain how materials are classified according to their appearance.
Answer:
1. Materials can be classified as lustrous or non-lustrous according to the appearance of their surfaces.
2. Metals such as copper, aluminium and gold generally have lustrous or shiny surfaces.
3. Paper, wood, rubber and jute generally have non-lustrous or non-shiny surfaces.

15. What is terracotta? Mention the importance of pottery described in the chapter.
Answer:
1. Clay that is baked to make pottery is called terracotta.
2. Pottery in the Indian subcontinent dates back about 7,000–8,000 years.
3. Pottery was used for purposes such as cooking and storing food grains, oil and ghee.

16. Explain the relationship between materials, objects and matter.
Answer:
1. Objects around us are made from one or more materials.
2. Materials are types of matter used for creating different objects.
3. All such matter has mass and occupies space.

17. How can materials be classified on the basis of different properties?
Answer:
1. Materials can be grouped as lustrous or non-lustrous according to their appearance.
2. They can be grouped as hard or soft and as transparent, translucent or opaque.
3. They can also be classified as soluble or insoluble according to their behaviour in water.

18. Explain why different balls are made from different materials.
Answer:

1. Balls used in different sports may be made from different materials.
2. Balls made from different materials show differences in properties such as their bouncing behaviour.
3. Materials with suitable properties are therefore selected according to the requirements of a particular sport.

6.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type

1. A student wants to make a window using wood, clear glass, or frosted glass. Which material should be selected if the student wants to see outside clearly? Explain.

Answer:

1. Clear glass should be selected because it is a transparent material.
2. Transparent materials allow objects on the other side to be seen clearly.
3. Wood is opaque, while frosted glass is translucent and therefore would not provide clear visibility.

2. An old metal spoon has become dull. Can it still be classified as a lustrous material? Justify your answer.

Answer:

1. Yes, the spoon can still be classified as being made of a normally lustrous material.
2. Metals may lose their lustre when their surfaces are exposed to air and moisture.
3. The metallic lustre may be observed better on a freshly cut or cleaned surface.

3. A student finds that rubber is harder than sponge but softer than iron. What conclusion can be drawn about hardness?

Answer:

1. Hardness and softness are relative properties of materials.
2. A material may be hard when compared with one material but soft when compared with another.
3. Therefore, rubber can be considered harder than sponge while being softer than iron.

4. Sugar and sand are separately added to water and stirred. Predict the observations and classify the two materials.

Answer:

1. Sugar disappears in water after stirring because it dissolves in water.
2. Sand remains undissolved and visible even after stirring.
3. Therefore, sugar is classified as soluble in water, while sand is classified as insoluble.

5. A shiny plastic object is shown to a student, who immediately classifies it as a metal. Is the classification correct? Explain.

Answer:

1. No, an object cannot be classified as a metal merely because it has a shiny surface.
2. Some non-metallic objects can appear shiny because of polishing or surface coating.
3. Hence, lustre alone is not sufficient to conclude that every shiny object is a metal.

6. A shopkeeper wants containers that allow customers to see the contents clearly. Compare transparent, translucent, and opaque materials for this purpose.

Answer:

1. A transparent material is most suitable because the contents can be seen clearly through it.
2. A translucent material would allow the contents to be seen only indistinctly.
3. An opaque material would be unsuitable because the contents could not be seen through it.

7. Two identical tumblers contain different amounts of water. How would you decide which contains a greater volume of water?

Answer:

1. The amount of space occupied by water in each tumbler should be compared.
2. The water occupying more space has the greater volume.
3. Therefore, the tumbler containing water up to a higher level has a greater volume of water.

8. A student claims that air is not matter because it cannot be seen. Analyse the statement.

Answer:

1. The student's statement is incorrect because visibility is not a condition for something to be matter.
2. Anything that occupies space and has mass is defined as matter.
3. Air has mass and occupies space, so it is matter even though it cannot normally be seen.

9. A pen contains plastic, metal, and ink. What does this tell you about the selection of materials for making an object?

Answer:

1. A single object can be made from more than one material.
2. Different parts of an object may require materials having different properties.
3. Therefore, materials are selected according to the purpose and requirements of different parts of an object.

10. Two balls of the same size but made from different materials bounce to different heights. Why might this happen, and what does it demonstrate?

Answer:

1. The balls behave differently because they are made from different materials with different properties.
2. Their different bouncing behaviour demonstrates that the properties of a material influence the behaviour of an object.
3. Therefore, balls for different sports are made from materials whose properties suit their specific purposes.

11. A liquid is added to water, shaken, and then left undisturbed; after some time, a separate layer appears. What can you infer?

Answer:

1. The separate layer shows that the liquid has not mixed completely with water.
2. This demonstrates that some liquids mix with water while others do not.
3. Therefore, liquids can differ in their behaviour when mixed with water.

12. Why would aquatic organisms be affected if there were no oxygen dissolved in water?

Answer:

1. Some gases, including oxygen, dissolve in water.
2. The chapter states that dissolved oxygen is important for aquatic plants and animals.
3. Therefore, the absence of dissolved oxygen would make the water unsuitable for their normal survival.

13. Material A is difficult to scratch and transparent, while material B is easily scratched and opaque. Classify both materials using these properties.

Answer:

1. Material A can be classified as hard because it is difficult to scratch and transparent because objects can be seen clearly through it.
2. Material B can be classified as soft because it is easily scratched and opaque because objects cannot be seen through it.
3. This shows that the same material can be classified using more than one property.

14. Water, sand, and pebbles look very different from one another. How can they still be placed in the same broad group?

Answer:

1. Water, sand, and pebbles all possess mass.
2. They also occupy space and therefore possess volume.
3. Since anything that has mass and occupies space is matter, all three can be grouped as matter.

15. A student groups glass and water together but places wood in another group. What property might have been used for classification? Explain.

Answer:

1. The student may have used transparency as the basis for classification.
2. Glass and water are transparent because objects can be seen clearly through them.
3. Wood is placed separately because it is opaque and does not allow objects to be seen through it.

16. A student says that objects made from different materials must always have different uses. Evaluate this statement.

Answer:

1. The statement is incorrect because the same type of object can be made from different materials.
2. Different materials may possess suitable properties that allow them to perform a similar function.
3. Hence, the suitability of a material depends on its properties and the intended purpose of the object.

17. A substance occupies space, but you are unsure whether it is matter. What additional property would you check and why?

Answer:

1. We should check whether the substance has mass.
2. According to the chapter, matter must both occupy space and have mass.
3. If the substance possesses mass as well as volume, it can be classified as matter.

18. A student writes the volume of a large container as 2 m^3. Express it in litres and explain the reasoning.

Answer:

1. The chapter states that **1 m^3 = 1000 L**.
2. Therefore, **2 m^3 = 2 × 1000 = 2000 L**.
3. Hence, the volume of the container is **2000 litres**.

19. Why is classification useful when studying many different objects and materials?

Answer:

1. Classification groups objects or materials according to their similarities and differences.
2. It makes a large variety of materials easier to organise and study systematically.
3. It also helps us recognise patterns in their properties.

20. A material is hard, lustrous, and opaque. Can it belong to all three groups at the same time? Explain.

Answer:

1. Yes, a material can possess several properties at the same time.
2. It may be hard based on resistance to scratching, lustrous based on its shiny appearance, and opaque based on visibility through it.
3. Therefore, materials can be classified in different ways depending on the property being considered.

6.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type

1. Explain how materials can be classified on the basis of their different properties.

Answer:

1. Materials can be classified into groups based on similarities and differences in their properties.
2. Based on appearance, materials can be classified as **lustrous** and **non-lustrous**.
3. Based on hardness, they can be classified as **hard** and **soft** materials.
4. Based on visibility through them, materials can be classified as **transparent, translucent, and opaque**.
5. Based on their behaviour in water, materials can be classified as **soluble and insoluble**.

2. Explain transparent, translucent, and opaque materials with suitable examples.

Answer:

1. Materials through which objects can be seen clearly are called **transparent materials**.
2. Glass, water, air, and cellophane paper are examples of transparent materials.
3. Materials through which objects can be seen but not clearly are called **translucent materials**.
4. Butter paper and frosted glass are examples of translucent materials.
5. Materials such as wood, cardboard, and metals, through which we cannot see, are called **opaque materials**.

3. Explain lustrous and non-lustrous materials with examples.

Answer:

1. Materials that typically have shiny surfaces are said to have a **lustrous appearance**.
2. Metals such as iron, copper, zinc, aluminium, and gold are generally lustrous.
3. Metals may lose their lustre when their surfaces are exposed to air and moisture.
4. Materials that do not have shiny surfaces are called **non-lustrous materials**.
5. Paper, wood, rubber, and jute are examples of non-lustrous materials.

4. Describe soluble and insoluble materials and their behaviour when mixed with water.

Answer:

1. Some materials dissolve or completely disappear when mixed and stirred in water.
2. Such materials are called **soluble materials**, and sugar and salt are examples.
3. Some materials remain visible and do not dissolve even after stirring in water.
4. Such materials are called **insoluble materials**, and sand is an example.
5. Thus, materials can be classified as soluble or insoluble based on their behaviour in water.

5. Explain mass and volume as properties of matter.

Answer:

1. All materials possess two important properties—**mass and volume**.
2. Mass gives the quantity of matter present in an object.
3. A heavier object has more mass, while a lighter object has less mass.
4. Volume is the amount of space occupied by matter.
5. Mass is commonly expressed in grams and kilograms, while liquid volume is commonly expressed in litres and millilitres.

6. Define matter and explain its main characteristics with examples.

Answer:

1. Anything that occupies space and has mass is called **matter**.
2. Mass indicates the quantity of matter contained in an object.
3. Volume indicates the amount of space occupied by the matter.
4. Water, sand, pebbles, and a cup are examples of matter because they have mass and occupy space.
5. Air is also matter even though it cannot normally be seen.

7. Explain hard and soft materials with suitable examples.

Answer:

1. Materials that can be compressed or scratched easily are called **soft materials**.
2. Materials that are difficult to compress or scratch are called **hard materials**.
3. Hardness and softness can be tested by pressing or trying to scratch a material.
4. Hardness is a relative property because a material can be harder than one material but softer than another.
5. For example, rubber is harder than sponge but softer than iron.

8. Explain why the properties of materials are important in selecting materials for making objects.

Answer:

1. Different materials possess different properties that make them suitable for different purposes.
2. A material used to make a tumbler should have properties that enable it to hold water.
3. The material for an object is therefore selected according to the purpose for which the object will be used.
4. Different parts of the same object may also require different materials because they perform different functions.
5. For example, a pen may contain materials such as plastic, metal, and ink.

9. Describe the importance and process of classification of objects and materials.

Answer:

1. Classification is the method of arranging objects into groups.
2. Objects can be grouped according to properties such as shape, colour, hardness, softness, appearance, or the material from which they are made.
3. An object may be made from different materials, and the same material may be used to make several objects.
4. Materials can also be classified according to similarities and differences in their properties.
5. Classification helps us organise materials and observe patterns in their properties more easily.

10. Explain the units used for measuring mass and volume.

Answer:

1. Mass is commonly measured in **grams (g)** and **kilograms (kg)**.
2. The SI unit of mass is **kilogram**, represented by the symbol **kg**.
3. Liquid volume is commonly measured in **litres (L)** and **millilitres (mL)**.
4. The SI unit of volume is the **cubic metre (m^3)**.
5. One cubic metre is equal to **1000 litres ($1\ m^3 = 1000\ L$)**.

11. Explain how solids, liquids, and gases may behave when mixed with water.

Answer:

1. Some solid materials such as sugar and salt dissolve completely in water and are called soluble materials.
2. Some solids such as sand do not dissolve in water and are called insoluble materials.
3. Some liquids mix completely with water, while others form a separate layer.
4. Some gases can also dissolve in water.
5. Oxygen is one such gas, and dissolved oxygen is important for aquatic plants and animals.

12. Write five points about objects and the materials from which they are made.

Answer:

1. All objects around us are made from one or more materials.
2. Paper, wood, cloth, glass, metal, plastic, and clay are examples of materials.

3. The same kind of object can sometimes be made from different materials.
4. A single material can also be used to make many different objects.
5. Materials are selected for making objects according to their properties and intended purposes.

6.12 Five-mark questions with Answers of HOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type

1. A school wants to select materials for three windows: one requiring a clear outside view, one requiring privacy with some visibility, and one requiring no visibility. Suggest suitable types of materials and justify your choices.

Answer:

1. A **transparent material**, such as clear glass, should be used where a clear outside view is required.
2. Transparent materials allow objects on the other side to be seen clearly.
3. A **translucent material**, such as frosted glass, can be used where privacy with limited visibility is required.
4. An **opaque material**, such as wood, can be used where no visibility is required.
5. Thus, transparent, translucent, and opaque materials should be selected according to the degree of visibility needed.

2. A student observes that a metal object that was once shiny has become dull. Analyse the observation and explain whether it should still be classified as a lustrous material.

Answer:

1. Metals such as iron, copper, zinc, aluminium, and gold generally have lustrous surfaces.
2. A metal may lose its lustre when its surface is exposed to air and moisture.
3. Therefore, the dull appearance of an old metal object does not necessarily mean that the material is non-lustrous.
4. Its metallic lustre may be observed more clearly on a freshly cut or cleaned surface.
5. Hence, the object can still be made of a normally lustrous material even though its exposed surface appears dull.

3. Sugar, sand, and an unknown substance are separately mixed with water. Sugar disappears, sand remains visible, and the unknown substance also disappears. Analyse and classify the three substances.

Answer:

1. Sugar disappears because it dissolves in water and is therefore classified as soluble.
2. Sand remains visible even after stirring and is therefore classified as insoluble.
3. Since the unknown substance disappears after mixing with water, it can also be classified as soluble in water.
4. The experiment shows that different materials behave differently when mixed with water.
5. Thus, materials can be classified as soluble or insoluble according to whether they dissolve in water.

4. A student says, "If an object shines, it must be made of metal." Evaluate this statement.

Answer:

1. The student's statement is not always correct because shine alone does not prove that an object is metallic.
2. Metals generally have lustrous or shiny surfaces.
3. However, some non-metallic objects may also appear shiny because of polishing or coating.

4. Therefore, an object's appearance should be considered carefully before classifying its material.
5. Hence, every shiny object cannot automatically be classified as a metal.

5. A student says that air cannot be matter because it cannot be seen or held like a solid object. Analyse the statement using the definition of matter.

Answer:

1. The student's statement is incorrect because visibility is not a requirement for something to be matter.
2. According to the chapter, anything that occupies space and has mass is called matter.
3. Air occupies space even though it cannot normally be seen.
4. Air also possesses mass and therefore satisfies both conditions required for matter.
5. Hence, air is correctly classified as matter.

6. Two balls of the same size but made from different materials bounce to different heights. Explain what this observation teaches us about materials and their uses.

Answer:

1. The different bouncing heights show that balls made from different materials can behave differently.
2. This difference occurs because materials possess different properties.
3. The properties of the material influence how an object performs during use.
4. Different sports require balls with properties suited to their particular requirements.
5. Therefore, materials should be selected according to the purpose for which an object is intended.

7. Material A is difficult to scratch, transparent, and does not dissolve in water. Classify it using three properties and explain why one material can belong to several groups.

Answer:

1. Material A is **hard** because it is difficult to scratch.
2. It is **transparent** because objects can be seen clearly through it.
3. It is **insoluble in water** because it does not dissolve when mixed with water.
4. A material can possess several properties at the same time and can therefore be classified in different ways.
5. Thus, classification depends on the particular property being considered.

8. A pen is made using plastic, metal, and ink. Explain what this example tells us about the relationship between an object's purpose and the materials used to make it.

Answer:

1. A single object can be made from more than one type of material.
2. Different parts of an object may perform different functions and therefore require different properties.
3. Plastic and metal can be used for suitable structural parts of a pen, while ink is required for writing.
4. This shows that the materials used in an object are selected according to the functions they need to perform.
5. Therefore, the properties and purpose of materials are important when designing and making an object.

9. Water, sand, pebbles, and air appear very different from one another. Explain how they can all be placed in the same broad category.

Answer:

1. Water, sand, pebbles, and air differ in appearance and other properties.
2. However, each of them occupies some amount of space.
3. Each of them also possesses mass.
4. Anything that occupies space and has mass satisfies the definition of matter.

5. Therefore, despite their differences, water, sand, pebbles, and air can all be classified as matter.

10. A student has many objects made of different materials and wants to organise them systematically. Explain how classification can help.

Answer:

1. The student can first observe the different properties of the objects and their materials.
2. They may be grouped as lustrous or non-lustrous according to appearance.
3. They may also be classified as hard or soft and as transparent, translucent, or opaque.
4. Their behaviour in water can further be used to classify them as soluble or insoluble.
5. Such classification makes it easier to compare materials and recognise patterns in their properties.

11. A liquid is mixed with water and forms a separate layer after being left undisturbed. Another liquid mixes completely. Analyse these observations.

Answer:

1. The first liquid does not mix completely with water because it forms a separate layer.
2. The second liquid mixes completely with water and does not remain as a separate layer.
3. These observations show that different liquids behave differently when mixed with water.
4. Therefore, we cannot assume that every liquid will mix completely with water.
5. Observing how liquids behave in water helps us compare their properties.

12. Two identical containers have different quantities of water, and one container is heavier. Explain the situation using the concepts of mass and volume.

Answer:

1. The water in each container occupies space, and the space occupied represents its volume.
2. The container holding more water has a greater volume of water than the one holding less.
3. Mass indicates the quantity of matter present in an object or material.
4. The heavier container with its contents has more mass than the lighter one with its contents.
5. Thus, mass and volume are two important properties used to describe matter.

6.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type

1. Your family wants to replace a window so that sunlight can enter and people inside can clearly see outside. Which type of material would you recommend? Explain your choice.

Answer:

1. I would recommend a **transparent material such as clear glass** for the window.
2. Transparent materials allow objects on the other side to be seen clearly.
3. Clear glass would therefore allow people inside the house to see outside.
4. Frosted glass would not be as suitable because it is translucent and does not provide a clear view.
5. Wood or cardboard would be unsuitable because they are opaque and cannot be seen through.

2. During a classroom experiment, you are given sugar, salt, sand and water. Describe how you would classify these solids according to their solubility in water.

Answer:

1. I would take water in separate containers and add a small amount of each solid material.
2. I would stir each mixture and observe whether the solid disappears in the water.

3. Sugar and salt would dissolve and hence be classified as **soluble in water**.
4. Sand would remain visible and hence be classified as **insoluble in water**.
5. Thus, the behaviour of each material in water can be used as a property for classification.

3. You are given sponge, rubber and iron and asked to arrange them according to hardness. How would you do it?

Answer:

1. I would try to compress or scratch each material and compare the results.
2. Sponge can be compressed easily and is therefore relatively soft.
3. Rubber is harder than sponge but softer than iron.
4. Iron is more difficult to compress or scratch and is therefore harder than the other two.
5. This activity demonstrates that hardness and softness are **relative properties** of materials.

4. A shop wants three types of partitions: one that gives a clear view, one that provides partial privacy, and one that completely blocks the view. Suggest suitable materials.

Answer:

1. Clear glass can be used where a clear view is required because it is transparent.
2. Transparent materials allow objects to be seen clearly through them.
3. Frosted glass can be used where partial privacy is required because it is translucent.
4. Wood can be used where the view must be completely blocked because it is opaque.
5. Thus, materials can be selected for practical applications according to their transparency.

5. You are asked to design a pen. Why might you use more than one material to make it?

Answer:

1. A pen has different parts that perform different functions.
2. Different parts may therefore require materials possessing different suitable properties.
3. Plastic can be one of the materials used for making parts of the pen.
4. Metal and ink can also be used as materials in the same pen.
5. Thus, a single object may contain several materials selected according to its purpose and requirements.

6. While cleaning your house, you find an old metal object that has lost its shine. Your friend says that it cannot be a lustrous material. How would you explain the observation?

Answer:

1. I would explain that metals generally have a lustrous or shiny appearance.
2. Metals may lose their lustre when their surfaces are exposed to air and moisture.
3. Therefore, an old metal object may appear dull even though the material is normally lustrous.
4. Its lustre may be observed more clearly on a freshly cut or suitable exposed surface.
5. Hence, the dull appearance alone should not be used to conclude that the object is made of a non-lustrous material.

7. You are given water, sand, pebbles and air and asked whether they are matter. How would you justify your answer?

Answer:

1. I would first use the definition that anything having mass and occupying space is called matter.
2. Water has mass and occupies space, so it is matter.
3. Sand and pebbles also have mass and occupy space, so they are matter.
4. Air also possesses mass and occupies space even though it cannot normally be seen.
5. Therefore, water, sand, pebbles and air can all be classified as **matter**.

8. You have many classroom objects and want to arrange them systematically. How would you use classification to organise them?
Answer:
1. I would first observe the different properties of the objects and the materials from which they are made.
2. I could classify them as **lustrous or non-lustrous** according to their appearance.
3. I could further classify materials as **hard or soft** according to their hardness.
4. I could also group them as **transparent, translucent or opaque** based on whether they can be seen through.
5. Such classification would make it easier to organise, compare and study the properties of the objects.

9. Two balls of the same size but made of different materials are dropped from the same height and bounce differently. How would you use this observation when choosing a ball for a sport?
Answer:
1. I would observe and compare how the two balls bounce when dropped.
2. Different bouncing behaviour indicates that the materials used in the balls have different properties.
3. Different sports require balls with properties suited to their particular purpose.
4. I would therefore select the ball whose behaviour is appropriate for the sport in which it will be used.
5. This demonstrates that the **properties and intended use** of a material should be considered when selecting it for an object.

10. You have two identical bottles, one containing 500 mL of water and another containing 1 L of water. Compare their volumes and explain the concept involved.
Answer:
1. Volume refers to the amount of space occupied by matter.
2. The first bottle contains a water volume of **500 mL**.
3. The second bottle contains **1 L**, which represents a greater volume of water than 500 mL.
4. Litre (L) and millilitre (mL) are units commonly used for expressing liquid volume.
5. Thus, the labels on bottles help us identify and compare the volume of liquid they contain.

6.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions
Below are **30 competency-oriented MCQs** based on the uploaded chapter. They include conceptual understanding, application, classification, comparison, inference, and simple numerical reasoning.

1. A student is given four materials: clear glass, butter paper, wood, and frosted glass. Which material allows an object behind it to be seen **clearly**?
A) Butter paper
B) Wood
C) Clear glass
D) Frosted glass
Answer: C) Clear glass

2. Which sequence correctly represents materials from **clear visibility → partial visibility → no visibility**?
A) Glass → Frosted glass → Wood

B) Wood → Glass → Frosted glass
C) Frosted glass → Wood → Glass
D) Glass → Wood → Frosted glass
Answer: A) Glass → Frosted glass → Wood
3. A material can be scratched easily with another material. It would most appropriately be described as:
A) Lustrous
B) Soft
C) Transparent
D) Soluble
Answer: B) Soft
4. Rubber is harder than sponge but softer than iron. This observation demonstrates that:
A) Rubber is always hard
B) Sponge is always the softest material
C) Hardness is a relative property
D) Iron is a soft material
Answer: C) Hardness is a relative property
5. Which of the following groups contains only materials that are generally lustrous?
A) Copper, aluminium, gold
B) Wood, rubber, jute
C) Paper, copper, wood
D) Jute, aluminium, rubber
Answer: A) Copper, aluminium, gold
6. An old metal object appears dull. Which is the best explanation?
A) All metals are naturally dull
B) Metals may lose lustre due to air and moisture
C) Metals become transparent with age
D) Hard materials cannot be lustrous
Answer: B) Metals may lose lustre due to air and moisture
7. A shiny object should not automatically be classified as a metal because:
A) metals never shine
B) all transparent materials shine
C) polishing or coating can make other materials appear shiny
D) only soft materials are shiny
Answer: C) Polishing or coating can make other materials appear shiny
8. Sugar, salt, sand, and sawdust are separately mixed with water. Which property is mainly being investigated?
A) Hardness
B) Transparency
C) Solubility
D) Lustre
Answer: C) Solubility
9. A substance disappears completely after being stirred in water. According to the chapter, the substance is:
A) Insoluble
B) Soluble
C) Opaque
D) Translucent
Answer: B) Soluble

10. Which observation provides the best evidence that a material is insoluble in water?
A) It shines in water
B) It remains visible after stirring
C) It changes colour
D) It becomes softer
Answer: B) It remains visible after stirring
11. A liquid forms a separate layer after being mixed with water and left undisturbed. What is the best conclusion?
A) The liquid mixes completely with water
B) The liquid does not mix completely with water
C) The liquid has no volume
D) Water has become a solid
Answer: B) The liquid does not mix completely with water
12. Which gas mentioned in the chapter dissolves in water and is important for aquatic organisms?
A) Hydrogen
B) Oxygen
C) Helium
D) Neon
Answer: B) Oxygen
13. Two identical containers contain different materials. Container P is heavier than container Q. Which statement is correct?
A) P has less mass
B) Q has more mass
C) P has more mass
D) Both must have equal mass
Answer: C) P has more mass
14. Which statement best describes mass?
A) It tells us how transparent an object is
B) It gives the quantity of matter in an object
C) It tells us how shiny an object is
D) It measures only liquids
Answer: B) It gives the quantity of matter in an object
15. Two identical tumblers contain different amounts of water. The water in tumbler X occupies more space than that in Y. Therefore:
A) X has a greater volume of water
B) Y has a greater volume of water
C) both must have equal volume
D) volume cannot be compared
Answer: A) X has a greater volume of water
16. Which pair represents properties possessed by all matter according to the chapter?
A) Colour and hardness
B) Lustre and transparency
C) Mass and volume
D) Solubility and softness
Answer: C) Mass and volume
17. Which statement correctly defines matter?
A) Anything that is visible
B) Anything that is solid
C) Anything that occupies space and has mass

D) Anything that dissolves in water
Answer: C) Anything that occupies space and has mass
18. A student says, “Air is not matter because I cannot see it.” Which response is correct?
A) The student is correct because matter must be visible
B) The student is incorrect because air has mass and occupies space
C) The student is correct because gases have no volume
D) The student is incorrect because air is a liquid
Answer: B) The student is incorrect because air has mass and occupies space
19. Which is the correct SI unit and symbol for mass?
A) Gram, gm
B) Kilogram, kg
C) Kilogram, kgs
D) Litre, L
Answer: B) Kilogram, kg
20. Which is the correct SI unit of volume?
A) Litre
B) Millilitre
C) Cubic metre
D) Kilogram
Answer: C) Cubic metre
21. A container has a volume of 3 m^3. What is its volume in litres?
A) 30 L
B) 300 L
C) 3000 L
D) 30,000 L
Answer: C) 3000 L
22. If 1 m^3 = 1000 L, then 5 m^3 equals:
A) 500 L
B) 5000 L
C) 50,000 L
D) 50 L
Answer: B) 5000 L
23. Which quantity is written correctly according to the notation used in the chapter?
A) 7 kgs
B) 7 Kg
C) 7 kg
D) 7 kgs.
Answer: C) 7 kg
24. Which is the correct way of writing five hundred millilitres?
A) 500 ML
B) 500 ml
C) 500 Ml
D) 500 mL
Answer: D) 500 mL
25. Material P is difficult to scratch, can be seen through clearly, and does not dissolve in water. Which classification is correct?
A) Soft, opaque, soluble
B) Hard, transparent, insoluble
C) Hard, translucent, soluble

D) Soft, transparent, insoluble
Answer: B) Hard, transparent, insoluble
26. Material Q can be compressed easily and objects cannot be seen through it. Which two properties describe Q?
A) Hard and transparent
B) Soft and opaque
C) Lustrous and transparent
D) Hard and translucent
Answer: B) Soft and opaque
27. A pen is made using plastic, metal, and ink. What is the most appropriate conclusion?
A) Every object must contain three materials
B) A single object may be made from different materials
C) Plastic and metal have identical properties
D) Ink is a metal
Answer: B) A single object may be made from different materials
28. Why can the same type of object sometimes be made from different materials?
A) All materials have identical properties
B) Different materials may have suitable properties for the same purpose
C) Material properties have no connection with use
D) Classification changes one material into another
Answer: B) Different materials may have suitable properties for the same purpose
29. Two same-sized balls made from different materials bounce to different heights. Which conclusion is most scientifically appropriate?
A) Size alone determines bouncing behaviour
B) The properties of the materials influence the balls' behaviour
C) All balls should bounce equally
D) The heavier-looking ball must bounce higher
Answer: B) The properties of the materials influence the balls' behaviour
30. A student groups glass, water, and air together. Which common property mentioned in the chapter best supports this grouping?
A) All are hard
B) All are lustrous
C) All are transparent
D) All are metals
Answer: C) All are transparent

Answer Key:

Q.	**Ans.**	**Q.**	**Ans.**	**Q.**	**Ans.**
1	C	11	B	21	C
2	A	12	B	22	B
3	B	13	C	23	C
4	C	14	B	24	D
5	A	15	A	25	B
6	B	16	C	26	B
7	C	17	C	27	B
8	C	18	B	28	B
9	B	19	B	29	B

Q. Ans.	Q. Ans.	Q. Ans.
10 B	20 C	30 C

6.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

“Best Practices” Opportunities in Teaching–Learning:
Here are **10 best-practice ideas** suitable for teaching this chapter effectively to Grade 6 students.

(1) **Learning through Real Materials:** Bring everyday objects such as glass, wood, paper, rubber, metal, sponge, plastic and cloth into the classroom. Let students observe, touch, compare and group them according to properties such as lustre, hardness and transparency. This makes the chapter's concept of **classification** concrete and experiential.

(2) **Student-Led Classification Activity:** Give each group a collection of familiar objects and ask students to develop their own criteria for grouping them. They can classify objects according to material, appearance, hardness, softness or transparency and then explain the reasoning behind their classification.

(3) **Transparency Investigation Station:** Set up a learning station with clear glass, butter paper, frosted glass, cardboard and similar materials. Students can observe an object through each material and classify it as **transparent, translucent or opaque** based on what they actually see.

(4) **Hands-on Solubility Experiment:** Allow students to test materials such as sugar, salt, sand, chalk powder and sawdust by mixing them separately with water. Ask them to record observations and classify each material as **soluble or insoluble**, following the investigative approach used in the chapter.

(5) **Predict–Observe–Explain (POE) Strategy:** Before conducting an activity, ask students to predict the outcome—for example, whether a material will dissolve in water or whether two same-sized balls will bounce equally. After observation, students compare the result with their prediction and explain it using the properties of materials.

(6) **Comparative Hardness Activity:** Provide materials such as sponge, rubber and other safe classroom objects and ask students to compare their hardness by gentle compression or safe scratch-testing. Emphasise the chapter's important idea that **hardness is relative**, as rubber may be harder than sponge but softer than iron.

(7) **Concept Mapping:** At the end of the lesson, students can prepare a concept map beginning with **Materials** and branching into *lustrous/non-lustrous*, *hard/soft*, *transparent/translucent/opaque*, and *soluble/insoluble*. A second branch can connect **Matter → Mass + Volume**, helping students consolidate the chapter systematically.

(8) **Connect Properties with Everyday Uses:** Ask students why glass is suitable for certain windows, why different sports balls are made from different materials, or why different parts of a pen use different materials. Such discussions help students connect **properties of materials with their suitability for particular purposes**.

(9) **Mass and Volume through Measurement:** Let students compare lighter and heavier classroom objects and observe different volumes of water in identical containers. They can then relate their observations to **mass as quantity of matter** and **volume as space occupied by matter**, while practising the units kg, g, L and mL.

(10) **Exit Ticket for Formative Assessment:** At the end of the lesson, give three quick questions such as: *Classify butter paper*, *Why is sand insoluble?*, and *Why is air considered matter?* Students' responses can help the teacher identify misconceptions before proceeding to the next concept. The activity reinforces the chapter's central ideas of classification, material properties and matter.

Recommended classroom approach: Observe → Predict → Experiment → Record → Classify → Explain → Apply. This sequence closely matches the activity-oriented and inquiry-based nature of *Materials Around Us* and encourages students to learn material properties through direct investigation rather than memorisation alone.

6.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for 7th Standard Students:
Here are **10 innovative teaching-learning ideas** that can make the chapter more exploratory, technology-supported, collaborative, and application-oriented.

(1) **Material Detective Challenge:** Create a "mystery material" activity in which students receive an unidentified material and investigate its properties—lustre, hardness, transparency and solubility. They record clues and finally classify the material based on evidence, turning classification into a scientific investigation.

(2) **Digital Material Classification Wall:** Students photograph safe everyday objects around the school or home and create a digital classification board. Images can be arranged under categories such as **lustrous/non-lustrous, hard/soft, transparent/translucent/opaque, and soluble/insoluble**, reinforcing the classification framework of the chapter.

(3) **QR-Code Learning Stations:** Set up classroom stations for different properties of materials and attach QR codes containing teacher-prepared questions, clues or mini-challenges. Students rotate through stations, conduct simple observations and submit their classifications and reasoning.

(4) **Design-a-Product Challenge:** Give groups a practical task such as designing a tumbler, window, storage container or simple classroom object. Students must select appropriate materials and justify their choices by linking the **properties of materials to the intended purpose of the object**.

(5) **Virtual Solubility Prediction Lab:** Before carrying out the actual water-solubility activity, students can use a teacher-created digital quiz or interactive slide to predict whether materials will dissolve. They then conduct the real experiment and compare **Prediction → Observation → Conclusion**, strengthening scientific reasoning.

(6) **Transparency Photography Experiment:** Students can place transparent, translucent and opaque materials between an object and a camera and photograph the resulting visibility. The photographs can then be compared to visually demonstrate how clearly objects can be seen through different materials.

(7) **Sports-Ball Engineering Investigation:** Using balls made from different materials, students can drop them from the same height and compare their bouncing behaviour. They can prepare a simple observation chart and discuss why different sports require materials with different properties.

(8) **Matter Hunt – "Does It Have Mass and Occupy Space?":** Organise a classroom or school-campus scavenger hunt in which students identify examples of matter and justify each choice using the two criteria **mass and volume**. Include air as a challenge item to address the misconception that only visible things are matter.

(9) **Student-Created Micro-Videos:** Small groups can produce 60–90 second explanatory videos on concepts such as *lustrous vs non-lustrous*, *hard vs soft*, *transparent vs translucent vs opaque*, *soluble vs insoluble*, or *mass vs volume*. Students become content creators rather than passive learners while revising the chapter's major classifications.

(10) **"Choose the Best Material" Innovation Fair:** Give each team a real-life problem—for example, selecting a material for a window, water container, privacy screen or sports

object. Teams display their proposed solution, material choice, relevant properties and justification, while classmates evaluate whether the selected material is suitable. This integrates **classification, properties, application, communication and problem-solving**.

A useful innovative learning cycle for this chapter would be: **Explore** → **Predict** → **Test** → **Classify** → **Design** → **Explain** → **Create**. This moves students beyond memorising definitions and encourages them to use the chapter's concepts to investigate and solve practical problems.

6.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. Any substance used to create an object is called a __________.
   Answer: Material
2. The method of arranging objects into groups is called __________.
   Answer: Classification
3. Materials having a shiny surface are called __________ materials.
   Answer: Lustrous
4. Materials that can be compressed or scratched easily are called __________ materials.
   Answer: Soft
5. Materials through which objects can be seen clearly are called __________ materials.
   Answer: Transparent
6. Butter paper and frosted glass are examples of __________ materials.
   Answer: Translucent
7. Wood and cardboard are examples of __________ materials.
   Answer: Opaque
8. Materials that dissolve in water are called __________ materials.
   Answer: Soluble
9. __________ is a gas that dissolves in water and is important for aquatic organisms.
   Answer: Oxygen
10. Anything that occupies space and has mass is called __________.
    Answer: Matter
11. The quantity of matter present in an object is indicated by its __________.
    Answer: Mass
12. The space occupied by matter is called its __________.
    Answer: Volume
13. The SI unit of mass is __________.
    Answer: Kilogram (kg)
14. The SI unit of volume is __________.
    Answer: Cubic metre (m^3)
15. One cubic metre is equal to __________ litres.
    Answer: 1000 litres

B. One-Mark Descriptive Questions:

1. **What is a material?**
   Answer: A material is any substance that is used to create an object.
2. **What is classification?**
   Answer: Classification is the method of arranging objects into groups.
3. **Give two examples of lustrous materials.**
   Answer: Copper and aluminium are examples of lustrous materials.
4. **What is a soft material?**
   Answer: A material that can be compressed or scratched easily is called a soft material.
5. **What is a transparent material?**
   Answer: A material through which objects can be seen clearly is called transparent.
6. **Give two examples of translucent materials.**
   Answer: Butter paper and frosted glass are translucent materials.
7. **What are insoluble materials?**
   Answer: Materials that do not dissolve in water are called insoluble materials.
8. **Why is dissolved oxygen important in water?**
   Answer: Dissolved oxygen is important for the survival of aquatic plants and animals.
9. **What is matter?**
   Answer: Anything that occupies space and has mass is called matter.
10. **What is volume?**
    Answer: Volume is the space occupied by matter.

C. Two-Mark Descriptive Questions:

1. Differentiate between lustrous and non-lustrous materials.

Answer:

1. Lustrous materials have shiny surfaces; metals such as copper and aluminium are generally lustrous.
2. Non-lustrous materials do not have shiny surfaces; examples include paper, wood and rubber.

2. Differentiate between hard and soft materials.

Answer:

1. Hard materials are difficult to compress or scratch.
2. Soft materials can be compressed or scratched easily.

3. Differentiate between transparent and opaque materials.

Answer:

1. Transparent materials allow objects to be seen clearly through them.

2. Opaque materials do not allow objects to be seen through them.

4. What are soluble and insoluble materials?

Answer:

1. Materials that dissolve in water are called soluble materials.
2. Materials that do not dissolve in water are called insoluble materials.

5. Why is hardness considered a relative property?

Answer:

1. A material may be harder than one material but softer than another.
2. For example, rubber is harder than sponge but softer than iron.

6. Explain the importance of dissolved oxygen in water.

Answer:

1. Oxygen is one of the gases that can dissolve in water.
2. Dissolved oxygen is important for aquatic plants and animals.

7. What are mass and volume?

Answer:

1. Mass gives the quantity of matter present in an object.
2. Volume is the space occupied by matter.

8. Why is air considered matter?

Answer:

1. Air occupies space.
2. Air also possesses mass and therefore satisfies the definition of matter.

D. Three-Mark Descriptive Questions:

1. Explain transparent, translucent and opaque materials.

Answer:

1. Transparent materials allow objects to be seen clearly through them; clear glass is an example.
2. Translucent materials allow objects to be seen but not clearly; frosted glass is an example.
3. Opaque materials do not allow objects to be seen through them; wood is an example.

2. Explain how materials can be classified according to their properties.

Answer:

1. Materials can be classified as lustrous or non-lustrous according to appearance.

2. They can be classified as hard or soft and as transparent, translucent or opaque.
3. They can also be classified as soluble or insoluble according to their behaviour in water.

3. Explain the relationship between the properties and uses of materials.

Answer:

1. Different materials possess different properties.
2. The material selected for an object should possess properties suitable for its intended purpose.
3. Different parts of the same object may therefore be made from different materials.

4. Explain the behaviour of different materials when mixed with water.

Answer:

1. Some materials such as sugar and salt dissolve in water.
2. Materials that dissolve are called soluble materials.
3. Materials such as sand that do not dissolve are called insoluble materials.

5. Explain mass, volume and matter.

Answer:

1. Mass gives the quantity of matter present in an object.
2. Volume is the amount of space occupied by matter.
3. Anything that occupies space and has mass is called matter.

6. Why is classification useful in studying materials?

Answer:

1. Classification arranges materials into groups based on their properties.
2. It helps us identify similarities and differences among materials.
3. It also makes it easier to observe patterns in their properties.

E. Five-Mark Descriptive Questions:

1. Explain five important ways of classifying materials.

Answer:

1. Materials may be classified as lustrous or non-lustrous based on their surface appearance.
2. They may be classified as hard or soft according to their resistance to compression or scratching.
3. They may be classified as transparent, translucent or opaque according to visibility through them.
4. They may be classified as soluble or insoluble according to their behaviour in water.
5. Such classification helps us systematically compare and study different materials.

2. Explain matter and its properties with suitable examples.

Answer:

1. Anything that occupies space and has mass is called matter.
2. Mass gives the quantity of matter present in an object.
3. Volume is the space occupied by matter.
4. Water, sand and pebbles are examples of matter because they have mass and occupy space.
5. Air is also matter because it possesses mass and occupies space.

3. Describe an activity to classify materials as soluble or insoluble in water.

Answer:

1. Take water in separate containers and collect materials such as sugar, salt, sand and sawdust.
2. Add a small quantity of each material separately to water.
3. Stir each mixture and observe whether the material disappears or remains visible.
4. Materials that dissolve are classified as soluble, while those that do not are classified as insoluble.
5. The activity demonstrates that different materials behave differently when mixed with water.

4. A house requires clear windows, privacy windows and doors that completely block visibility. Explain how you would select materials for each.

Answer:

1. Clear glass should be selected for windows where a clear outside view is required.
2. Clear glass is transparent and allows objects to be seen clearly through it.
3. Frosted glass can be selected for privacy windows because it is translucent.
4. Wood can be selected for doors that must completely block visibility because it is opaque.
5. Thus, the transparency property of materials can be applied when selecting materials for different purposes.

5. Explain why different materials are selected for making different objects.

Answer:

1. Every material possesses a particular set of properties.
2. An object's intended purpose determines the properties required from its material.
3. The same kind of object may sometimes be made from different suitable materials.
4. A single object may also contain several materials because its different parts perform different functions.
5. Therefore, understanding material properties helps us select appropriate materials for practical uses.

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6th Standard Science Book Chapter 7

Chapter 7: Temperature and its Measurement

7.1 Summary of the Chapter:

Chapter 7: Temperature and its Measurement — Summary:

(1) **Temperature** tells us how hot or cold a body is. A hotter body has a higher temperature than a colder body. Our **sense of touch is not always reliable** for judging hotness or coldness.

(2) A device used to measure temperature is called a **thermometer**. Two commonly used types are **clinical thermometers**, used for measuring human body temperature, and **laboratory thermometers**, used for various experimental purposes.

(3) **Digital clinical thermometers** display temperature digitally and work using heat sensors. They are safer and easier to read than older mercury thermometers, as mercury is toxic and difficult to dispose of safely.

(4) The normal temperature of a healthy human body is taken as approximately **37.0 °C or 98.6 °F**. However, body temperature can vary slightly depending on factors such as **age, time of day and activity level**.

(5) The three commonly used temperature scales are **Celsius, Fahrenheit and Kelvin**. Their units are degree Celsius (**°C**), degree Fahrenheit (**°F**) and kelvin (**K**) respectively. The **SI unit of temperature is kelvin**.

(6) Temperature can be converted from Celsius to Kelvin using the relation: **Temperature in K = Temperature in °C + 273.15**.

(7) A **laboratory thermometer** generally consists of a sealed glass tube with a bulb containing a liquid such as coloured alcohol or mercury. The liquid column rises or falls with changes in temperature. A typical laboratory thermometer has a range of about **–10 °C to 110 °C**.

(8) While using a laboratory thermometer, it should be held **vertically**, its bulb should not touch the bottom or sides of the container, and the reading should be taken **while the thermometer is still immersed**. The eye should be directly in line with the liquid level for an accurate reading.

(9) During **boiling**, the temperature of water remains constant, and during **melting**, the temperature of ice also remains constant. Correct measurement procedures are essential because improper handling or reading of a thermometer can produce inaccurate results.

(10) **Air temperature** is an important weather parameter. Weather reports provide the **maximum and minimum air temperatures**, which generally vary from day to day and across seasons. Temperature data collected at weather stations, together with other parameters, are used for **weather forecasting**.

7.2 Important Formulas:

Important Formulas – Chapter 7: Temperature and its Measurement:

The chapter is mainly conceptual, so there are **only a few formulas/calculations** required for quantitative problems. The following are the important ones.

1. **Conversion from Celsius to Kelvin**

$$\boxed{T(K) = T(°C) + 273.15}$$

Example: If the temperature is 25 °C,

$$T = 25 + 273.15 = 298.15\ K$$

This conversion is explicitly given in the chapter.

2. **Conversion from Kelvin to Celsius**

By rearranging the formula above:

$$\boxed{T(°C) = T(K) - 273.15}$$

Example:

$$300K = 300 - 273.15 = 26.85°C$$

The chapter also explains that **0 K corresponds approximately to −273.15 °C**, called absolute zero.

3. **Smallest Division / Least Count of a Thermometer**

$$\boxed{\text{Smallest Division} = \frac{\text{Temperature difference between two marked values}}{\text{Number of divisions between them}}}$$

For example, if there are 10 divisions between 0 °C and 10 °C:

$$\frac{10-0}{10} = 1°C$$

Therefore, the smallest value measurable is **1 °C**.

4. **Temperature Difference**

For comparing two temperatures:

$$\boxed{\Delta T = T_2 - T_1}$$

or, when only the magnitude of the difference is required,

$$\boxed{\text{Temperature difference} = |\, T_2 - T_1 \,|}$$

Example: Difference between 40 °C and 35 °C:

$$40 - 35 = 5°C$$

The chapter introduces temperature difference as a way of comparing how hot or cold two bodies are.

5. **Range of a Thermometer**

The usable range is identified by its minimum and maximum readings:

$$\boxed{\text{Range} = \text{Lowest measurable temperature to Highest measurable temperature}}$$

A typical laboratory thermometer discussed in the chapter has a range of:

$$\boxed{-10°C \text{ to } 110°C}$$

6. **Celsius–Fahrenheit Reference Relation**

The chapter does **not give a general Celsius–Fahrenheit conversion formula**, but it provides the important equivalence:

$$\boxed{37.0°C = 98.6°F}$$

This is the normal human body temperature used in the chapter.

Quick Formula Sheet

Quantity	**Formula / Relation**
Celsius → Kelvin	**K = °C + 273.15**
Kelvin → Celsius	**°C = K − 273.15**
Smallest division	**Temperature interval ÷ Number of divisions**
Temperature difference	**$\Delta T = T_2 - T_1$**
Normal body temperature	**37.0 °C = 98.6 °F**
Absolute zero	**0 K = −273.15 °C**
Typical laboratory thermometer range	**−10 °C to 110 °C**

Most important for quantitative questions: students should particularly practise **Celsius–Kelvin conversion, calculating the smallest division of a thermometer, reading thermometer scales, and finding differences between temperature readings**, since the chapter-end exercises directly test thermometer divisions and scale readings.

7.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

LOTS Type – Fill in the Blanks with Answers:

1. The reliable measure of the hotness or coldness of a body is called its __________.
   Answer: Temperature
2. A device used to measure temperature is called a __________.
   Answer: Thermometer
3. We cannot always rely upon our sense of __________ to decide whether a body is hot or cold.
   Answer: Touch
4. A __________ **thermometer** is used to measure human body temperature.
   Answer: Clinical
5. A thermometer used for various experiments in a science laboratory is called a __________ **thermometer**.
   Answer: Laboratory
6. Digital clinical thermometers generally measure temperature using __________ **sensors**.
   Answer: Heat
7. The unit of temperature on the Celsius scale is __________.
   Answer: Degree Celsius (°C)
8. The normal temperature of a healthy human body is taken to be __________ **°C**.
   Answer: 37.0
9. A body temperature of 37.0 °C is equivalent to __________ **°F**.
   Answer: 98.6
10. The temperature of a person may vary depending on age, time of the day and __________ **level**.
    Answer: Activity
11. The three commonly used temperature scales are Celsius, Fahrenheit and __________.
    Answer: Kelvin
12. The SI unit of temperature is __________.
    Answer: Kelvin
13. The symbol used for kelvin is __________.
    Answer: K
14. Temperature in kelvin is obtained by adding __________ to the temperature in degree Celsius.
    Answer: 273.15
15. A typical laboratory thermometer has a range from __________ **°C to 110 °C**.
    Answer: –10
16. The liquid generally used in a laboratory thermometer is alcohol or __________.
    Answer: Mercury
17. Alcohol used in a laboratory thermometer is generally coloured __________ so that it can be easily seen.
    Answer: Red
18. In a laboratory thermometer, the liquid column __________ or falls when the temperature changes.
    Answer: Rises
19. A laboratory thermometer should be held __________ while measuring temperature.
    Answer: Vertically
20. The bulb of a laboratory thermometer should not touch the bottom or __________ of the beaker.
    Answer: Sides

21. The temperature must be read while the laboratory thermometer is still __________ in the water.
    Answer: Immersed
22. While reading a laboratory thermometer, the eye should be directly in line with the level of the __________ **column**.
    Answer: Liquid
23. The temperature of water remains __________ while it is boiling.
    Answer: Constant
24. The temperature of ice remains constant while it is __________.
    Answer: Melting
25. Thermometers used to measure temperature without touching a person's body are called __________ **thermometers**.
    Answer: Infrared
26. Infrared thermometers are also known as __________ **thermometers**.
    Answer: Non-contact
27. A room thermometer gives an approximate idea of the __________ **temperature**.
    Answer: Room
28. Weather reports generally mention the maximum and __________ air temperatures of the day.
    Answer: Minimum
29. Air temperature is an important __________ **parameter**.
    Answer: Weather
30. Air-temperature data, along with other weather parameters, are used for making weather __________.
    Answer: Forecasts
31. The lowest possible temperature is approximately __________ **°C**.
    Answer: –273.15
32. A temperature of –273.15 °C corresponds to __________ **kelvin**.
    Answer: 0
33. The lowest possible temperature, 0 K, is called __________ **zero**.
    Answer: Absolute
34. The Indian scientist Anna Mani is popularly known as the "__________ **Woman of India.**"
    Answer: Weather
35. Anna Mani invented and built several __________ **measurement instruments**.
    Answer: Weather

These questions are **LOTS (Lower Order Thinking Skills)** because they primarily test **recall, recognition, terminology, units, basic facts and direct understanding** from the chapter.

7.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS Type – Fill in the Blanks with Answers:

1. Riya first keeps her right hand in warm water and then places it in normal water. The normal water may feel __________ to her right hand.
   Answer: Cool
2. If one hand kept in warm water and another in cold water are later placed in the same tap water, the two hands may sense the tap water __________.
   Answer: Differently
3. The above observation proves that our sense of touch is not always a __________ way of judging temperature.
   Answer: Reliable

4. Rahul feels feverish, but his forehead does not feel very hot to his mother. To confirm his condition accurately, she should use a __________.
   Answer: Clinical thermometer
5. A healthy person's temperature is 36.8 °C instead of 37.0 °C. This can still be considered normal because 37.0 °C represents the __________ body temperature of a large number of healthy people.
   Answer: Average
6. Two healthy students record slightly different body temperatures at the same time. One possible reason could be a difference in their __________ **level**.
   Answer: Activity
7. If a thermometer placed in the armpit shows 36.0 °C, the actual body temperature may be approximately __________ **°C to 37.0 °C**.
   Answer: 36.5
8. If the temperature of an object is 27 °C, its temperature on the Kelvin scale is __________ **K**.
   Answer: 300.15 K
9. A temperature of 300 K is equal to approximately __________ **°C**.
   Answer: 26.85 °C
10. A laboratory thermometer has 20 equal divisions between 0 °C and 20 °C. Its smallest division represents __________ **°C**.
    Answer: 1 °C
11. A thermometer has 10 equal divisions between 10 °C and 15 °C. Each small division represents __________ **°C**.
    Answer: 0.5 °C
12. If there are 50 equal divisions between 0 °C and 100 °C on a thermometer, each division represents __________ **°C**.
    Answer: 2 °C
13. A student wants to measure a temperature of 22.5 °C. A thermometer whose smallest division is 1 °C would be __________ suitable than one whose smallest division is 0.5 °C.
    Answer: Less
14. A laboratory thermometer with a range of –10 °C to 110 °C can measure 105 °C but cannot measure __________ **°C**.
    Answer: 120 °C
15. If the bulb of a laboratory thermometer touches the bottom of a beaker containing warm water, the reading may represent the temperature of the __________ rather than only that of the water.
    Answer: Beaker
16. If a student removes a laboratory thermometer from warm water before taking the reading, the liquid column begins to __________.
    Answer: Fall
17. Therefore, the reading of a laboratory thermometer should be taken while it is still __________ in the substance.
    Answer: Immersed
18. Five students obtain slightly different temperatures for the same boiling water. One possible reason is that all of them may not have followed the __________ method of reading the thermometer.
    Answer: Correct

19. If the temperature of boiling water is checked repeatedly while it continues to boil, the temperature should remain approximately __________.
    Answer: Constant
20. Similarly, while ice is melting, its temperature remains __________.
    Answer: Constant
21. If the maximum air temperature recorded on Monday is 32 °C and on Tuesday is 35 °C, Tuesday is __________ **°C** hotter in terms of maximum temperature.
    Answer: 3 °C
22. If the maximum temperature of a place increases as summer approaches, the data indicate a __________ trend in temperature.
    Answer: Rising
23. Maximum and minimum air temperatures usually change from day to day because weather depends on __________ **factors**.
    Answer: Several
24. A person needs to measure another person's temperature without physical contact. The most suitable instrument would be an __________ **thermometer**.
    Answer: Infrared
25. Non-contact thermometers can help reduce the risk of spreading __________ because they do not need to touch the person's body.
    Answer: Disease
26. A student tries to measure boiling water with a clinical thermometer. The experiment is inappropriate because boiling-water temperature is __________ the range of a clinical thermometer.
    Answer: Outside
27. If a patient's temperature changes from 40.0 °C to 38.0 °C, the temperature has decreased by __________ **°C**.
    Answer: 2.0 °C
28. Vaishnavi's temperature record shows 40.0 °C at 7 p.m. on Day One and 36.6 °C at 10 p.m. on Day Three. The difference between these readings is __________ **°C**.
    Answer: 3.4 °C
29. If Komal says that she has a fever of 101 degrees, she most likely means __________, because 101 °C would be far beyond normal human body temperature.
    Answer: 101 °F
30. The temperature –273.15 °C corresponds to __________ **K** and is known as absolute zero.
    Answer: 0 K

These HOTS fill-ups emphasize **application, calculation, interpretation, comparison, inference and reasoning** rather than simple recall of definitions.

7.5 One-mark questions with Answers of LOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is temperature?**
   Answer: Temperature is a reliable measure of the hotness or coldness of a body.
2. **What is a thermometer?**
   Answer: A thermometer is a device used to measure temperature.
3. **Why can we not always rely on our sense of touch to judge temperature?**
   Answer: Our sense of touch may give different sensations for the same temperature and therefore may not correctly tell whether a body is hot or cold.

4. **What is a clinical thermometer?**
   Answer: A clinical thermometer is a thermometer used to measure human body temperature.
5. **What is a digital clinical thermometer?**
   Answer: A digital clinical thermometer is a battery-operated thermometer that displays body temperature digitally.
6. **How does a digital thermometer determine temperature?**
   Answer: A digital thermometer determines temperature with the help of heat sensors.
7. **What is the commonly accepted normal temperature of a healthy human body?**
   Answer: The normal temperature of a healthy human body is taken to be 37.0 °C.
8. **What is normal human body temperature on the Fahrenheit scale?**
   Answer: Normal human body temperature is 98.6 °F on the Fahrenheit scale.
9. **Name any two factors that influence human body temperature.**
   Answer: Age and activity level are two factors that influence human body temperature.
10. **Name the three temperature scales discussed in the chapter.**
    Answer: The three temperature scales are Celsius, Fahrenheit and Kelvin.
11. **What is the SI unit of temperature?**
    Answer: The SI unit of temperature is kelvin.
12. **What is the symbol for degree Celsius?**
    Answer: The symbol for degree Celsius is °C.
13. **What is the symbol for degree Fahrenheit?**
    Answer: The symbol for degree Fahrenheit is °F.
14. **What is the symbol for kelvin?**
    Answer: The symbol for kelvin is K.
15. **State the relation used to convert Celsius temperature into Kelvin.**
    Answer: Temperature in kelvin = Temperature in degree Celsius + 273.15.
16. **What is a laboratory thermometer?**
    Answer: A laboratory thermometer is a thermometer used to measure temperatures for various purposes in laboratories.
17. **Which liquids are generally used in laboratory thermometers?**
    Answer: Alcohol or mercury is generally used in laboratory thermometers.
18. **Why is the alcohol in a laboratory thermometer coloured red?**
    Answer: Alcohol is coloured red so that the liquid column can be easily seen.
19. **What is the typical range of a laboratory thermometer?**
    Answer: The typical range of a laboratory thermometer is –10 °C to 110 °C.
20. **What is meant by the smallest value of a thermometer?**
    Answer: It is the smallest temperature difference that can be read using the thermometer.
21. **How is the smallest value measurable by a thermometer determined?**
    Answer: It is determined by dividing the temperature difference between two bigger marks by the number of divisions between them.
22. **How should a laboratory thermometer be held while measuring temperature?**
    Answer: A laboratory thermometer should be held vertically while measuring temperature.
23. **When should the reading of a laboratory thermometer be taken?**
    Answer: The reading should be taken while the thermometer is still immersed in the substance.
24. **Where should the bulb of a laboratory thermometer be positioned while measuring the temperature of water?**

Answer: The bulb should remain immersed in water without touching the bottom or sides of the beaker.

25. **How should the eye be positioned while reading a laboratory thermometer?**
    Answer: The eye should be directly in line with the level of the liquid column.
26. **What happens to the temperature of water while it is boiling?**
    Answer: The temperature of water remains constant while it is boiling.
27. **What happens to the temperature of ice while it is melting?**
    Answer: The temperature of ice remains constant while it is melting.
28. **What is a non-contact thermometer?**
    Answer: A non-contact thermometer measures body temperature without touching the person's body.
29. **What is another name for a non-contact thermometer?**
    Answer: A non-contact thermometer is also called an infrared thermometer.
30. **What is one advantage of an infrared thermometer?**
    Answer: An infrared thermometer reduces the risk of spreading disease because it measures temperature without physical contact.
31. **What does a room thermometer indicate?**
    Answer: A room thermometer gives an approximate idea of the room temperature.
32. **Which two air temperatures are commonly mentioned in weather reports?**
    Answer: Weather reports commonly mention the maximum and minimum air temperatures of the day.
33. **Why is air temperature monitored at weather stations?**
    Answer: Air temperature is monitored because it is an important weather parameter used in making weather forecasts.
34. **Who was Anna Mani?**
    Answer: Anna Mani was an Indian scientist known as the "Weather Woman of India."
35. **What was one important contribution of Anna Mani?**
    Answer: Anna Mani invented and built many weather measurement instruments.
36. **What is absolute zero?**
    Answer: Absolute zero is the lowest possible temperature, approximately –273.15 °C or 0 K.

7.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **Why is touching a person's forehead not a reliable way to confirm fever?**
   Answer: Our sense of touch is not always reliable for accurately judging temperature.
2. **A student feels the same water as warm with one hand and cool with the other; what does this show?**
   Answer: It shows that our perception of hotness or coldness depends on previous exposure and cannot always be trusted.
3. **Why should a thermometer be preferred over touch for comparing temperatures?**
   Answer: A thermometer provides an objective and reliable measurement of temperature.
4. **A healthy child has a body temperature of 36.8 °C; should it necessarily be considered abnormal?**
   Answer: No, because a healthy person's temperature can be slightly different from the average value of 37.0 °C.
5. **Why might the body temperature of the same person vary at different times of the day?**

Answer: Body temperature may vary because it is influenced by factors such as time of day and activity level.

6. **Why might an armpit temperature reading be lower than the actual body temperature?**
   Answer: An armpit reading is generally about 0.5 °C to 1 °C lower than the actual body temperature.
7. **A person's temperature is 37 °C; what would it be on the Fahrenheit scale?**
   Answer: A temperature of 37 °C is equivalent to 98.6 °F.
8. **If the temperature is 27 °C, what is its value on the Kelvin scale?**
   Answer: The temperature is 300.15 K because 27 + 273.15 = 300.15 K.
9. **If an object has a temperature of 300 K, what is its approximate temperature in Celsius?**
   Answer: Its temperature is approximately 26.85 °C because 300 − 273.15 = 26.85 °C.
10. **Why should a clinical thermometer not be used to measure boiling water?**
    Answer: A clinical thermometer should not be used because the temperature of boiling water lies outside its measuring range.
11. **A thermometer has 10 divisions between 20 °C and 30 °C; what is its smallest measurable value?**
    Answer: Its smallest measurable value is 1 °C because 10 °C divided by 10 divisions equals 1 °C.
12. **A thermometer has 20 divisions between 10 °C and 20 °C; what does each division represent?**
    Answer: Each division represents 0.5 °C because 10 °C divided by 20 equals 0.5 °C.
13. **Why should the range and smallest division of a thermometer be checked before using it?**
    Answer: They should be checked to ensure that the thermometer can measure the required temperature with suitable precision.
14. **Why should the bulb of a laboratory thermometer not touch the bottom of a beaker?**
    Answer: It should not touch the bottom so that the thermometer measures the temperature of the water correctly.
15. **Why must a laboratory thermometer be held vertically while taking a reading?**
    Answer: It must be held vertically to obtain the temperature reading correctly.
16. **Why should the eye be kept at the same level as the liquid column while reading a thermometer?**
    Answer: Keeping the eye in line with the liquid level helps obtain an accurate reading.
17. **What happens if a laboratory thermometer is removed from warm water before its reading is noted?**
    Answer: The liquid column begins to fall, so the observed reading may no longer represent the water's temperature.
18. **Several students obtain slightly different readings for the same boiling water; what is one likely reason?**
    Answer: Some students may not have followed the correct procedure for reading the thermometer.
19. **What can you infer if the temperature of water does not increase further while it continues boiling?**
    Answer: We can infer that the temperature of water remains constant while it is boiling.

20. **What can you infer if the temperature of ice remains unchanged while it melts?**
    Answer: We can infer that the temperature of ice remains constant during melting.
21. **Why would an infrared thermometer be preferable when measuring the temperature of many people?**
    Answer: An infrared thermometer can measure temperature without physical contact and thereby reduce the risk of spreading disease.
22. **If the maximum temperature rises from 30 °C to 35 °C, by how much has it increased?**
    Answer: The maximum temperature has increased by 5 °C.
23. **Why do maximum and minimum air temperatures usually change from one day to another?**
    Answer: They usually change because weather depends on several varying factors.
24. **Why is continuous recording of air temperature useful for weather forecasting?**
    Answer: Recorded air-temperature data, together with other weather parameters, help in making weather forecasts.
25. **Vaishnavi's temperature falls from 40.0 °C to 38.0 °C; by how much has it decreased?**
    Answer: Her temperature has decreased by 2.0 °C.
26. **If a patient says that their fever is 101 degrees, which temperature scale is most likely being used?**
    Answer: The Fahrenheit scale is most likely being used because 101 °C would be far outside the normal human body-temperature range.
27. **Which thermometer is more suitable for measuring 22.5 °C—one with a smallest division of 1 °C or 0.5 °C?**
    Answer: The thermometer with a smallest division of 0.5 °C is more suitable because it can directly measure 22.5 °C.
28. **If the temperature of a room is 25 °C, what is its temperature in kelvin?**
    Answer: The room temperature is 298.15 K because 25 + 273.15 = 298.15 K.
29. **What does a temperature of 0 K indicate?**
    Answer: A temperature of 0 K indicates absolute zero, the lowest temperature possible according to scientific understanding.
30. **Why are digital thermometers safer than mercury thermometers?**
    Answer: Digital thermometers are safer because they do not contain toxic mercury that may be released if a thermometer breaks.

7.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is temperature? How is it measured?**
   Answer:
   1. Temperature is a reliable measure of the hotness or coldness of a body.
   2. It is measured using an instrument called a thermometer.
2. **Why can we not always rely on our sense of touch to decide whether an object is hot or cold?**
   Answer:
   1. Our sense of touch can give different sensations for the same object depending on what we touched earlier.
   2. Therefore, a thermometer is required for reliable measurement of temperature.
3. **Differentiate between a clinical thermometer and a laboratory thermometer.**
   Answer:

1. A clinical thermometer is used to measure human body temperature.
2. A laboratory thermometer is used to measure temperatures for various other purposes.

4. **What is a digital clinical thermometer? How does it measure temperature?**
   Answer:
   1. A digital clinical thermometer is a battery-operated thermometer that displays body temperature digitally.
   2. It determines temperature with the help of heat sensors.
5. **Why are digital thermometers preferred over mercury thermometers?**
   Answer:
   1. Mercury is highly toxic and is difficult to dispose of safely if a thermometer breaks.
   2. Digital thermometers avoid this risk and their displays are easier to read.
6. **Mention any two precautions to be followed while using a digital clinical thermometer.**
   Answer:
   1. The tip of the thermometer should be washed with soap and water before and after use.
   2. The digital display portion should be kept out of water while washing the thermometer.
7. **What is considered the normal human body temperature? Does every healthy person have exactly this temperature?**
   Answer:
   1. The normal temperature of a healthy human body is taken to be 37.0 °C.
   2. A healthy person's temperature may be slightly higher or lower because 37.0 °C is an average value.
8. **Mention any two factors that influence human body temperature.**
   Answer:
   1. Age can influence the body temperature of a person.
   2. Time of day and activity level can also cause variations in body temperature.
9. **What are the Celsius and Fahrenheit scales? State the normal human body temperature on both scales.**
   Answer:
   1. Celsius and Fahrenheit are two scales used for measuring temperature, with units °C and °F respectively.
   2. Normal human body temperature is taken as 37.0 °C, which is equivalent to 98.6 °F.
10. **What is the Kelvin scale? State its importance.**
    Answer:
    1. The Kelvin scale is a temperature scale whose unit is kelvin, denoted by K.
    2. Kelvin is the SI unit of temperature used in scientific work.
11. **State the relationship between the Celsius and Kelvin scales with an example.**
    Answer:
    1. Temperature in Kelvin = Temperature in Celsius + 273.15.
    2. For example, 27 °C is equal to 300.15 K.
12. **Describe the basic structure of a laboratory thermometer.**
    Answer:
    1. A laboratory thermometer consists of a long, narrow, uniform and sealed glass tube with a liquid-filled bulb at one end.

2. A narrow liquid column moves inside the tube alongside a Celsius scale to indicate temperature.

13. **Which liquids are commonly used in laboratory thermometers? Why is alcohol coloured?**
Answer:
    1. Alcohol or mercury is generally used as the liquid in laboratory thermometers.
    2. Alcohol is coloured red so that its column can be easily seen.
14. **What is the typical range of a laboratory thermometer? What does this range indicate?**
Answer:
    1. A typical laboratory thermometer has a range from –10 °C to 110 °C.
    2. This means it can measure temperatures between –10 °C and 110 °C.
15. **How can we find the smallest value that a laboratory thermometer can measure?**
Answer:
    1. Find the temperature difference between two consecutive bigger marks and count the smaller divisions between them.
    2. Divide the temperature difference by the number of divisions to obtain the smallest measurable value.
16. **Mention two precautions to be followed while using a laboratory thermometer.**
Answer:
    1. The thermometer should be handled carefully and should not be held by its bulb.
    2. Its bulb should not touch the bottom or sides of the beaker while measuring temperature.
17. **How should a laboratory thermometer be positioned and read correctly?**
Answer:
    1. The thermometer should be held vertically with its bulb properly immersed in the substance.
    2. The eye should be directly in line with the liquid level while taking the reading.
18. **Why should the reading of a laboratory thermometer be taken while it is still immersed in water?**
Answer:
    1. The liquid column begins to fall as soon as the thermometer is removed from warm water.
    2. Therefore, the temperature should be read while the thermometer remains immersed in the water.
19. **What happens to the temperature of water during boiling and ice during melting?**
Answer:
    1. The temperature of water remains constant while it is boiling.
    2. Similarly, the temperature of ice remains constant while it is melting.
20. **What are infrared thermometers? Mention one advantage of using them.**
Answer:
    1. Infrared thermometers are non-contact thermometers that measure body temperature without touching the person.
    2. They help reduce the risk of spreading disease because no physical contact is required.

21. **What information about air temperature is generally provided in weather reports?**
    Answer:
    1. Weather reports generally provide the maximum air temperature of the day.
    2. They also provide the minimum air temperature recorded during the day.
22. **Why do maximum and minimum air temperatures change from day to day?**
    Answer:
    1. Weather depends on several factors, so air temperatures usually vary every day.
    2. Temperature generally rises towards summer and falls during winter.
23. **How is air-temperature information useful in weather forecasting?**
    Answer:
    1. Air temperature is an important weather parameter monitored at weather stations worldwide.
    2. Its data, along with other weather parameters, are used to prepare weather forecasts.
24. **Who was Anna Mani? Mention one of her important contributions.**
    Answer:
    1. Anna Mani was an Indian scientist popularly known as the "Weather Woman of India."
    2. She invented and built many weather-measurement instruments and also explored wind and solar energy in India.
25. **What is absolute zero? Give its value in Celsius and Kelvin.**
    Answer:
    1. Absolute zero is the lowest temperature that can be achieved according to scientific understanding.
    2. Its value is approximately –273.15 °C, which is equal to 0 K.

7.8. Two-mark questions with Answers of HOTS Type: (26 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:

1. **Why is our sense of touch not a reliable method for comparing the temperatures of objects?**
   Answer:
   1. The same object may feel hot or cold depending on what our hand was touching earlier.
   2. Hence, a thermometer provides a more reliable measure of temperature.
2. **A person feels warm to touch but may not actually have a fever. How can you verify whether the person has a fever?**
   Answer:
   1. Measure the person's body temperature using a clinical thermometer instead of relying on touch.
   2. Compare the measured value with the normal body temperature, which is taken as about 37.0 °C.
3. **Two healthy students have temperatures of 36.7 °C and 37.2 °C respectively; does this necessarily mean that one of them is ill? Give reasons.**
   Answer:
   1. No, 37.0 °C is an average normal body temperature and individual temperatures can vary slightly.
   2. Body temperature may also vary with age, time of day and activity level.

4. **Why should an armpit temperature reading be interpreted carefully?**
   Answer:
    1. The temperature measured in the armpit can be about 0.5 °C to 1 °C lower than the actual body temperature.
    2. Therefore, the place where body temperature is measured can affect the observed value.
5. **Why are digital thermometers safer than mercury thermometers?**
   Answer:
    1. Mercury is highly toxic and can create a safety problem if a mercury thermometer breaks.
    2. Digital thermometers do not contain mercury and use heat sensors to measure temperature.
6. **Why would an infrared thermometer be more suitable for checking the temperatures of many people quickly?**
   Answer:
    1. An infrared thermometer measures temperature without touching the person's body.
    2. This non-contact method helps reduce the risk of spreading disease from one person to another.
7. **A student wants to measure the temperature of boiling water using a clinical thermometer. Why is this incorrect?**
   Answer:
    1. A clinical thermometer is designed for the limited range of human body temperatures.
    2. The temperature of boiling water lies outside this range, so a laboratory thermometer should be used instead.
8. **A laboratory thermometer has 10 equal divisions between 20 °C and 30 °C; calculate its smallest measurable value.**
   Answer:
    1. The temperature interval is 30 − 20 = 10 °C.
    2. Therefore, the smallest measurable value is 10 ÷ 10 = **1 °C**.
9. **A thermometer has 20 equal divisions between 30 °C and 40 °C; what is its smallest measurable value?**
   Answer:
    1. The temperature difference between the two marked values is 40 − 30 = 10 °C.
    2. Hence, each division represents 10 ÷ 20 = **0.5 °C**.
10. **Which is more suitable for measuring 22.5 °C: a thermometer with a smallest division of 1 °C or 0.5 °C? Why?**
    Answer:
    1. The thermometer with a smallest division of 0.5 °C is more suitable.
    2. It can directly show 22.5 °C, whereas a thermometer with 1 °C divisions cannot show this value precisely.
11. **What error may occur if the bulb of a laboratory thermometer touches the bottom of the beaker?**
    Answer:
    1. The thermometer may be influenced by the temperature of the beaker instead of measuring only the water temperature.
    2. Therefore, the bulb should remain immersed in the water without touching the bottom or sides.

12. **Why should a laboratory thermometer be read while it is still immersed in the substance?**
    Answer:
    1. The liquid column may begin to fall when the thermometer is removed from a warm substance.
    2. Reading it while immersed helps obtain the temperature of the substance at that moment.
13. **Why should your eye be at the same level as the liquid column while reading a laboratory thermometer?**
    Answer:
    1. The eye should be directly in line with the liquid level to observe the scale correctly.
    2. Looking from above or below may lead to an incorrect reading.
14. **Five students measure the temperature of the same boiling water but obtain slightly different readings; what could be the reason?**
    Answer:
    1. Some students may not have followed the correct method of positioning or reading the thermometer.
    2. Such procedural differences can result in slightly different temperature readings.
15. **What can you conclude if the thermometer reading does not increase even though water continues to boil?**
    Answer:
    1. The observation shows that the temperature remains constant while water is boiling.
    2. Continued boiling therefore does not necessarily mean a continued rise in the measured temperature.
16. **Ice is melting, but its temperature does not rise during the observation; what does this indicate?**
    Answer:
    1. It indicates that the temperature of ice remains constant while it is melting.
    2. Thus, melting can continue even when the thermometer does not show an increase in temperature.
17. **Convert a temperature of 25 °C into kelvin and state the relationship used.**
    Answer:
    1. Temperature in Kelvin = Temperature in Celsius + 273.15.
    2. Therefore, 25 °C = 25 + 273.15 = **298.15 K**.
18. **A substance is at 310.15 K; find its temperature in degree Celsius.**
    Answer:
    1. Celsius temperature can be obtained by subtracting 273.15 from the Kelvin value.
    2. Therefore, 310.15 − 273.15 = **37 °C**.
19. **A patient's temperature decreases from 40 °C to 37 °C; what can you infer from these readings?**
    Answer:
    1. The patient's temperature has decreased by **3 °C**.
    2. The final reading of 37 °C is equal to the average normal human body temperature stated in the chapter.

20. **A person says, "My temperature is 101 degrees." Why is it important to know the temperature scale?**
    Answer:
    1. The numerical value of a temperature has meaning only when the temperature scale is known.
    2. In this context, 101 degrees would most reasonably refer to Fahrenheit rather than Celsius.
21. **The maximum temperature of a city is 34 °C on Monday and 38 °C on Tuesday; what does this tell you?**
    Answer:
    1. The maximum temperature increased by **4 °C** from Monday to Tuesday.
    2. This shows that air temperature can vary from one day to another.
22. **Why is recording only one day's temperature insufficient for understanding the temperature pattern of a place?**
    Answer:
    1. Maximum and minimum air temperatures can vary from day to day and across seasons.
    2. Temperature records over several days are therefore more useful for identifying changes and trends.
23. **How can temperature measurements help in predicting weather?**
    Answer:
    1. Air temperature is one of the important weather parameters continuously monitored at weather stations.
    2. Temperature data combined with other weather parameters are used for preparing weather forecasts.
24. **Why can a laboratory thermometer with a range of –10 °C to 110 °C not be used to measure 120 °C?**
    Answer:
    1. The highest temperature that the thermometer can measure is 110 °C.
    2. Since 120 °C is outside its range, the thermometer is unsuitable for that measurement.
25. **A thermometer has a smaller division of 0.5 °C while another has a smaller division of 1 °C; which can give a more precise reading? Why?**
    Answer:
    1. The thermometer with 0.5 °C divisions can give a more precise reading.
    2. Its smaller scale divisions allow finer temperature values to be measured.
26. **Why is 0 K a scientifically important temperature?**
    Answer:
    1. A temperature of 0 K corresponds to approximately –273.15 °C.
    2. It represents absolute zero, the lowest possible temperature according to scientific understanding.

7.9. Three-mark questions with Answers of LOTS Type: (18 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is temperature? Why is it necessary to use a thermometer to measure it?**
    Answer:
    1. Temperature is a reliable measure of the hotness or coldness of a body.
    2. Our sense of touch cannot always correctly determine how hot or cold an object is.

   3. Therefore, an instrument called a thermometer is used to measure temperature reliably.
2. **What are clinical and laboratory thermometers? State their uses.**
   Answer:
   1. A clinical thermometer is used to measure the temperature of the human body.
   2. A laboratory thermometer is used to measure temperatures for various purposes in laboratories.
   3. The thermometer selected for measurement depends on the purpose and the temperature range involved.
3. **Explain how a digital clinical thermometer is used to measure body temperature.**
   Answer:
   1. The tip of the digital thermometer is cleaned and placed under the tongue.
   2. The thermometer is kept in position until it gives a beep indicating that the reading is ready.
   3. It is then removed and the temperature shown on its digital display is noted.
4. **Mention three precautions to be followed while using a digital clinical thermometer.**
   Answer:
   1. The thermometer tip should be washed with soap and water before and after use.
   2. The digital display portion should not be immersed in water while cleaning the thermometer.
   3. The manufacturer's instructions should be followed carefully while using the thermometer.
5. **Why are digital clinical thermometers preferred to mercury thermometers?**
   Answer:
   1. Mercury is a highly toxic substance and can be dangerous if a thermometer breaks.
   2. Digital thermometers do not contain mercury and therefore avoid this hazard.
   3. They use heat sensors and have displays that are easier to read.
6. **Explain the normal temperature of the human body and its possible variations.**
   Answer:
   1. The normal temperature of a healthy human body is taken to be 37.0 °C or 98.6 °F.
   2. This value is an average, so the temperature of a healthy person may be slightly higher or lower.
   3. Body temperature may vary with factors such as age, time of the day and activity level.
7. **Name and explain the three temperature scales discussed in the chapter.**
   Answer:
   1. The Celsius scale measures temperature in degree Celsius, represented by °C.
   2. The Fahrenheit scale measures temperature in degree Fahrenheit, represented by °F.
   3. The Kelvin scale measures temperature in kelvin (K), which is the SI unit of temperature.
8. **Explain the relationship between the Celsius and Kelvin temperature scales.**
   Answer:
   1. Celsius and Kelvin are two scales used for expressing temperature.
   2. Temperature in kelvin is obtained by adding 273.15 to the temperature in degree Celsius.

3. Thus, the relationship is **Temperature in K = Temperature in °C + 273.15**.

9. **Describe the construction of a laboratory thermometer.**
Answer:
    1. A laboratory thermometer consists of a long, narrow, uniform and sealed glass tube.
    2. It has a bulb at one end containing a liquid such as alcohol or mercury.
    3. The liquid rises or falls in a narrow column alongside a Celsius scale according to the temperature.
10. **What is the range of a laboratory thermometer? How can its range be identified?**
Answer:
    1. The range of a thermometer extends from the lowest temperature to the highest temperature that it can measure.
    2. A typical laboratory thermometer has a range from –10 °C to 110 °C.
    3. The range can be identified by observing the lowest and highest marked temperature values on its scale.
11. **Explain how to determine the smallest value that a laboratory thermometer can measure.**
Answer:
    1. First, note the temperature difference between two consecutive bigger marks on the thermometer.
    2. Next, count the number of equal smaller divisions between those two marks.
    3. Divide the temperature difference by the number of divisions to obtain the smallest measurable value.
12. **State three precautions to be followed while measuring temperature using a laboratory thermometer.**
Answer:
    1. The thermometer should be held vertically while taking the temperature reading.
    2. Its bulb should be completely immersed in the substance without touching the bottom or sides of the container.
    3. The reading should be taken while the thermometer is still immersed, with the eye in line with the liquid level.
13. **Describe what happens to the temperature of water during boiling.**
Answer:
    1. The temperature of water increases as it is heated before boiling begins.
    2. Once the water starts boiling, its temperature remains approximately constant while boiling continues.
    3. Therefore, continued boiling does not produce a continuous rise in the thermometer reading.
14. **Describe what happens to the temperature of ice while it is melting.**
Answer:
    1. Ice begins to change from the solid state to liquid water when it melts.
    2. During the melting process, its temperature remains constant.
    3. Thus, melting can continue even though the thermometer does not show an increase in temperature.
15. **What are infrared thermometers? State their usefulness.**
Answer:
    1. Infrared thermometers are thermometers that can measure body temperature without touching the person's body.
    2. They are therefore also called non-contact thermometers.

3. Their non-contact operation helps reduce the risk of spreading disease.

16. **Explain the importance of maximum and minimum air temperatures in weather reports.**
Answer:
    1. Weather reports commonly provide the maximum and minimum air temperatures recorded during a day.
    2. These temperatures vary from day to day and also change with the seasons.
    3. Temperature data are important weather parameters used along with other observations for weather forecasting.
17. **Write three points about Anna Mani and her contribution to science.**
Answer:
    1. Anna Mani was an Indian scientist popularly known as the "Weather Woman of India."
    2. She invented and built several instruments used for weather measurement.
    3. She also carried out important work related to wind and solar energy in India.
18. **What is absolute zero? Explain its value on the Celsius and Kelvin scales.**
Answer:
    1. Absolute zero is the lowest possible temperature according to scientific understanding.
    2. Its value on the Celsius scale is approximately –273.15 °C.
    3. On the Kelvin scale, –273.15 °C corresponds to **0 K**.

7.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:

1. **A student touches two objects and feels that one is colder than the other. Can this observation alone prove that their temperatures are different? Explain.**
Answer:
    1. No, the sense of touch is not always a reliable method of judging temperature.
    2. Our sensation of hotness or coldness can depend on what our hand was exposed to earlier.
    3. The temperatures should therefore be measured with a thermometer for a reliable comparison.
2. **A person's forehead feels warm, but the clinical thermometer shows 37.0 °C. What can you conclude?**
Answer:
    1. The thermometer reading should be considered more reliable than the sensation of touch.
    2. A temperature of 37.0 °C is taken as the average normal temperature of a healthy human body.
    3. Therefore, feeling warm to touch alone is not sufficient to conclude that the person has a fever.
3. **Two healthy children record body temperatures of 36.7 °C and 37.2 °C. Explain why both readings may be normal.**
Answer:
    1. The value 37.0 °C represents an average normal human body temperature rather than an exact value for everyone.
    2. Body temperature may vary slightly from person to person.
    3. Factors such as age, time of day and activity level can also influence body temperature.

4. **A student's armpit temperature is 36.2 °C. Estimate the possible actual body-temperature range and explain your reasoning.**
   Answer:
    1. An armpit reading may be about 0.5 °C to 1 °C lower than the actual body temperature.
    2. Therefore, the actual temperature could be approximately 36.7 °C to 37.2 °C.
    3. Hence, the place where temperature is measured should be considered while interpreting the reading.
5. **A student wants to use a clinical thermometer to measure the temperature of boiling water. Explain why this is inappropriate.**
   Answer:
    1. A clinical thermometer is designed to measure temperatures within the human body-temperature range.
    2. The temperature of boiling water lies outside the range of a clinical thermometer.
    3. Therefore, a suitable laboratory thermometer should be used for this experiment.
6. **A thermometer has 20 equal divisions between 20 °C and 30 °C. Calculate its smallest measurable temperature and explain its significance.**
   Answer:
    1. The temperature difference is 30 − 20 = 10 °C.
    2. The smallest measurable value is 10 ÷ 20 = **0.5 °C**.
    3. Therefore, the thermometer can show temperature changes in steps of 0.5 °C.
7. **Two thermometers have smallest divisions of 1 °C and 0.5 °C respectively. Which would you choose to measure 22.5 °C and why?**
   Answer:
    1. The thermometer having a smallest division of 0.5 °C should be selected.
    2. It can directly indicate a temperature such as 22.5 °C on its scale.
    3. The thermometer with 1 °C divisions cannot show 22.5 °C as precisely.
8. **A student places the bulb of a laboratory thermometer against the bottom of a beaker while measuring water temperature. Why can this give an incorrect result?**
   Answer:
    1. The thermometer bulb may be influenced by the temperature of the beaker itself.
    2. As a result, the reading may not correctly represent only the temperature of the water.
    3. The bulb should therefore remain immersed in the water without touching the bottom or sides of the beaker.
9. **A student removes a laboratory thermometer from warm water and then notes its reading. Explain why this method may give an inaccurate result.**
   Answer:
    1. The liquid column begins to fall after the thermometer is removed from warm water.
    2. The later reading may therefore be lower than the actual temperature of the water.
    3. Hence, a laboratory thermometer should be read while its bulb is still immersed in the substance.
10. **Three students measure the temperature of the same water but obtain slightly different readings. Suggest three possible procedural reasons.**
   Answer:

1. One student may have allowed the bulb to touch the container instead of keeping it properly immersed.
2. Another may not have viewed the liquid column with the eye directly in line with its level.
3. A student may also have removed the thermometer before taking the reading.

11. **Water continues to receive heat after it starts boiling, but its thermometer reading remains nearly constant. What can you infer?**
Answer:
    1. The observation shows that the temperature of water remains approximately constant while boiling.
    2. Continued boiling does not result in a continuous increase in the measured temperature.
    3. Thus, a substance can continue undergoing a change even though its temperature remains constant.
12. **Ice is melting, but the thermometer reading remains constant. What does this observation tell you?**
Answer:
    1. The ice is undergoing a change from solid ice to liquid water.
    2. Its temperature remains constant during the melting process.
    3. Therefore, melting can continue without a simultaneous increase in temperature.
13. **A temperature is recorded as 30 °C. Convert it into kelvin and explain the calculation.**
Answer:
    1. The relationship is: Temperature in K = Temperature in °C + 273.15.
    2. Therefore, 30 + 273.15 = **303.15 K**.
    3. Hence, 30 °C is equivalent to 303.15 K.
14. **A temperature is given as 310.15 K. Find its Celsius value using the relationship given in the chapter.**
Answer:
    1. From the Celsius–Kelvin relationship, the Celsius value can be obtained by subtracting 273.15.
    2. Thus, 310.15 − 273.15 = **37 °C**.
    3. Therefore, 310.15 K corresponds to 37 °C.
15. **Why would a non-contact thermometer be a suitable choice for checking the temperatures of many people at a public place?**
Answer:
    1. A non-contact or infrared thermometer can measure body temperature without touching the person.
    2. This makes repeated temperature measurements convenient when many people have to be checked.
    3. Avoiding physical contact also helps reduce the risk of spreading disease.
16. **The maximum temperature of a place is 32 °C on Monday, 34 °C on Tuesday and 36 °C on Wednesday. What can you infer from these data?**
Answer:
    1. The maximum temperature has increased by 2 °C each day.
    2. The total increase from Monday to Wednesday is 4 °C.
    3. The data therefore show a rising temperature trend over the three days.

17. **Why are both maximum and minimum temperatures useful for understanding the weather of a place?**
    Answer:
    1. The maximum temperature indicates the highest air temperature recorded during the day.
    2. The minimum temperature indicates the lowest air temperature recorded during the day.
    3. Together, these values provide more useful information about daily temperature variation than a single reading.
18. **A person says, "I have a fever of 101 degrees." Explain why the scale must be identified before interpreting this statement.**
    Answer:
    1. A numerical temperature value is meaningful only when its temperature scale is known.
    2. A reading of 101 °F can represent a raised human body temperature, whereas 101 °C is far outside the normal body-temperature range.
    3. Therefore, in this context, "101 degrees" most reasonably refers to the Fahrenheit scale.
19. **A laboratory thermometer has a range of –10 °C to 110 °C. Can it be used to measure temperatures of –15 °C and 105 °C? Explain.**
    Answer:
    1. It cannot measure –15 °C because that value is below its minimum range of –10 °C.
    2. It can measure 105 °C because that value lies within the range of –10 °C to 110 °C.
    3. Therefore, the range of a thermometer must be checked before selecting it for a measurement.
20. **Why is 0 K different from 0 °C? Explain using the information in the chapter.**
    Answer:
    1. Zero on the Kelvin scale corresponds to approximately –273.15 °C.
    2. This temperature is called absolute zero and represents the lowest possible temperature according to scientific understanding.
    3. Therefore, 0 K and 0 °C represent entirely different temperatures.

7.11 Five-mark questions with Answers of LOTS Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:

1. What is temperature? Explain the importance of measuring temperature using a thermometer.

Answer:
1. Temperature is a reliable measure of the hotness or coldness of a body.
2. Our sense of touch alone cannot always tell us correctly how hot or cold an object is.
3. A thermometer is an instrument used to measure temperature.
4. Different thermometers are used for different purposes, such as clinical thermometers for measuring body temperature and laboratory thermometers for experiments.
5. Thus, thermometers provide a reliable way of determining temperature instead of depending only on our sense of touch.

2. Explain how body temperature is measured using a digital clinical thermometer.

Answer:
1. The tip of the digital clinical thermometer should first be cleaned before use.

2. The thermometer is switched on and its tip is placed under the tongue.
3. It is kept in position until a beep indicates that the measurement has been completed.
4. The thermometer is then removed and the temperature shown on its digital display is noted.
5. After use, its tip should be cleaned again while taking care not to immerse the digital display portion in water.

3. Write five points about normal human body temperature and its variations.

Answer:

1. The normal temperature of a healthy human body is taken to be 37.0 °C.
2. On the Fahrenheit scale, 37.0 °C is equal to 98.6 °F.
3. The value of 37.0 °C is an average normal body temperature and is not necessarily the exact temperature of every healthy person.
4. Body temperature may vary with factors such as age, time of the day and activity level.
5. The temperature measured in the armpit may be about 0.5 °C to 1 °C lower than the actual body temperature.

4. Describe a laboratory thermometer and its important features.

Answer:

1. A laboratory thermometer consists of a long, narrow, uniform and sealed glass tube.
2. It has a bulb at one end containing a liquid such as alcohol or mercury.
3. A narrow column of the liquid rises or falls inside the tube according to changes in temperature.
4. The thermometer has a Celsius scale marked along the glass tube for reading the temperature.
5. A typical laboratory thermometer has a measuring range from about –10 °C to 110 °C.

5. Explain the correct method of measuring the temperature of water using a laboratory thermometer.

Answer:

1. The laboratory thermometer should be held vertically with its bulb properly immersed in the water.
2. The bulb should not touch the bottom or sides of the container.
3. The thermometer should be allowed to remain in the water until the liquid column becomes steady.
4. The eye should be directly in line with the level of the liquid column while taking the reading.
5. The reading should be noted while the thermometer is still immersed in the water.

6. Explain how the smallest temperature value measurable by a laboratory thermometer is determined.

Answer:

1. First, observe two consecutive bigger temperature marks on the thermometer scale.
2. Find the difference in temperature between these two marked values.
3. Count the number of equal smaller divisions present between the two marks.
4. Divide the temperature difference by the number of smaller divisions to find the value of one division.
5. For example, if there are 10 divisions between 0 °C and 10 °C, the smallest measurable value is 10 ÷ 10 = **1 °C**.

7. Write five precautions to be followed while using a laboratory thermometer.

Answer:

1. A laboratory thermometer should be handled carefully and should not be held by its bulb.
2. It should be kept vertically while measuring the temperature of a substance.

3. The bulb should be properly immersed in the substance whose temperature is being measured.
4. The bulb should not touch the bottom or sides of the container.
5. The reading should be taken with the eye in line with the liquid level while the thermometer is still immersed.

8. Explain what happens to temperature when water boils and ice melts.
Answer:
1. When water is heated, its temperature rises until it begins to boil.
2. Once boiling begins, the temperature of the water remains approximately constant while boiling continues.
3. Similarly, ice changes from the solid state to liquid water during melting.
4. The temperature of ice remains constant while the melting process continues.
5. Thus, both boiling water and melting ice can undergo a change while their temperatures remain constant.

9. Explain the Celsius, Fahrenheit and Kelvin temperature scales.
Answer:
1. Celsius, Fahrenheit and Kelvin are temperature scales discussed in the chapter.
2. Temperature on the Celsius scale is expressed in degree Celsius and written as °C.
3. Temperature on the Fahrenheit scale is expressed in degree Fahrenheit and written as °F.
4. Temperature on the Kelvin scale is expressed in kelvin, represented by K, and kelvin is the SI unit of temperature.
5. Celsius temperature can be converted to kelvin using the relation **Temperature in K = Temperature in °C + 273.15**.

10. Explain how air temperature is useful in studying weather.
Answer:
1. Air temperature is an important parameter used to describe weather conditions.
2. Weather reports commonly provide the maximum and minimum air temperatures recorded during a day.
3. Air temperature may vary from one day to another and also changes with the seasons.
4. Weather stations regularly record air temperature along with other weather parameters.
5. These observations are used together to prepare weather forecasts.

7.12 Five-mark questions with Answers of HOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:
1. Meera touches a metal spoon and a wooden spoon kept in the same room and feels that the metal spoon is colder. Can she conclude that the metal spoon has a lower temperature? Explain how she should verify it.
Answer:
1. Meera should not conclude the temperatures merely from her sense of touch because touch is not always a reliable measure of hotness or coldness.
2. The sensation produced by touching an object may not accurately represent its temperature.
3. She should use a suitable thermometer to measure the temperature of each object.
4. The thermometer readings will provide a reliable basis for comparing their temperatures.
5. Therefore, temperature should be determined by measurement rather than by touch alone.

2. Two healthy students record body temperatures of 36.6 °C and 37.2 °C. One student claims that only the student with 36.6 °C is healthy because normal body temperature is exactly 37 °C. Evaluate this claim.

Answer:

1. The claim is incorrect because 37.0 °C represents the average normal temperature of a healthy human body.
2. Every healthy person need not have exactly the same body temperature.
3. Body temperature may vary slightly with age, time of the day and activity level.
4. Therefore, small differences such as 36.6 °C and 37.2 °C do not by themselves prove that a person is unhealthy.
5. Body-temperature readings should therefore be interpreted considering normal variations rather than treating 37.0 °C as an unchanging value.

3. A student's armpit temperature is 36.0 °C, and the student concludes that the body temperature is below normal. Analyse the conclusion.

Answer:

1. An armpit temperature reading can be about 0.5 °C to 1 °C lower than the actual body temperature.
2. Therefore, an armpit reading of 36.0 °C may correspond to an actual temperature of approximately 36.5 °C to 37.0 °C.
3. The normal body temperature of 37.0 °C stated in the chapter is itself an average value.
4. Hence, the measured value should be interpreted by considering both the site of measurement and normal body-temperature variation.
5. The student should therefore not conclude from the armpit reading alone that the body temperature is abnormally low.

4. A laboratory thermometer has 20 equal divisions between 20 °C and 30 °C. Find its smallest measurable temperature and decide whether it can directly measure 24.5 °C.

Answer:

1. The temperature difference between the two marked values is 30 − 20 = 10 °C.
2. There are 20 equal divisions within this interval.
3. Therefore, the value of one division is 10 ÷ 20 = **0.5 °C**.
4. Since 24.5 °C is an exact multiple of the 0.5 °C divisions, it can be directly indicated on the scale.
5. Hence, the thermometer is suitable for measuring 24.5 °C.

5. A student measures the temperature of warm water by allowing the thermometer bulb to touch the bottom of the beaker and then removes the thermometer before noting the reading. Identify the errors and explain the correct method.

Answer:

1. The first error is allowing the thermometer bulb to touch the bottom of the beaker.
2. The bulb should remain immersed in the water without touching the bottom or sides of the container.
3. The second error is removing the laboratory thermometer before taking the reading.
4. The liquid column may begin to fall after the thermometer is removed from warm water.
5. Therefore, the thermometer should be held vertically and read at eye level while it is still immersed in the water.

6. Five students obtain slightly different temperature readings for the same boiling water. Analyse why their readings might differ and suggest how they can improve the experiment.

Answer:

1. Different readings may occur if the students do not follow the correct method of using the laboratory thermometer.

2. The thermometer bulb may touch the bottom or sides of the container in some observations.
3. Some students may not keep their eyes directly in line with the liquid level while taking the reading.
4. Others may remove the thermometer from the water before noting the temperature.
5. The students can improve reliability by following the same correct procedure for positioning, observing and reading the thermometer.

7. Water continues to receive heat after it begins boiling, but its thermometer reading remains almost unchanged. What conclusions can you draw from this observation?

Answer:

1. Before boiling begins, heating causes the temperature of the water to increase.
2. Once the water starts boiling, its temperature remains approximately constant while boiling continues.
3. Therefore, continuous heating during boiling does not necessarily produce a continuous increase in the thermometer reading.
4. The observation shows that water can continue undergoing the process of boiling while its temperature remains constant.
5. A similar observation is made for ice, whose temperature remains constant while it is melting.

8. A student has two thermometers: Thermometer A has a range of –10 °C to 110 °C with divisions of 1 °C, while Thermometer B has divisions of 0.5 °C. Which would be more suitable for measuring 22.5 °C? Justify your answer.

Answer:

1. A thermometer must have a suitable range and sufficiently small divisions for the required measurement.
2. Thermometer A has 1 °C divisions and therefore cannot directly indicate 22.5 °C precisely.
3. Thermometer B has smaller divisions of 0.5 °C.
4. Hence, 22.5 °C can be directly represented on the scale of Thermometer B.
5. Therefore, Thermometer B would be the more suitable choice for this measurement.

9. A student records temperatures of 25 °C, 30 °C and 37 °C and wants to express them in kelvin. Calculate the values and explain the method.

Answer:

1. The chapter gives the relation: **Temperature in K = Temperature in °C + 273.15**.
2. Therefore, 25 °C = 25 + 273.15 = **298.15 K**.
3. Similarly, 30 °C = 30 + 273.15 = **303.15 K**.
4. Also, 37 °C = 37 + 273.15 = **310.15 K**.
5. Thus, a Celsius temperature can be converted to kelvin by adding 273.15 to its numerical value.

10. A city records maximum temperatures of 30 °C, 32 °C, 35 °C and 37 °C on four consecutive days. Analyse the data and explain why such temperature records are useful.

Answer:

1. The maximum temperature rises from 30 °C on the first day to 37 °C on the fourth day.
2. This represents an overall increase of **7 °C** during the four-day period.
3. The readings therefore indicate a rising trend in the maximum air temperature.
4. Recording temperatures over several days helps us understand how air temperature changes with time.
5. Such temperature data, together with other weather parameters, are useful for preparing weather forecasts.

11. A person says, “My body temperature is 101 degrees.” Explain why this statement is incomplete and how you would interpret it.
Answer:
1. The statement is incomplete because the temperature scale has not been specified.
2. Temperature values may be expressed using Celsius, Fahrenheit or Kelvin scales.
3. The chapter states that normal body temperature is about 37.0 °C or 98.6 °F.
4. Therefore, a body temperature of 101 degrees would reasonably refer to **101 °F**, not 101 °C.
5. Hence, the unit or scale must always accompany a temperature value to avoid misunderstanding.

12. During a disease outbreak, a school needs to check the temperatures of many students. Which type of thermometer would be suitable, and why?
Answer:
1. A non-contact or infrared thermometer would be suitable for checking the students' temperatures.
2. It can measure body temperature without touching the person's body.
3. This makes it convenient when many people need to be checked.
4. Since there is no direct physical contact, the risk of spreading disease through repeated contact is reduced.
5. Therefore, an infrared thermometer is useful when body temperatures of many individuals need to be measured without contact.

7.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:
1. Rohan wants to find out whether his younger brother has a fever. He first touches his forehead and then uses a digital clinical thermometer. Explain the correct and reliable method he should follow.
Answer:
1. Rohan should not depend only on touching his brother's forehead because the sense of touch is not always reliable for judging temperature.
2. He should use a digital clinical thermometer to obtain a reliable measurement of body temperature.
3. The tip of the thermometer should be cleaned and placed correctly as instructed before taking the reading.
4. He should wait until the thermometer indicates that the measurement is complete and then note the displayed temperature.
5. The reading can be interpreted considering that the average normal human body temperature is about 37.0 °C.

2. During a science experiment, Ananya has to measure the temperature of hot water in a beaker. Describe how she should use a laboratory thermometer to obtain a correct reading.
Answer:
1. Ananya should select a laboratory thermometer whose range includes the expected temperature of the water.
2. She should hold the thermometer vertically and immerse its bulb properly in the water.
3. The bulb should not touch the bottom or sides of the beaker.
4. She should keep her eye directly in line with the level of the liquid column while noting the temperature.

5. She should take the reading while the thermometer is still immersed in the water because the liquid column may fall after it is removed.

3. A student has two thermometers: one has 10 equal divisions between 20 °C and 30 °C, while the other has 20 equal divisions over the same interval. Which thermometer should be chosen to measure 24.5 °C? Explain with calculations.

Answer:

1. For the first thermometer, the smallest division is (30 − 20) ÷ 10 = **1 °C**.
2. For the second thermometer, the smallest division is (30 − 20) ÷ 20 = **0.5 °C**.
3. A temperature of 24.5 °C cannot be directly indicated by a scale having only 1 °C divisions.
4. The thermometer with 0.5 °C divisions can directly indicate 24.5 °C.
5. Therefore, the second thermometer should be selected because its smaller divisions are suitable for the required measurement.

4. During an experiment, Ravi removes a laboratory thermometer from warm water before noting the reading, while Meena reads it with the bulb still immersed. Whose method is correct? Explain.

Answer:

1. Meena's method is correct because a laboratory thermometer should be read while it is still immersed in the substance.
2. When Ravi removes the thermometer from warm water, the liquid column may begin to fall.
3. His reading may therefore not represent the actual temperature of the water at the time of measurement.
4. The bulb should remain properly immersed without touching the bottom or sides of the container.
5. Hence, the reading should be noted at eye level while the thermometer remains immersed in the water.

5. A school wants to check the body temperatures of a large number of students without making the thermometer touch each student. Which thermometer would you recommend? Justify your choice.

Answer:

1. A non-contact or infrared thermometer would be suitable for this purpose.
2. It can measure body temperature without physically touching the person's body.
3. This makes it convenient when the temperatures of many students have to be checked.
4. Avoiding physical contact also helps reduce the risk of spreading disease through repeated contact.
5. Therefore, an infrared thermometer is an appropriate choice for such large-scale temperature checking.

6. A patient records body temperatures of 40.0 °C, 39.0 °C, 38.0 °C and 37.0 °C at regular intervals. Analyse the readings and state what they indicate.

Answer:

1. The readings show a steady decrease in body temperature from 40.0 °C to 37.0 °C.
2. The total decrease is 40.0 − 37.0 = **3.0 °C**.
3. Each successive reading is 1.0 °C lower than the previous reading.
4. The final temperature of 37.0 °C corresponds to the average normal body temperature stated in the chapter.
5. Thus, the sequence indicates that the patient's raised temperature has gradually returned to the average normal value.

7. A student heats water and records its temperature every minute; after boiling starts, the temperature remains nearly unchanged. Explain the observation using what you learned in the chapter.

Answer:

1. Before boiling begins, the temperature of the water increases as it is heated.
2. When the water begins to boil, the thermometer reading becomes approximately constant.
3. The water continues boiling even though the measured temperature does not continue to rise.
4. Therefore, continued heating during boiling does not necessarily produce a further rise in temperature.
5. This experiment demonstrates the chapter's observation that the temperature of water remains constant while it is boiling.

8. Your class records the maximum temperatures of your town as 31 °C, 33 °C, 35 °C, 36 °C and 38 °C over five consecutive days. Analyse the data and explain how such records are useful.

Answer:

1. The maximum temperature increases from 31 °C on the first day to 38 °C on the fifth day.
2. The overall increase during the five days is **7 °C**.
3. The data therefore show a rising trend in maximum air temperature.
4. Recording temperatures regularly helps us observe how air temperature changes from day to day.
5. Such temperature observations, together with other weather parameters, are useful for preparing weather forecasts.

9. A laboratory thermometer has a range of –10 °C to 110 °C. A student wants to use it to measure –15 °C, 25 °C and 105 °C. Decide which temperatures can be measured and justify your answer.

Answer:

1. The thermometer can measure only temperatures that lie between –10 °C and 110 °C.
2. It cannot measure –15 °C because this value is below its minimum limit of –10 °C.
3. It can measure 25 °C because this value lies within its range.
4. It can also measure 105 °C because this value is below its maximum limit of 110 °C.
5. Therefore, 25 °C and 105 °C can be measured, whereas –15 °C cannot be measured with this thermometer.

10. A science teacher records the room temperature as 27 °C and asks students to express it on the Kelvin scale. Show how they should solve the problem and explain the relationship used.

Answer:

1. The relationship given in the chapter is **Temperature in K = Temperature in °C + 273.15**.
2. The measured room temperature is 27 °C.
3. Therefore, the Kelvin temperature is 27 + 273.15 = **300.15 K**.
4. The symbol K is written without the degree sign because the unit is called kelvin.
5. Hence, the room temperature of 27 °C is equivalent to **300.15 K**.

7.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

1. Three bowls P, Q and R contain cold, lukewarm and hot water respectively. A student first keeps one hand in P and the other in R, and then places both hands in Q. What is most likely to happen?
A. Both hands will feel Q at exactly the same temperature
B. The hand from P will feel Q warm, while the hand from R will feel Q cool
C. Both hands will feel Q cold
D. Both hands will feel Q hot
Answer: B. The experiment demonstrates that our sense of touch is not always a reliable indicator of temperature.
2. Which instrument is most suitable for measuring the temperature of hot water during a science experiment?
A. Clinical thermometer
B. Laboratory thermometer
C. Infrared body thermometer
D. Room thermometer
Answer: B. Laboratory thermometer
3. Which statement about normal human body temperature is correct?
A. Every healthy person always has exactly 37.0 °C
B. 37.0 °C is an average normal body temperature
C. A healthy person's temperature never changes during the day
D. Body temperature is independent of activity
Answer: B. The value 37.0 °C represents an average and may vary with factors such as age, time and activity.
4. A healthy person's temperature measured in the armpit is 36.2 °C. Which could reasonably be the person's actual body temperature?
A. 34.2 °C
B. 35.0 °C
C. 36.7 °C
D. 39.2 °C
Answer: C. 36.7 °C, because an armpit reading can be about 0.5 °C to 1 °C lower than the actual body temperature.
5. Which of the following correctly represents normal human body temperature on the Celsius and Fahrenheit scales?
A. 37.0 °C = 98.6 °F
B. 37.0 °C = 37.0 °F
C. 98.6 °C = 37.0 °F
D. 37.0 °C = 273.15 °F
Answer: A. 37.0 °C = 98.6 °F
6. The SI unit of temperature is:
A. degree Celsius
B. degree Fahrenheit
C. kelvin
D. degree kelvin
Answer: C. kelvin
7. Which is the correct way of writing a temperature on the Kelvin scale?
A. 300 °K
B. 300 K
C. 300 °Kelvin
D. K 300°
Answer: B. 300 K

8. A room has a temperature of 27 °C. Its temperature on the Kelvin scale is:
A. 246.15 K
B. 273.15 K
C. 300.15 K
D. 310.15 K
Answer: C. 300.15 K, since 27 + 273.15 = 300.15 K.
9. A temperature of 310.15 K corresponds to:
A. 27 °C
B. 37 °C
C. 73 °C
D. 310.15 °C
Answer: B. 37 °C, since 310.15 − 273.15 = 37 °C.
10. A thermometer has 10 equal divisions between 20 °C and 30 °C. What is the value of each division?
A. 0.1 °C
B. 0.5 °C
C. 1 °C
D. 2 °C
Answer: C. 1 °C, because (30 − 20) ÷ 10 = 1 °C.
11. There are 20 equal divisions between 10 °C and 20 °C on a thermometer. What is its smallest measurable value?
A. 0.2 °C
B. 0.5 °C
C. 1 °C
D. 2 °C
Answer: B. 0.5 °C, because (20 − 10) ÷ 20 = 0.5 °C.
12. Which thermometer is most suitable for directly measuring 22.5 °C?
A. Smallest division = 5 °C
B. Smallest division = 2 °C
C. Smallest division = 1 °C
D. Smallest division = 0.5 °C
Answer: D. Smallest division = 0.5 °C
13. A laboratory thermometer has a range of –10 °C to 110 °C. Which temperature cannot be measured using it?
A. –5 °C
B. 0 °C
C. 105 °C
D. 115 °C
Answer: D. 115 °C
14. Which arrangement is correct while measuring the temperature of water using a laboratory thermometer?
A. Bulb touching the bottom of the beaker
B. Bulb touching the side of the beaker
C. Bulb immersed in water without touching the beaker
D. Thermometer removed before taking the reading
Answer: C. The bulb should remain immersed without touching the bottom or sides of the container.
15. Why should a laboratory thermometer be read while it is still immersed in warm water?

A. Its scale disappears after removal
B. The liquid column may begin to fall after removal
C. The glass tube expands immediately
D. The bulb stops working outside water
Answer: B. The liquid column may begin to fall after the thermometer is removed from warm water.
16. While reading a laboratory thermometer, the observer's eye should be:
A. much above the liquid level
B. much below the liquid level
C. directly in line with the liquid level
D. closed to avoid reflection
Answer: C. Directly in line with the liquid level
17. Four students measure the same water sample. Who is most likely to obtain the correct reading?
A. Ravi holds the thermometer horizontally
B. Anita allows its bulb to touch the bottom
C. Sara removes it before reading
D. Kiran keeps it vertical, with the bulb immersed and reads at eye level
Answer: D. Kiran
18. What happens to the temperature of water while it continues to boil?
A. It continuously increases
B. It continuously decreases
C. It remains approximately constant
D. It immediately falls to room temperature
Answer: C. It remains approximately constant.
19. Which observation is expected while ice is melting?
A. Its temperature remains constant during melting
B. Its temperature increases continuously
C. Its temperature immediately becomes 37 °C
D. Its temperature always decreases continuously
Answer: A. Its temperature remains constant during melting.
20. Which thermometer would be most appropriate for checking the temperatures of many people without physical contact?
A. Laboratory thermometer
B. Infrared thermometer
C. Room thermometer
D. Alcohol laboratory thermometer
Answer: B. Infrared thermometer
21. Digital thermometers are considered safer than mercury thermometers mainly because:
A. digital thermometers contain more mercury
B. mercury is toxic if released from a broken thermometer
C. digital thermometers cannot measure body temperature
D. mercury does not respond to temperature
Answer: B. Mercury is toxic, whereas digital thermometers use heat sensors and avoid this hazard.
22. Consider the following statements:
I. A laboratory thermometer should be held vertically while taking a reading.
II. Its bulb should touch the bottom of the container for an accurate reading.
Which option is correct?

A. Both I and II are correct
B. Both I and II are incorrect
C. I is correct but II is incorrect
D. I is incorrect but II is correct
Answer: C. The thermometer should be vertical, but its bulb should not touch the container.
23. The maximum temperatures of a city over four days are 31 °C, 33 °C, 35 °C and 38 °C. Which conclusion is correct?
A. The temperature shows a decreasing trend
B. The temperature remains constant
C. The temperature shows an increasing trend
D. No comparison is possible
Answer: C. The temperature shows an increasing trend. Air temperatures can vary from day to day.
24. A city's maximum temperature changes from 29 °C to 36 °C. What is the increase?
A. 5 °C
B. 6 °C
C. 7 °C
D. 8 °C
Answer: C. 7 °C
25. Which combination is most useful for describing daily air-temperature variation?
A. Only maximum temperature
B. Only minimum temperature
C. Maximum and minimum temperatures
D. Human body temperature
Answer: C. Maximum and minimum temperatures
26. A student says that a pulse rate alone can always confirm whether a person has fever. Which statement is correct?
A. The student is correct in all cases
B. Pulse rate alone is not a reliable indicator of fever
C. Pulse rate and temperature are always identical
D. Fever can never affect pulse rate
Answer: B. Pulse rate alone is not a reliable indicator of fever.
27. If 0 K represents absolute zero, what is its approximate value on the Celsius scale?
A. 0 °C
B. –100 °C
C. –273.15 °C
D. 273.15 °C
Answer: C. –273.15 °C
28. Which of the following temperatures is theoretically below absolute zero and therefore not possible according to the chapter?
A. 273 K
B. 100 K
C. 1 K
D. –5 K
Answer: D. –5 K, because 0 K represents the lowest possible temperature.
29. A person says, "My fever is 101 degrees." Which interpretation is most reasonable?
A. 101 °C
B. 101 K
C. 101 °F
D. The temperature scale does not matter

Answer: C. 101 °F, because 101 °C would be far outside the normal human body-temperature range discussed in the chapter.

30. Which sequence best represents the correct scientific approach to deciding whether a person has fever?

A. Touch forehead → guess temperature → conclude

B. Check pulse only → conclude

C. Measure with a clinical thermometer → note reading → interpret the temperature

D. Ask whether the person feels hot → conclude

Answer: C. Measure with a clinical thermometer → note reading → interpret the temperature.

31. Consider the following:

P: Temperature is a reliable measure of hotness or coldness.

Q: Touch is always a reliable way of measuring temperature.

R: A thermometer is used to measure temperature.

Which combination is correct?

A. P and Q only

B. Q and R only

C. P and R only

D. P, Q and R

Answer: C. P and R only

32. A thermometer has 50 equal divisions between 0 °C and 100 °C. If its liquid column reaches the 18th division above 0 °C, what temperature does it indicate?

A. 18 °C

B. 36 °C

C. 50 °C

D. 68 °C

Answer: B. 36 °C. Each division represents $100 \div 50 = 2$ °C, so $18 \times 2 = 36$ °C.

33. Anna Mani is associated mainly with:

A. measuring human pulse rate

B. developing weather-measurement instruments

C. inventing the Celsius scale

D. discovering absolute zero

Answer: B. Developing weather-measurement instruments

34. Why are air-temperature records collected at weather stations?

A. Only to measure human body temperature

B. Only to compare laboratory thermometers

C. To provide weather data that can contribute to forecasting

D. To determine the normal temperature of humans

Answer: C. Air-temperature data, along with other weather parameters, contribute to weather forecasting.

35. Which statement best summarises the scientific idea developed throughout the chapter?

A. Temperature should always be estimated by touch

B. All thermometers can be used for every temperature

C. Reliable temperature measurement requires an appropriate thermometer and correct measurement procedure

D. Every object at the same place must feel equally hot or cold

Answer: C. Reliable measurement depends on choosing a suitable thermometer and using it correctly.

7.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

“Best Practices” Opportunities for Teaching–Learning:

(1) Learning through hands-on thermometer activities:
Allow students to observe and use laboratory, digital clinical and room thermometers wherever safely possible. Students can identify the range, scale markings and smallest measurable value and practise reading temperatures correctly. This reinforces the chapter’s emphasis on correct thermometer use.

(2) Begin with the “Touch versus Temperature” experiment:
Conduct the chapter activity using cold, warm and normal water to demonstrate why our sense of touch cannot always reliably judge temperature. Ask students to record what each hand feels and then relate their observations to the need for thermometers.

(3) Demonstrate the correct laboratory thermometer technique:
Demonstrate the proper method before allowing students to perform measurements: keep the thermometer vertical, immerse the bulb without touching the container, keep the eye in line with the liquid column and take the reading while the thermometer remains immersed. A “correct versus incorrect method” demonstration can help prevent common errors.

(4) Use observation tables and temperature records:
Ask students to record room or air temperature at selected times over several days and organise the readings in a table. They can identify maximum and minimum values and discuss day-to-day changes, connecting classroom learning with weather observations.

(5) Practise scale-reading before actual measurement:
Provide enlarged drawings of thermometer scales and ask students to determine the range, number of divisions, smallest measurable value and indicated temperature. This develops accuracy in reading instruments before students handle real thermometers.

(6) Connect temperature scales through numerical practice:
Give short problems requiring students to convert Celsius temperatures into kelvin using **Temperature in K = Temperature in °C + 273.15**. Use familiar values such as room and body temperatures so that numerical work remains connected to everyday situations.

(7) Use real-life health situations:
Present situations such as checking fever at home, choosing between clinical and laboratory thermometers, or deciding when a non-contact thermometer would be useful. Students can explain why 37.0 °C is an average normal body temperature and why body temperature may vary.

(8) Promote safety-conscious thermometer use:
Teach students to clean digital clinical thermometer tips appropriately and explain why mercury thermometers have largely been replaced by safer digital alternatives. This integrates scientific knowledge with responsible laboratory and health practices.

(9) Use prediction–observation–explanation activities:
Before demonstrating boiling water or melting ice, ask students to predict what will happen to the temperature. They should then observe the readings and explain why the temperature remains approximately constant during boiling or melting, as described in the chapter.

(10) Integrate weather and Indian scientific contributions:
Connect temperature measurement with weather forecasting and introduce Anna Mani’s contribution to weather-measurement instruments. Students can prepare a small poster or classroom presentation titled **“Anna Mani – Weather Woman of India.”**

These practices emphasise **hands-on learning, observation, measurement skills, safety, real-life application, numerical reasoning and scientific inquiry**, making the chapter more experiential for Grade 6 students.

7.16 Innovations Opportunity List from the Chapter: (12 Ideas)

"Innovations" Opportunities in Teaching–Learning for Grade 6:

(1) Digital Temperature Detective Challenge:
Create small student teams and give each team different temperature-measurement situations, such as measuring body temperature, room temperature or warm water. Students identify the appropriate thermometer, explain their choice and demonstrate the correct procedure. This converts instrument selection into a problem-solving activity.

(2) DIY Thermometer-Scale Model:
Students can create enlarged thermometer models using cardboard, paper strips and movable coloured columns. The teacher can announce temperatures and students move the column to the correct position, helping them understand scale divisions, range and thermometer readings.

(3) "Spot the Mistake" Thermometer Lab:
The teacher intentionally demonstrates incorrect practices—for example, touching the bulb to the beaker, viewing the scale from the wrong angle or removing the thermometer before reading it. Students act as "science inspectors," identify each mistake and explain the correct procedure.

(4) Classroom Temperature Data Lab:
Students record room or air temperatures at selected times and maintain a class temperature chart over several days. They can identify maximum and minimum values, compare daily changes and discuss temperature trends, connecting the chapter with real weather observations.

(5) Interactive Celsius–Kelvin Number Line:
Create a large floor or wall number line showing corresponding Celsius and Kelvin temperatures. Students physically match Celsius cards with Kelvin cards using the relationship **K = °C + 273.15**, turning temperature conversion into an interactive mathematical game.

(6) Thermometer Escape-Room Activity:
Design a classroom "escape room" with clues involving thermometer range, smallest scale division, temperature readings and suitable thermometer selection. Each correct solution reveals the clue for the next station, promoting collaborative problem-solving using chapter concepts.

(7) Predict–Measure–Explain Challenge:
Before measuring a substance, students predict whether it will have a higher or lower temperature than another sample, then use a thermometer to test their prediction. They finally explain why measured evidence is more dependable than judging temperature only through touch.

(8) Boiling and Melting Time-Lapse Investigation:
Under teacher supervision, students can observe temperature readings during heating of water or melting of ice and plot the readings against time. They then identify the stage at which temperature remains approximately constant, turning the textbook observation into a data-based investigation.

(9) "Which Thermometer Am I?" Role-Play:

Assign students roles such as clinical thermometer, laboratory thermometer and infrared thermometer. Each student gives clues about where and how they are used, while classmates identify the thermometer and justify their answers.

(10) Young Meteorologist Project:
Convert one corner of the classroom into a miniature weather station where students maintain daily maximum/minimum temperature records. Teams can present a short weekly "weather bulletin" based on their observations, linking temperature measurement with weather forecasting.

(11) Anna Mani Digital Storytelling Activity:
Students can prepare a short digital presentation, illustrated timeline or classroom story about Anna Mani, popularly known as the "Weather Woman of India," focusing on her work with weather-measurement instruments. This integrates scientific learning with awareness of Indian contributions to science.

(12) QR-Based Temperature Quiz Stations:
The teacher can place QR codes at different classroom stations containing questions on body temperature, thermometer selection, scale reading, Celsius–Kelvin conversion and measurement precautions. Students move in teams from one station to another, solve the challenges and maintain a digital or paper "Temperature Explorer Passport."

These innovations can make the chapter more **experiential, inquiry-based, collaborative, technology-enabled and application-oriented**, while remaining suitable for Grade 6 learners.

7.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. The reliable measure of the hotness or coldness of a body is called __________.
   Answer: Temperature

2. The instrument used to measure temperature is called a __________.
   Answer: Thermometer

3. The normal temperature of a healthy human body is taken as __________ **°C**.
   Answer: 37.0

4. Normal human body temperature on the Fahrenheit scale is __________ **°F**.
   Answer: 98.6

5. The SI unit of temperature is __________.
   Answer: kelvin

6. Temperature in kelvin = Temperature in degree Celsius + __________.
   Answer: 273.15

7. A typical laboratory thermometer has a range from __________ **°C to 110 °C**.
   Answer: –10

8. The bulb of a laboratory thermometer should not touch the bottom or __________ of the container.
   Answer: sides

9. The temperature of water remains __________ while it is boiling.
   Answer: constant

10. Anna Mani is popularly known as the "__________ **Woman of India**."
    Answer: Weather

B. One-Mark Descriptive Questions:

1. **What is temperature?**
   Answer: Temperature is a reliable measure of the hotness or coldness of a body.
2. **What is a thermometer?**
   Answer: A thermometer is an instrument used to measure temperature.
3. **What is a clinical thermometer used for?**
   Answer: A clinical thermometer is used to measure human body temperature.
4. **Why are digital thermometers safer than mercury thermometers?**
   Answer: Digital thermometers are safer because they do not contain toxic mercury.
5. **What is the normal temperature of a healthy human body?**
   Answer: The normal temperature of a healthy human body is taken as 37.0 °C or 98.6 °F.
6. **What is the SI unit of temperature?**
   Answer: The SI unit of temperature is kelvin (K).
7. **What is the typical range of a laboratory thermometer?**
   Answer: A typical laboratory thermometer has a range from –10 °C to 110 °C.
8. **Why should a laboratory thermometer be read while it is still immersed?**
   Answer: It should be read while immersed because the liquid column may begin to fall after removal.
9. **What happens to the temperature of water while it is boiling?**
   Answer: The temperature of water remains approximately constant while it is boiling.
10. **What are non-contact thermometers?**
    Answer: Non-contact or infrared thermometers measure body temperature without touching the person.

C. Two-Mark Descriptive Questions:

1. **Why is our sense of touch not always reliable for judging temperature?**
   Answer:
   - The same object may feel different depending on what our hand was touching earlier.
   - Therefore, a thermometer should be used for reliable temperature measurement.
2. **Differentiate between a clinical thermometer and a laboratory thermometer.**
   Answer:
   - A clinical thermometer is used to measure human body temperature.
   - A laboratory thermometer is used for measuring temperatures during laboratory activities.
3. **Mention two factors that can cause variations in normal body temperature.**
   Answer:
   - Body temperature may vary with age and time of the day.
   - It may also vary according to a person's activity level.

4. **Mention two precautions while using a laboratory thermometer.**
   Answer:
   - The bulb should remain immersed without touching the bottom or sides of the container.
   - The reading should be taken at eye level while the thermometer is still immersed.
5. **How is the smallest value measurable by a thermometer determined?**
   Answer:
   - Find the temperature difference between two consecutive bigger marks.
   - Divide this difference by the number of equal divisions between them.
6. **Why should a clinical thermometer not be used to measure boiling water?**
   Answer:
   - A clinical thermometer is designed for the human body-temperature range.
   - Boiling-water temperature lies outside its measuring range.
7. **State the relationship between Celsius and Kelvin scales with an example.**
   Answer:
   - Temperature in K = Temperature in °C + 273.15.
   - Thus, 27 °C = 300.15 K.
8. **What happens to temperature during boiling and melting?**
   Answer:
   - The temperature of water remains constant while it boils.
   - The temperature of ice also remains constant while it melts.

D. Three-Mark Descriptive Questions:

1. **Explain why temperature should be measured with a thermometer rather than judged by touch.**
   Answer:
   - Our sense of touch may not always correctly indicate hotness or coldness.
   - Temperature provides a reliable measure of how hot or cold a body is.
   - Therefore, a thermometer is used for reliable temperature measurement.
2. **Describe the main features of a laboratory thermometer.**
   Answer:
   - It consists of a long, narrow, uniform and sealed glass tube.
   - It contains a liquid such as alcohol or mercury in a bulb.
   - A typical laboratory thermometer has a range of about –10 °C to 110 °C.
3. **Explain the correct method of reading a laboratory thermometer.**
   Answer:
   - Keep the thermometer vertical with its bulb immersed in the substance.

- Ensure that the bulb does not touch the bottom or sides of the container.
- Take the reading at eye level while the thermometer remains immersed.

4. **Explain normal human body temperature and its variations.**
Answer:
    - The average normal body temperature is taken as 37.0 °C or 98.6 °F.
    - A healthy person's temperature can be slightly higher or lower than this value.
    - It may vary with age, time of the day and activity level.
5. **A thermometer has 20 divisions between 20 °C and 30 °C; find its smallest measurable value.**
Answer:
    - The temperature difference is 30 – 20 = 10 °C.
    - There are 20 equal divisions in this interval.
    - Hence, the smallest measurable value is 10 ÷ 20 = **0.5 °C**.
6. **Explain how temperature measurements are useful in studying weather.**
Answer:
    - Maximum and minimum air temperatures are commonly recorded.
    - Air temperature varies from day to day and across seasons.
    - Temperature data, along with other weather parameters, help in preparing weather forecasts.

E. Five-Mark Descriptive / Application Questions:

1. **Describe the correct procedure and precautions for measuring the temperature of water using a laboratory thermometer.**
Answer:
    - Select a laboratory thermometer with a suitable range.
    - Keep the thermometer vertical with its bulb properly immersed in the water.
    - Ensure that the bulb does not touch the bottom or sides of the container.
    - Keep the eye directly in line with the liquid level while taking the reading.
    - Note the temperature while the thermometer is still immersed in the water.
2. **Explain the three temperature scales discussed in the chapter and their relationship.**
Answer:
    - Celsius, Fahrenheit and Kelvin are three temperature scales discussed in the chapter.
    - Celsius temperature is expressed in degree Celsius (°C).
    - Fahrenheit temperature is expressed in degree Fahrenheit (°F), and normal body temperature is 98.6 °F.
    - Kelvin temperature is expressed in kelvin (K), which is the SI unit of temperature.

- Celsius can be converted to kelvin using **K = °C + 273.15**.

3. **A student measures warm water incorrectly by touching the thermometer bulb to the beaker and removing it before reading. Identify the mistakes and explain the correct method.**
   Answer:
   - The bulb should not touch the bottom of the beaker.
   - It should also not touch the sides of the beaker.
   - The thermometer should be held vertically with its bulb immersed in the water.
   - The student should observe the liquid column with the eye directly in line with it.
   - The reading should be taken while the thermometer is still immersed.

4. **Explain how you would determine whether a thermometer can accurately measure 24.5 °C if it has 20 divisions between 20 °C and 30 °C.**
   Answer:
   - The temperature interval between 20 °C and 30 °C is 10 °C.
   - There are 20 equal divisions in this interval.
   - Therefore, each division represents 10 ÷ 20 = 0.5 °C.
   - A temperature of 24.5 °C corresponds exactly to one of these 0.5 °C divisions.
   - Hence, this thermometer can directly indicate 24.5 °C.

5. **Explain the importance of temperature measurement in everyday life using suitable examples.**
   Answer:
   - Clinical thermometers help us measure body temperature and check for fever.
   - Laboratory thermometers help measure temperatures during scientific activities.
   - Infrared thermometers allow body temperature to be measured without physical contact.
   - Room and air-temperature measurements help us understand our surroundings and weather conditions.
   - Temperature data recorded at weather stations contribute to weather forecasting.

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6th Standard Science Book Chapter 8

Chapter 8: A Journey through States of Water

8.1 Summary of the Chapter:

Summary of Chapter 8 – *A Journey through States of Water:*

(1) **Water exists in three states**—solid as **ice**, liquid as **water**, and gaseous as **water vapour**. These are different forms of the same substance.

(2) **Evaporation** is the process by which liquid water changes into water vapour. It occurs continuously, even at room temperature, as seen in drying clothes, mopped floors, and sweat.

(3) **Water vapour is invisible**, although steam may appear visible because it contains tiny droplets of liquid water.

(4) **Condensation** is the conversion of water vapour into liquid water. When water vapour in the air touches a cold surface, it forms water droplets, such as those seen on the outside of a glass containing ice-cold water.

(5) The three states of water have **different properties**. Ice has a fixed shape and does not flow; liquid water flows and takes the shape of its container while maintaining its volume; water vapour spreads throughout the available space.

(6) Water can **change from one state to another by heating or cooling**. Heating ice changes it into water and further heating converts water into water vapour, while cooling can reverse these changes.

(7) The conversion of a **solid into a liquid is called melting**, while the conversion of a **liquid into a solid is called freezing**. Similar changes can also be observed in substances such as wax and coconut oil.

(8) The **rate of evaporation depends on several conditions**. Increasing the surface area exposed to air makes evaporation faster; therefore, water spread on a plate evaporates faster than the same amount kept in a bottle cap.

(9) **Higher temperature and greater movement of air increase evaporation**. Water evaporates faster in sunlight than in shade, and clothes dry faster on hot or windy days. High humidity, as on rainy days, slows evaporation.

(10) **Evaporation produces a cooling effect.** Water seeping through an earthen pot evaporates and cools the water inside; the same principle is used in a **pot-in-pot cooler** and a *surahi*.

(11) **Clouds and rain are formed through condensation.** As moist air rises, it cools, and water vapour condenses around tiny dust particles to form droplets. These droplets combine, become heavier, and fall as rain; under special conditions, precipitation may occur as hail or snow.

(12) The continuous movement of water from the Earth's surface to the atmosphere through **evaporation** and its return through **rain, hail, or snow** is called the **water cycle**. Since only a small portion of Earth's water is directly usable, the chapter emphasises using water wisely, avoiding wastage, and keeping water bodies free from pollution.

8.2 Important Formulas:

This chapter is mainly **conceptual and activity-based** and does **not prescribe many standard mathematical formulae**. Quantitative questions are most likely to arise from the activities involving **mass, time, evaporation, surface area, and comparison of observations**. For example, Activity 8.4 records mass every five minutes for 30 minutes, while Activities 8.7–8.8 compare the time taken for evaporation under different conditions.

No.	Formula / Relationship	Use
1	**Change in mass = Final mass − Initial mass**	To calculate increase/decrease in mass during condensation experiments.
2	**Mass of condensed water = Final mass − Initial mass**	To estimate the amount of water collected by condensation, when the experimental setup permits this interpretation.
3	**Change in water level = Initial water level − Final water level**	To compare water levels before and after an experiment.
4	**Time taken = Final time − Initial time**	To calculate the duration of evaporation or another observed process.
5	**Average rate of evaporation = Amount of water evaporated ÷ Time taken**	Useful for constructed numerical problems comparing evaporation rates.
6	**Amount of water evaporated = Initial amount − Final amount**	To determine how much water has evaporated.
7	**Percentage of water evaporated = (Amount evaporated ÷ Initial amount) × 100**	Useful for percentage-based quantitative questions.
8	**Percentage of water remaining = (Final amount ÷ Initial amount) × 100**	To determine the proportion of water left after evaporation.
9	**Average change per unit time = Total change ÷ Total time**	Can be used with mass or amount-of-water observations taken at regular intervals.
10	**Evaporation rate ∝ exposed surface area**	Greater exposed surface area generally leads to faster evaporation. The chapter compares water in a bottle cap with the same amount spread on a plate.
11	**Evaporation rate increases with temperature**	Water evaporates faster under warmer/sunny conditions than under cooler/shaded conditions.
12	**Evaporation rate increases with air movement**	Greater movement of air increases the rate of evaporation; hence clothes generally dry faster on a windy day.
13	**Evaporation rate decreases as humidity increases**	High humidity slows evaporation; therefore, clothes generally dry more slowly on rainy days.

Important Unit Conversions for Numerical Problems
1 L = 1000 mL
1 kg = 1000 g
1 hour = 60 minutes
1 minute = 60 seconds
For **Grade 6**, the most important quantitative relationships to practise from this chapter are **change in mass, amount of water evaporated, time taken for evaporation, average evaporation rate, and percentage evaporated**. The chapter itself emphasizes collecting and comparing experimental data rather than using advanced formulae.

8.3 Fill-Up the Blank LOTS type questions with Answers: (30 Questions)

LOTS Type – Fill in the Blanks with Answers:

1. Water exists in __________ different states in our daily life.
   Answer: three
2. The solid state of water is called __________.
   Answer: ice
3. Ice gets converted into water when it __________.
   Answer: melts
4. Water in its gaseous state is called __________.
   Answer: water vapour
5. The process of conversion of water into its vapour state is called __________.
   Answer: evaporation
6. Evaporation takes place continuously even at __________ **temperature**.
   Answer: room
7. Water vapour is actually __________ to us.
   Answer: invisible
8. The process of conversion of water vapour into its liquid state is called __________.
   Answer: condensation
9. Water vapour forms water droplets when it comes in contact with a __________ **surface**.
   Answer: cold
10. The amount of water vapour present in the air is known as __________.
    Answer: humidity
11. Ice has a __________ **shape**.
    Answer: fixed
12. Liquid water takes the shape of the __________ in which it is kept.
    Answer: container
13. The volume of liquid water remains __________ even when its shape changes.
    Answer: constant
14. Water vapour spreads out in the entire __________ **space**.
    Answer: available
15. The process of conversion of a solid into a liquid state is called __________.
    Answer: melting
16. The process of conversion of a liquid into a solid state is called __________.
    Answer: freezing
17. Water changes into ice when it is placed in a __________ **environment**.
    Answer: cold
18. Water evaporates faster when a larger area of it is exposed to __________.
    Answer: air
19. Water spread on a __________ evaporates faster than the same amount of water kept in a bottle cap.
    Answer: plate
20. Water evaporates faster from a bottle cap kept in __________ than one kept in shade.
    Answer: sunlight
21. Clothes generally dry faster on a __________ day because increased movement of air speeds up evaporation.
    Answer: windy
22. Water evaporates __________ on a rainy day because the humidity is high.
    Answer: slowly

23. Water seeping through the surface of an earthen pot evaporates and produces a __________ **effect**.
    Answer: cooling
24. A traditional clay pot called a __________ is used to keep water cold during summer.
    Answer: surahi
25. Water vapour in the atmosphere condenses around tiny __________ **particles** to form clouds.
    Answer: dust
26. Small water droplets floating in the air together form __________.
    Answer: clouds
27. When water droplets in clouds become sufficiently heavy, they fall as __________.
    Answer: rain
28. Under special conditions, water may fall from clouds as hail or __________.
    Answer: snow
29. Water from oceans and the Earth's surface enters the atmosphere through __________.
    Answer: evaporation
30. The continuous circulation of water between the Earth's surface and the atmosphere is known as the __________.
    Answer: water cycle

8.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS Type – Fill in the Blanks with Answers:

1. A puddle disappears after a few hours even though the ground is not absorbing all the water. This happens mainly because of __________.
   Answer: evaporation
2. Water sprinkled on a hot dosa pan disappears much faster than water kept on a steel plate because a higher __________ increases evaporation.
   Answer: temperature
3. A student notices water droplets outside a glass containing ice-cold water. These droplets come from the __________ **present in the surrounding air**.
   Answer: water vapour
4. If the water level inside a cold glass does not decrease but droplets appear outside it, the droplets are most likely formed by __________.
   Answer: condensation
5. Dew is commonly observed on plants in the morning because water vapour comes in contact with __________ **surfaces** and condenses.
   Answer: cold
6. If equal quantities of water are placed in a bottle cap and a plate under identical conditions, the water in the __________ will evaporate faster.
   Answer: plate
7. Water spread over a large surface evaporates faster because a __________ **area** of water is exposed to the air.
   Answer: larger
8. Two identical wet clothes are kept outside, one on a windy day and another on a still day. The cloth exposed to greater __________ will dry faster.
   Answer: movement of air
9. If two equal quantities of water are kept in sunlight and shade, the water kept in __________ will generally evaporate first.
   Answer: sunlight

10. Clothes dry more slowly on a rainy day because the __________ of the surrounding air is high.
    Answer: humidity
11. To make wet clothes dry faster on a rainy day, increasing the __________ **of air** around them would help speed up evaporation.
    Answer: movement
12. If an ice cube is transferred from a square container to a round container without melting, its shape remains unchanged because ice has a __________ **shape**.
    Answer: fixed
13. When the same amount of liquid water is transferred from a glass to a differently shaped vessel, its shape changes but its __________ **remains constant**.
    Answer: volume
14. Unlike liquid water, water vapour spreads throughout the entire __________ **space**.
    Answer: available
15. If ice is kept outside a freezer and receives heat from its surroundings, it changes into liquid water through __________.
    Answer: melting
16. If liquid water is placed in a sufficiently cold environment such as a freezer, it changes into ice through __________.
    Answer: freezing
17. Water stored in an earthen pot becomes cool because water seeps through its surface and undergoes __________.
    Answer: evaporation
18. Sprinkling water on a roof during a hot summer can make the surroundings cooler because evaporation produces a __________ **effect**.
    Answer: cooling
19. In a pot-in-pot cooler, keeping the sand between the two pots __________ helps maintain the cooling effect.
    Answer: moist
20. As moist air rises higher in the atmosphere, it becomes cooler and water vapour changes into tiny water droplets through __________.
    Answer: condensation
21. Tiny water droplets formed around dust particles remain suspended in the atmosphere and together form __________.
    Answer: clouds
22. When tiny droplets in clouds join together and become sufficiently __________, they fall towards the Earth as rain.
    Answer: heavy
23. In the bottle experiment, adding a burnt piece of newspaper helps cloud formation because it provides tiny __________ **particles** around which water vapour can condense.
    Answer: dust
24. If evaporation from oceans and other water bodies stopped completely, the amount of water vapour entering the __________ would greatly decrease.
    Answer: atmosphere
25. Water that evaporates from the Earth's surface eventually returns as rain, hail, or snow as part of the __________.
    Answer: water cycle

26. An Atmospheric Water Generator obtains water from humid air by cooling it and causing water vapour to undergo __________.
Answer: condensation
27. If the exposed surface area and temperature are the same, water is expected to evaporate faster when the surrounding air is more __________.
Answer: windy
28. If the surrounding air already contains a large amount of water vapour, evaporation becomes __________.
Answer: slower
29. A student observes an increase in the mass of a covered tumbler containing ice-cold water. The increase can be explained by water vapour from the air undergoing __________ on the cold outer surface.
Answer: condensation
30. Evaporation and condensation are important complementary processes because they help move water between the Earth's surface and the __________ during the water cycle.
Answer: atmosphere

8.5 One-mark questions with Answers of LOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What are the three states in which water exists?**
Answer: Water exists in solid, liquid and gaseous states.
2. **What is the solid state of water called?**
Answer: The solid state of water is called ice.
3. **What is the gaseous state of water called?**
Answer: The gaseous state of water is called water vapour.
4. **What happens when an ice cube is left at room temperature?**
Answer: An ice cube melts and changes into liquid water when left at room temperature.
5. **What is evaporation?**
Answer: Evaporation is the process of conversion of water into its vapour state.
6. **Does evaporation take place at room temperature?**
Answer: Yes, evaporation takes place continuously even at room temperature.
7. **Give one example of evaporation from daily life.**
Answer: Drying of wet clothes is an example of evaporation.
8. **Why is steam visible while water vapour is invisible?**
Answer: Steam is visible because it contains tiny droplets of water, whereas water vapour itself is invisible.
9. **What is condensation?**
Answer: Condensation is the process of conversion of water vapour into its liquid state.
10. **When does water vapour form water droplets?**
Answer: Water vapour forms water droplets when it comes in contact with a cold surface.
11. **What is humidity?**
Answer: The amount of water vapour present in the air is called humidity.
12. **Does ice have a fixed shape?**
Answer: Yes, ice retains its shape irrespective of the container in which it is placed.
13. **Does liquid water have a fixed shape?**
Answer: No, liquid water takes the shape of the container in which it is kept.

14. **What happens to the volume of water when it is transferred from one container to another?**
    Answer: The volume of water remains constant when it is transferred from one container to another.
15. **How does water vapour behave in the available space?**
    Answer: Water vapour spreads throughout the entire available space.
16. **What is melting?**
    Answer: Melting is the process of conversion of a solid into its liquid state.
17. **What is freezing?**
    Answer: Freezing is the process of conversion of a liquid into its solid state.
18. **How can water be converted into ice?**
    Answer: Water can be converted into ice by placing it in a cold environment such as a freezer.
19. **How does exposed surface area affect evaporation?**
    Answer: Water evaporates faster when a larger surface area is exposed to air.
20. **How does sunlight affect evaporation?**
    Answer: Water evaporates faster in sunlight than in shade.
21. **How does movement of air affect evaporation?**
    Answer: Increased movement of air makes water evaporate faster.
22. **Why does water evaporate slowly on a rainy day?**
    Answer: Water evaporates slowly on a rainy day because the humidity of the air is high.
23. **Why does water remain cool in an earthen pot?**
    Answer: Water seeping through the earthen pot evaporates and produces a cooling effect.
24. **What is a surahi used for during summer?**
    Answer: A surahi is used to keep water cold during summer.
25. **How are clouds formed?**
    Answer: Clouds form when water vapour condenses into tiny water droplets, generally around dust particles.
26. **What causes rain to fall from clouds?**
    Answer: Rain falls when water droplets in clouds join together, become bigger and heavy, and start falling towards the Earth.
27. **Around what particles do water droplets generally form in clouds?**
    Answer: Water droplets in clouds generally form around tiny dust particles.
28. **Name two forms of precipitation other than rain mentioned in the chapter.**
    Answer: Hail and snow are two forms of precipitation mentioned in the chapter.
29. **What is the water cycle?**
    Answer: The continuous circulation of water from the Earth's surface to the atmosphere and back to the Earth is called the water cycle.
30. **Why should we use water wisely?**
    Answer: We should use water wisely because only a small portion of the water available on Earth is fit for use by plants, animals and humans.

8.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **Why does water kept in a shallow plate disappear faster than the same amount of water kept in a bottle cap?**

Answer: Water in a shallow plate evaporates faster because a larger surface area is exposed to air.

2. **Why does water sprinkled on a hot pan disappear quickly?**
   Answer: Water disappears quickly from a hot pan because the higher temperature causes faster evaporation.
3. **A puddle disappears without boiling; what process is responsible for this?**
   Answer: Evaporation causes the water in the puddle to change gradually into water vapour.
4. **Why can evaporation occur even when water is not heated to boiling?**
   Answer: Evaporation occurs continuously even at room temperature.
5. **Why do water droplets appear on the outside of a glass containing ice-cold water?**
   Answer: Water vapour in the surrounding air condenses into droplets when it touches the cold surface of the glass.
6. **If the water level inside an ice-cold glass does not decrease, what does this indicate about the droplets outside it?**
   Answer: It indicates that the droplets outside are formed by condensation of water vapour from the air rather than by water seeping through the glass.
7. **Why are dew drops commonly seen on plants in the morning?**
   Answer: Dew drops form when water vapour in the air condenses on the cool surfaces of plants.
8. **Why do water droplets form on the inner surface of a plate covering a vessel of hot water?**
   Answer: Water vapour from the hot water condenses into droplets when it comes in contact with the cooler plate.
9. **Why does an ice cube retain its shape when transferred from one container to another?**
   Answer: An ice cube retains its shape because water in the solid state has a fixed shape.
10. **Why does liquid water change its shape when poured into another container?**
    Answer: Liquid water has no fixed shape and therefore takes the shape of the container in which it is kept.
11. **Why can water vapour occupy the entire available space in a container?**
    Answer: Water vapour is a gas and therefore spreads throughout the entire available space.
12. **What would happen to an ice cube if it is taken out of a freezer and kept in a warm room?**
    Answer: The ice cube would absorb heat and melt into liquid water.
13. **How would you change liquid water into solid ice?**
    Answer: Liquid water can be changed into ice by cooling it sufficiently, such as by placing it in a freezer.
14. **Why does candle wax become liquid when heated and solid again when cooled?**
    Answer: Candle wax changes its state because heating causes melting while cooling causes solidification.
15. **Why will water kept in sunlight evaporate faster than water kept in shade?**
    Answer: Water in sunlight receives more heat and therefore evaporates faster.
16. **Why do wet clothes usually dry faster on a windy day?**
    Answer: Increased movement of air around wet clothes speeds up the evaporation of water.

17. **Why do wet clothes generally take longer to dry on a rainy day?**
Answer: Wet clothes dry slowly on a rainy day because high humidity reduces the rate of evaporation.
18. **How could you make wet clothes dry faster on a rainy day?**
Answer: Wet clothes can be dried faster by increasing air movement around them, for example by using a fan.
19. **Why does water stored in an earthen pot remain cooler than water stored in a steel pot?**
Answer: Water seeping through the tiny pores of an earthen pot evaporates and produces a cooling effect.
20. **Why does rubbing sanitiser on the hands produce a cooling sensation?**
Answer: The sanitiser evaporates from the skin and produces a cooling effect.
21. **Why must the sand between the two pots of a pot-in-pot cooler be kept moist?**
Answer: Moist sand supplies water for evaporation, which produces the cooling effect inside the pot-in-pot cooler.
22. **What would happen to cloud formation if rising moist air did not cool sufficiently?**
Answer: Cloud formation would be reduced because water vapour would not condense sufficiently into tiny water droplets.
23. **Why do tiny water droplets in the atmosphere form around dust particles?**
Answer: Dust particles provide surfaces around which water vapour can condense to form tiny droplets.
24. **Why does rain begin to fall from a cloud after its droplets become larger?**
Answer: Rain begins when water droplets combine and become heavy enough to fall towards the Earth.
25. **Why does adding a burnt piece of newspaper help produce cloud-like haziness in the bottle experiment?**
Answer: The burnt newspaper supplies tiny dust particles around which water vapour condenses.
26. **What would happen to the water cycle if evaporation from the Earth's surface decreased greatly?**
Answer: Less water vapour would enter the atmosphere, reducing the water available for condensation and precipitation.
27. **How are evaporation and condensation connected in the water cycle?**
Answer: Evaporation carries water into the atmosphere as vapour, while condensation changes the vapour into water droplets.
28. **Why does water ultimately return to oceans after falling as rain or snow?**
Answer: Water falling on Earth eventually flows through rivers and other pathways back towards the oceans as part of the water cycle.
29. **If two equal quantities of water are kept under identical conditions except for surface area, which one will evaporate faster?**
Answer: The water having the larger exposed surface area will evaporate faster.
30. **Why is it important to prevent pollution of usable water sources?**
Answer: Water sources must be protected because only a small portion of Earth's water is fit for use by plants, animals and humans.

8.7 Two-mark questions with Answers of LOTS Type: (20 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type

1. What are the three states of water? Give an example of each.
Answer:
1. Water exists in three states—solid, liquid and gaseous.
2. Ice is the solid state, water is the liquid state, and water vapour is the gaseous state.

2. What is evaporation? Give one example.
Answer:
1. Evaporation is the process of conversion of water into its vapour state.
2. Drying of wet clothes is an example of evaporation.

3. What is condensation? Give one example.
Answer:
1. Condensation is the process of conversion of water vapour into its liquid state.
2. Water droplets appearing on a cold surface are an example of condensation.

4. State two properties of ice.
Answer:
1. Ice has a fixed shape and retains its shape irrespective of the container in which it is placed.
2. Ice does not flow or spread like liquid water.

5. State two properties of liquid water.
Answer:
1. Liquid water has no fixed shape and takes the shape of its container.
2. It can flow and spread while its volume remains constant.

6. State two properties of water vapour.
Answer:
1. Water vapour has no fixed shape and spreads throughout the available space.
2. It is invisible and is present in the air around us even at room temperature.

7. Define melting and freezing.
Answer:
1. Melting is the process of conversion of a solid into its liquid state.
2. Freezing is the process of conversion of a liquid into its solid state.

8. How can the states of water be changed by heating?
Answer:
1. When ice is heated, it melts and changes into liquid water.
2. On further heating, liquid water changes into water vapour.

9. How can liquid water be converted into ice and ice back into water?
Answer:
1. Liquid water freezes and becomes ice when kept in a cold environment such as a freezer.
2. When the ice is removed from the freezer and warmed, it melts back into liquid water.

10. Mention two everyday examples of evaporation.
Answer:
1. Water present in wet clothes evaporates while the clothes dry.
2. Water left on a mopped floor also evaporates and gradually disappears.

11. How does exposed surface area affect evaporation?
Answer:
1. Water evaporates faster when a larger surface area is exposed to air.
2. Therefore, water spread on a plate evaporates faster than the same amount kept in a bottle cap.

12. How do sunlight and wind affect evaporation?
Answer:
1. Water evaporates faster in sunlight than in shade.

2. Increased movement of air on a windy day also makes water evaporate faster.

13. What is humidity? How does it affect evaporation?
Answer:
1. The amount of water vapour present in the air is known as humidity.
2. When humidity is high, as on rainy days, water evaporates more slowly.

14. Explain the cooling effect of evaporation with an example.
Answer:
1. Evaporation produces a cooling effect as water changes into vapour.
2. Water seeping through an earthen pot evaporates and helps keep the water inside cool.

15. What is a pot-in-pot cooler? How does it work?
Answer:
1. A pot-in-pot cooler consists of a smaller earthen pot placed inside a larger pot with moist sand between them.
2. Water from the moist sand evaporates and creates a cooling effect inside the pots.

16. How are clouds formed?
Answer:
1. As moist air rises higher in the atmosphere, it becomes cooler and water vapour condenses into tiny droplets around dust particles.
2. These tiny droplets remain suspended in the air and together form clouds.

17. How is rain formed from clouds?
Answer:
1. Small water droplets in clouds join together to form bigger drops of water.
2. When these drops become sufficiently heavy, they fall towards the Earth as rain.

18. What role do dust particles play in cloud formation?
Answer:
1. Tiny dust particles provide surfaces around which water vapour can condense.
2. The condensed water forms tiny droplets that contribute to cloud formation.

19. What is the water cycle? Mention two processes involved in it.
Answer:
1. The continuous circulation of water between the Earth's surface and the atmosphere is called the water cycle.
2. Evaporation and condensation are two important processes involved in this circulation.

20. Why is it important to use water wisely?
Answer:
1. Only a small portion of the water available on Earth is fit for use by plants, animals and humans.
2. Increasing demand for water can cause shortages, so water should be used wisely and protected from pollution.

8.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type

1. Why does water spread on a plate evaporate faster than the same amount of water kept in a bottle cap?
Answer:
1. Water spread on a plate has a larger surface area exposed to the air.
2. A larger exposed surface area increases the rate of evaporation.

2. Water droplets appear on the outside of a glass containing ice-cold water. Where do these droplets come from? Explain.

Answer:

1. The droplets come from water vapour present in the surrounding air.
2. The water vapour condenses into liquid water when it comes in contact with the cold surface of the glass.

3. Why does the mass of a glass containing ice-cold water increase after some time?

Answer:

1. Water vapour from the surrounding air condenses on the cold outer surface of the glass.
2. The condensed water droplets add extra mass to the glass and its contents.

4. A student says that the droplets outside a cold glass have leaked through the glass. How can you show that this is incorrect?

Answer:

1. Mark the water level inside the glass and observe that it does not decrease while droplets form outside.
2. This shows that the outside droplets are formed by condensation of water vapour from the air.

5. Why do wet clothes dry faster in sunlight than in shade?

Answer:

1. Water in clothes exposed to sunlight evaporates faster than water in clothes kept in shade.
2. Therefore, the water leaves the clothes as water vapour in a shorter time.

6. Why do clothes dry faster on a windy day than on a day with little air movement?

Answer:

1. Increased movement of air around wet clothes speeds up evaporation.
2. Hence, water from the clothes changes into vapour more quickly on a windy day.

7. Why do wet clothes take longer to dry on a rainy day?

Answer:

1. The amount of water vapour in the air, or humidity, is generally higher on a rainy day.
2. High humidity slows down evaporation, so wet clothes take longer to dry.

8. If equal amounts of water are kept in two identical bottle caps, one in sunlight and the other in shade, what will you observe? Why?

Answer:

1. The water kept in sunlight will evaporate faster than the water kept in shade.
2. Thus, the bottle cap in sunlight will become empty earlier.

9. Why does an earthen pot keep water cooler than its surroundings?

Answer:

1. A small amount of water seeps through the tiny pores of the earthen pot and reaches its outer surface.
2. This water evaporates and produces a cooling effect, keeping the water inside cool.

10. Why does sprinkling water on the floor or roof provide a cooling effect?

Answer:

1. The sprinkled water gradually changes into water vapour through evaporation.
2. This evaporation produces a cooling effect in the surroundings.

11. A student transfers water from a glass into a bowl. What changes and what remains the same?

Answer:

1. The shape of the water changes because liquid water takes the shape of its container.
2. The volume of the water remains constant if none of the water is lost.

12. How is ice different from liquid water when both are placed in differently shaped containers?

Answer:

1. Ice retains its own shape because it is a solid with a fixed shape.
2. Liquid water changes its shape and takes the shape of the container.

13. What happens when ice is heated and the resulting water is heated further?

Answer:

1. On heating, ice melts and changes from the solid state into liquid water.
2. On further heating, liquid water changes into water vapour.

14. How can you reverse the change of ice into water?

Answer:

1. The liquid water can be placed in a sufficiently cold environment such as a freezer.
2. It then freezes and changes back into solid ice.

15. Why does water vapour spread throughout a container while ice does not?

Answer:

1. Water vapour is in the gaseous state and spreads throughout the available space.
2. Ice is in the solid state and retains its fixed shape.

16. How does cooling of moist air lead to the formation of clouds?

Answer:

1. As moist air rises higher in the atmosphere, it becomes cooler and water vapour condenses around tiny dust particles.
2. The resulting tiny water droplets remain suspended together in the air and form clouds.

17. Why are tiny dust particles important for cloud formation?

Answer:

1. Tiny dust particles provide surfaces around which water vapour can condense.
2. The tiny water droplets formed around these particles contribute to the formation of clouds.

18. How does a cloud eventually produce rain?

Answer:

1. Tiny water droplets in a cloud combine to form larger and heavier drops.
2. When the drops become sufficiently heavy, they fall towards the Earth as rain.

19. What might happen to cloud and rain formation if water from oceans and other water bodies did not evaporate?

Answer:

1. Much less water vapour would enter the atmosphere from the Earth's surface.
2. Consequently, less water would be available for condensation and subsequent precipitation.

20. How are evaporation and condensation opposite yet connected processes?

Answer:

1. Evaporation changes liquid water into water vapour, while condensation changes water vapour back into liquid water.
2. Both processes work together in the continuous movement of water through the water cycle.

21. A student wants water to evaporate quickly without boiling it. What two conditions could the student provide?

Answer:

1. The student can spread the water over a larger exposed surface area.
2. The student can keep it in sunlight or provide greater movement of air around it.

22. Why does a pot-in-pot cooler need moist sand between the two earthen pots?
Answer:
1. The moist sand continuously provides water that can evaporate through the porous earthen pot.
2. This evaporation produces the cooling effect needed to keep the contents of the inner pot cool.

23. If the air becomes more humid, what happens to evaporation and why?
Answer:
1. Evaporation becomes slower when the humidity of the surrounding air increases.
2. Therefore, water and wet objects take longer to dry under highly humid conditions.

24. Why is water vapour not the same as the visible steam seen near hot water?
Answer:
1. Water vapour itself is invisible.
2. The visible steam contains tiny water droplets formed when water vapour cools and condenses.

25. Why are both evaporation and precipitation necessary for maintaining the water cycle?
Answer:
1. Evaporation transfers water from the Earth's surface into the atmosphere as water vapour.
2. Precipitation returns water to the Earth as rain, hail or snow, allowing the cycle to continue.

8.9. Three-mark questions with Answers of LOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type
1. What are the three states of water? State one property of each.
Answer:
1. **Solid:** Ice is the solid state of water and has a fixed shape.
2. **Liquid:** Water is the liquid state and takes the shape of its container.
3. **Gas:** Water vapour is the gaseous state and spreads throughout the available space.

2. Explain evaporation with two examples from daily life.
Answer:
1. Evaporation is the process by which liquid water changes into water vapour.
2. Wet clothes dry because the water present in them evaporates into the air.
3. Water on a freshly mopped floor also gradually disappears due to evaporation.

3. What is condensation? Explain how it can be observed using a cold glass.
Answer:
1. Condensation is the process by which water vapour changes into liquid water.
2. When a glass containing ice-cold water is kept in the open, water droplets appear on its outer surface.
3. These droplets are formed when water vapour in the surrounding air condenses on the cold glass.

4. State three properties of liquid water.
Answer:
1. Liquid water does not have a fixed shape and takes the shape of its container.
2. Water can flow and spread from one place to another.
3. Its volume remains constant when transferred from one container to another, provided no water is lost.

5. State three properties of water vapour.
Answer:
1. Water vapour is the gaseous state of water.
2. It has no fixed shape and spreads throughout the available space.
3. Water vapour is invisible and is present in the air around us even at room temperature.

6. Explain melting and freezing with reference to water.
Answer:
1. Melting is the conversion of a solid into a liquid, as when ice changes into water.
2. Freezing is the conversion of a liquid into a solid, as when water changes into ice.
3. Thus, heating and cooling can bring about changes between the solid and liquid states of water.

7. Describe how heating changes the states of water.
Answer:
1. When ice is heated, it changes from the solid state into liquid water.
2. The conversion of ice into water is called melting.
3. On further heating, liquid water changes into water vapour.

8. Mention three factors that help water evaporate faster.
Answer:
1. A larger exposed surface area increases the rate of evaporation.
2. Water evaporates faster in sunlight than in shade.
3. Increased movement of air also speeds up evaporation.

9. Explain how exposed surface area affects evaporation.
Answer:
1. The rate of evaporation increases when a larger surface area of water is exposed to air.
2. Water spread on a plate has a larger exposed surface area than the same amount of water in a bottle cap.
3. Therefore, water in the plate evaporates faster than water in the bottle cap.

10. What is humidity? How does it affect evaporation?
Answer:
1. Humidity is the amount of water vapour present in the air.
2. Humidity is generally high on rainy days because the air contains more water vapour.
3. High humidity slows down evaporation, so wet clothes take longer to dry.

11. Explain the cooling effect of evaporation using an earthen pot.
Answer:
1. A small amount of water seeps through the tiny pores of an earthen pot to its outer surface.
2. This water evaporates from the outer surface of the pot.
3. The evaporation produces a cooling effect and helps keep the water inside the pot cool.

12. Describe how a pot-in-pot cooler works.
Answer:
1. A smaller earthen pot is placed inside a larger earthen pot, and the space between them is filled with sand.
2. The sand is kept moist so that water can evaporate through the porous surfaces of the pots.
3. Evaporation produces a cooling effect that helps keep the contents of the inner pot cool.

13. Explain the formation of clouds in three points.
Answer:
1. Water vapour present in rising air cools as the air moves higher in the atmosphere.

2. The water vapour condenses into tiny water droplets, generally around dust particles.
3. These tiny droplets remain suspended together in the atmosphere and form clouds.

14. Explain how rain is formed.

Answer:
1. Tiny water droplets present in clouds join together to form larger drops.
2. As more droplets combine, the drops become bigger and heavier.
3. When they become sufficiently heavy, they fall towards the Earth as rain.

15. Explain the role of dust particles in cloud formation.

Answer:
1. Tiny dust particles are present in the atmosphere.
2. Water vapour condenses around these dust particles to form tiny water droplets.
3. These droplets collect together and contribute to the formation of clouds.

16. Describe the water cycle in three points.

Answer:
1. Water from oceans and the Earth's surface evaporates and enters the atmosphere as water vapour.
2. The water vapour condenses to form clouds and returns to the Earth as rain, hail or snow.
3. Water then flows back towards water bodies, continuing the circulation known as the water cycle.

17. Differentiate between ice, liquid water and water vapour based on shape and movement.

Answer:
1. Ice has a fixed shape and does not flow or spread.
2. Liquid water has no fixed shape, takes the shape of its container, and can flow.
3. Water vapour has no fixed shape and spreads throughout the available space.

18. Explain how sunlight, air movement and humidity influence evaporation.

Answer:
1. Water evaporates faster in sunlight than in shade.
2. Increased movement of air speeds up evaporation.
3. High humidity slows evaporation because the surrounding air already contains more water vapour.

19. Describe three observations related to the condensation experiment using a glass of ice-cold water.

Answer:
1. After some time, water droplets appear on the outer surface of the cold glass.
2. The water level marked inside the glass does not fall because the outside water has not leaked from within.
3. The droplets are formed by condensation of water vapour present in the surrounding air.

20. Why is conservation of water important? Give three points.

Answer:
1. Only a small portion of the water available on Earth is fit for use by plants, animals and humans.
2. Increasing demand for usable water can lead to water shortages.
3. Therefore, water should be used wisely and water sources should be protected from pollution.

8.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type

1. A student keeps equal amounts of water in a shallow plate and a bottle cap under the same conditions. Predict what will happen and explain why.

Answer:

1. The water in the shallow plate will evaporate faster than the water in the bottle cap.
2. This is because the plate provides a larger exposed surface area for evaporation.
3. Thus, increasing the exposed surface area increases the rate of evaporation.

2. Water droplets appear outside a glass containing ice-cold water. Explain how you can prove that the water has not leaked through the glass.

Answer:

1. Mark the initial water level inside the glass before observing the droplets.
2. The water level inside remains unchanged even though droplets collect on the outside.
3. Therefore, the outside droplets are formed by condensation of water vapour from the surrounding air and not by leakage.

3. A glass containing ice-cold water is weighed repeatedly and its mass increases. Explain the observation.

Answer:

1. The cold surface of the glass cools the water vapour present in the surrounding air.
2. The water vapour condenses into liquid water droplets on the outside of the glass.
3. These additional water droplets increase the total mass measured by the balance.

4. Two identical wet handkerchiefs are kept separately, one in sunlight and the other in shade. Predict the result and explain it.

Answer:

1. The handkerchief kept in sunlight will generally dry faster than the one kept in shade.
2. Water evaporates faster in sunlight than under shaded conditions.
3. Therefore, the water present in the sunlit handkerchief changes into water vapour more quickly.

5. Clothes dry quickly on a windy day but slowly on a rainy day. Explain the reasons for this difference.

Answer:

1. Increased movement of air on a windy day speeds up the evaporation of water from clothes.
2. On a rainy day, the air generally has high humidity, which slows down evaporation.
3. Hence, windy conditions favour faster drying, while highly humid conditions make drying slower.

6. A student transfers ice, liquid water and water vapour into differently shaped containers. Compare how their shapes would behave.

Answer:

1. Ice will retain its fixed shape because it is a solid.
2. Liquid water will take the shape of the container because it has no fixed shape.
3. Water vapour will spread throughout the available space because it is in the gaseous state.

7. Suppose you want a small quantity of water to evaporate as quickly as possible without boiling it. Suggest three suitable conditions.

Answer:

1. Spread the water over a large surface area instead of keeping it in a narrow container.
2. Keep the water in sunlight rather than in shade.
3. Provide greater movement of air around the water to further speed up evaporation.

8. Why does water in an earthen pot remain cool during summer? Explain the process.

Answer:

1. A small amount of water seeps through the tiny pores of the earthen pot to its outer surface.
2. This water evaporates from the outer surface of the pot.
3. Evaporation produces a cooling effect and thereby helps keep the water inside cool.

9. A pot-in-pot cooler stops cooling effectively when the sand between the pots becomes dry. Explain why.
Answer:
1. The moist sand normally supplies water for evaporation through the porous earthen pots.
2. When the sand becomes dry, less water is available for evaporation.
3. As a result, the cooling effect due to evaporation decreases and the cooler becomes less effective.

10. What would happen to cloud formation if rising moist air did not become sufficiently cool? Explain.
Answer:
1. Cooling of rising moist air is necessary for water vapour to condense into tiny droplets.
2. Without sufficient cooling, much less condensation would occur around dust particles.
3. Therefore, the formation of water droplets and consequently clouds would be reduced.

11. Explain why dust particles in the atmosphere are important for the formation of clouds and rain.
Answer:
1. Tiny dust particles provide surfaces around which water vapour can condense.
2. The condensed water forms tiny droplets that remain suspended together to form clouds.
3. These droplets can combine, become larger and heavier, and eventually fall as rain.

12. A student observes visible mist above hot water and says, "This is water vapour." Evaluate the statement.
Answer:
1. Water vapour itself is invisible and cannot normally be seen.
2. The visible mist consists of tiny liquid water droplets formed when water vapour cools and condenses.
3. Therefore, the visible mist should not be considered water vapour itself.

13. Explain how heating and cooling can repeatedly change water from one state to another.
Answer:
1. Heating ice causes it to melt and change from the solid state into liquid water.
2. Further heating can change liquid water into water vapour, while cooling water can change it back into ice.
3. Thus, changes in heating and cooling conditions allow water to move between its solid, liquid and gaseous states.

14. If humidity becomes very high while temperature and air movement remain unchanged, predict how it will affect drying of clothes.
Answer:
1. High humidity means that the surrounding air contains a large amount of water vapour.
2. Under such conditions, evaporation of water from wet clothes becomes slower.
3. Therefore, the clothes will take a longer time to dry.

15. Explain how evaporation and condensation work together in the water cycle.
Answer:

1. Water from oceans and the Earth's surface evaporates and enters the atmosphere as water vapour.
2. The water vapour cools and condenses to form tiny droplets that contribute to cloud formation.
3. Water eventually returns to the Earth as precipitation, allowing the cycle to continue.

16. Imagine that evaporation from oceans and other water bodies suddenly stopped. Predict three consequences for the water cycle.
Answer:
1. Much less water vapour would enter the atmosphere from the Earth's surface.
2. With less water vapour available, cloud formation through condensation would decrease.
3. Consequently, precipitation such as rain, hail and snow would also be affected.

17. A student wants to test only the effect of sunlight on evaporation. How should the experiment be arranged?
Answer:
1. Equal amounts of water should be placed in two identical containers so that the exposed surface areas are the same.
2. One container should be kept in sunlight and the other in shade while the other conditions are kept as similar as possible.
3. The time taken for the water to evaporate from each container should then be compared.

18. Why is a wide plate more suitable than a narrow bottle for drying a small quantity of water quickly?
Answer:
1. A wide plate exposes a larger surface area of water to the surrounding air.
2. A larger exposed area allows evaporation to occur faster.
3. Therefore, water in the wide plate will generally disappear sooner than the same quantity in a narrow container.

19. How can the water cycle show that the same water can be used repeatedly in nature?
Answer:
1. Water evaporates from the Earth's surface and enters the atmosphere as water vapour.
2. It later condenses and returns to the Earth as rain, hail or snow.
3. This continuous movement circulates water between the Earth and atmosphere again and again.

20. A region receives rainfall but its usable water sources are polluted. Why can it still face a shortage of usable water?
Answer:
1. The chapter explains that only a small portion of the water available on Earth is fit for use by plants, animals and humans.
2. Pollution can make available water sources unsuitable for use.
3. Therefore, conserving water and protecting water sources from pollution are both necessary.

8.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:
1. Explain the three states of water and their main properties.
Answer:
1. Water exists in three states—solid, liquid and gaseous.
2. Ice is the solid state of water and has a fixed shape.

3. Liquid water has no fixed shape and takes the shape of the container in which it is kept.
4. Water vapour is the gaseous state of water and spreads throughout the available space.
5. Water vapour is invisible and is present in the air around us even at room temperature.

2. Explain evaporation and mention the factors that affect it.

Answer:

1. Evaporation is the process by which liquid water changes into water vapour.
2. Evaporation takes place continuously, even at room temperature.
3. Water evaporates faster when a larger surface area is exposed to air.
4. Water evaporates faster in sunlight, and increased movement of air also speeds up evaporation.
5. High humidity slows down evaporation, which is why wet clothes dry slowly on rainy days.

3. Explain condensation with the help of the experiment using a glass containing ice-cold water.

Answer:

1. A glass containing ice-cold water is kept in the open for some time.
2. After a while, small water droplets appear on the outer surface of the glass.
3. The water level inside the glass does not decrease, showing that the droplets have not leaked from inside.
4. Water vapour present in the surrounding air cools when it comes in contact with the cold surface and changes into liquid water droplets.
5. This conversion of water vapour into liquid water is called condensation.

4. Explain how water changes from one state to another.

Answer:

1. Ice changes from the solid state into liquid water when it is heated.
2. The conversion of a solid into a liquid is called melting.
3. On further heating, liquid water changes into water vapour.
4. When liquid water is cooled sufficiently, such as in a freezer, it changes into solid ice.
5. The conversion of liquid water into its solid state is called freezing.

5. Describe how the exposed surface area, sunlight and movement of air affect evaporation.

Answer:

1. A larger exposed surface area makes water evaporate faster.
2. Therefore, the same amount of water spread on a plate evaporates faster than water kept in a bottle cap.
3. Water kept in sunlight evaporates faster than water kept in shade.
4. Increased movement of air also increases the rate of evaporation.
5. Hence, spreading wet clothes out in sunlight and moving air helps them dry faster.

6. Explain the cooling effect of evaporation with examples from daily life.

Answer:

1. Evaporation of water produces a cooling effect.
2. Water seeping through the tiny pores of an earthen pot reaches its outer surface and evaporates.
3. This evaporation helps keep the water stored inside the earthen pot cool.
4. Sprinkling water on a hot surface also produces cooling as the water evaporates.
5. The chapter also mentions the cooling sensation caused by evaporation of sanitiser from our hands.

7. Describe the construction and working of a pot-in-pot cooler.

Answer:

1. A pot-in-pot cooler consists of a smaller earthen pot placed inside a larger earthen pot.

2. The space between the two pots is filled with sand.
3. The sand is kept moist by adding water to it.
4. Water from the moist sand evaporates through the porous surfaces of the earthen pots and produces a cooling effect.
5. This cooling helps keep the contents placed inside the smaller pot cool.

8. Explain the formation of clouds and rain.

Answer:

1. Water vapour is present in the air and rises along with warm air into the atmosphere.
2. As the air rises higher, it becomes cooler and the water vapour begins to condense.
3. Water vapour condenses around tiny dust particles to form very small water droplets.
4. These tiny droplets remain suspended together in the atmosphere and form clouds.
5. When the droplets combine and become sufficiently heavy, they fall towards the Earth as rain.

9. Describe the water cycle in five points.

Answer:

1. Water from oceans and the Earth's surface evaporates and enters the atmosphere as water vapour.
2. Water vapour rises in the atmosphere and cools.
3. It condenses to form tiny water droplets that contribute to cloud formation.
4. Water returns to the Earth in the form of precipitation such as rain, hail or snow.
5. Water eventually flows back towards water bodies, and this continuous circulation is called the water cycle.

10. Compare the properties of ice, liquid water and water vapour.

Answer:

1. Ice is a solid that has a fixed shape and does not flow or spread.
2. Liquid water has no fixed shape and takes the shape of its container.
3. Liquid water can flow and spread, while its volume remains constant when transferred between containers without loss.
4. Water vapour has no fixed shape and spreads throughout the available space.
5. Unlike visible liquid water and ice, water vapour is invisible and is present in the air around us.

11. Explain humidity and its relationship with evaporation.

Answer:

1. Humidity is the amount of water vapour present in the air.
2. The humidity of air is generally higher during rainy days.
3. High humidity reduces the rate of evaporation.
4. Therefore, water from wet clothes evaporates more slowly when the air is highly humid.
5. This is why clothes usually take longer to dry on rainy days.

12. Explain why water conservation is important.

Answer:

1. Water continuously circulates between the Earth and atmosphere through the water cycle.
2. However, only a small portion of the water available on Earth is fit for use by plants, animals and humans.
3. The demand for usable water is increasing.
4. Pollution can make available water sources unsuitable for use.
5. Therefore, water should be used wisely and available water sources should be protected from pollution.

8.12 Five-mark questions with Answers of HOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:

1. A student keeps equal quantities of water in a shallow plate and a bottle cap at the same place. Predict the observations and explain the reason.

Answer:

1. The water kept in the shallow plate will evaporate faster than the water in the bottle cap.
2. The shallow plate provides a larger exposed surface area of water.
3. A larger area allows more water to be exposed to the surrounding air.
4. Hence, the time required for complete evaporation from the plate will be shorter.
5. This experiment shows that a larger exposed surface area increases the rate of evaporation.

2. Water droplets appear on the outside of a glass containing ice-cold water. A student claims that the water has leaked through the glass. How would you test and correct this conclusion?

Answer:

1. Mark the initial level of water inside the glass before keeping it aside.
2. Observe the water level and the outer surface of the glass after some time.
3. Water droplets will appear outside even though the marked water level inside does not decrease.
4. This shows that the droplets have not leaked through the glass but have come from water vapour present in the surrounding air.
5. The water vapour cools on touching the cold glass and changes into liquid droplets by condensation.

3. Wet clothes are kept outdoors on a hot, windy day and on a humid, rainy day. Compare their drying and explain the factors responsible.

Answer:

1. Wet clothes will generally dry faster on a hot, windy day.
2. Sunlight helps water evaporate faster than under shaded conditions.
3. Increased movement of air also speeds up evaporation from the clothes.
4. On a rainy day, the humidity of the surrounding air is generally high.
5. High humidity slows evaporation, so the clothes take longer to dry.

4. Design an experiment to investigate whether sunlight affects the rate of evaporation.

Answer:

1. Take two identical bottle caps and pour equal quantities of water into each of them.
2. Keep one bottle cap in sunlight and the other in shade while keeping the other conditions as similar as possible.
3. Observe both caps at regular intervals and record the time taken for the water to evaporate completely.
4. The water kept in sunlight will evaporate faster than the water kept in shade.
5. The observation shows that exposure to sunlight increases the rate of evaporation.

5. A family wants to keep drinking water cool without using electricity. How can an earthen pot help them? Explain scientifically.

Answer:

1. Water can be stored in an earthen pot because its surface contains tiny pores.
2. A small amount of water seeps through these pores and reaches the outer surface.
3. The water present on the outer surface gradually evaporates.
4. Evaporation produces a cooling effect.
5. Therefore, the water remaining inside the earthen pot stays cooler, making it a useful method that does not require electricity.

6. A pot-in-pot cooler is not cooling properly because the sand between the two pots has become dry. Explain the problem and suggest a solution.
Answer:
1. The cooling effect of a pot-in-pot cooler depends on evaporation of water from the moist sand.
2. When the sand becomes dry, there is less water available for evaporation.
3. Therefore, the cooling effect decreases and the inner pot does not remain sufficiently cool.
4. Water should be added regularly to keep the sand between the two pots moist.
5. The water can then evaporate and restore the cooling effect of the pot-in-pot cooler.

7. A student says that the white mist seen above hot water is water vapour. Analyse the statement and explain what is actually observed.
Answer:
1. Water vapour itself is invisible and cannot normally be seen.
2. Hot water produces water vapour that moves into the surrounding cooler air.
3. On cooling, some of this water vapour condenses into tiny liquid water droplets.
4. These tiny droplets together become visible as the white mist commonly called steam.
5. Therefore, the visible white mist is made of tiny water droplets rather than water vapour itself.

8. Explain what would happen to cloud and rain formation if moist air rose into the atmosphere but did not cool sufficiently.
Answer:
1. Cooling of moist air helps water vapour condense into tiny water droplets.
2. If the rising air did not cool sufficiently, much less condensation would occur.
3. Fewer tiny water droplets would form around dust particles.
4. As a result, cloud formation would be reduced.
5. With fewer cloud droplets available to combine into heavy drops, the formation of rain would also be affected.

9. Explain how evaporation, condensation and precipitation are interconnected in the water cycle.
Answer:
1. Water from oceans and the Earth's surface evaporates and enters the atmosphere as water vapour.
2. As water vapour rises and cools, it condenses into tiny water droplets.
3. These droplets contribute to the formation of clouds in the atmosphere.
4. When the droplets combine and become sufficiently heavy, water returns to the Earth as precipitation such as rain, hail or snow.
5. Water eventually flows back towards water bodies, allowing the water cycle to continue.

10. A student wants wet clothes to dry as quickly as possible. Using your knowledge of evaporation, suggest suitable conditions and explain them.
Answer:
1. The clothes should be spread out properly so that a larger wet surface area is exposed to air.
2. They should preferably be placed in sunlight because water evaporates faster there than in shade.
3. They should be kept where there is good movement of air, as increased air movement speeds up evaporation.
4. Highly humid conditions should be avoided because high humidity slows down evaporation.

5. Thus, spreading the clothes in a sunny and well-ventilated place will help them dry more quickly.

11. Suppose evaporation from oceans and other water bodies decreased greatly. Analyse its possible effect on the water cycle.

Answer:

1. Less water would change into water vapour and enter the atmosphere.
2. Consequently, less water vapour would be available for condensation.
3. This could reduce the formation of water droplets and clouds.
4. With fewer cloud droplets, precipitation such as rain, hail or snow could also decrease.
5. Thus, reduced evaporation would disturb the continuous circulation of water described by the water cycle.

12. A region receives sufficient rainfall but still faces a shortage of usable water because its water sources are polluted. Explain why water conservation is necessary in such a situation.

Answer:

1. Only a small portion of the water available on Earth is fit for use by plants, animals and humans.
2. Pollution can make available water sources unsuitable for use.
3. Therefore, receiving rainfall alone does not guarantee an adequate supply of usable water.
4. Water should be used wisely so that the available usable supply is not wasted.
5. Water sources must also be protected from pollution to maintain the availability of usable water.

8.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. Meera washed her school uniform in the evening and needs it dry by the next morning. Using your knowledge of evaporation, suggest five ways or conditions that can help it dry faster.

Answer:

1. Meera should spread the uniform properly instead of keeping it folded, so that a larger surface area is exposed to air.
2. She should hang it in a place where there is good movement of air.
3. If sunlight is available, keeping the uniform in sunlight will increase evaporation.
4. She can use a fan to increase air movement when drying it indoors.
5. These conditions increase evaporation and help the water in the uniform change into water vapour more quickly.

2. Rohan notices water droplets on the outside of his cold-water bottle and thinks that the bottle is leaking. How can he investigate and explain what is actually happening?

Answer:

1. Rohan can mark the water level inside the bottle before observing it for some time.
2. He will notice that droplets form outside even though the water level inside does not decrease due to those droplets.
3. Water vapour is naturally present in the surrounding air.
4. When this water vapour touches the cold surface of the bottle, it cools and changes into liquid water.
5. Thus, the droplets are formed by condensation of atmospheric water vapour and are not necessarily due to leakage.

3. A family wants to keep vegetables cool during summer in a place where electricity is unavailable. How can they use the idea of a pot-in-pot cooler?

Answer:

1. They can place a smaller earthen pot inside a larger earthen pot.
2. The space between the two pots should be filled with sand and the sand should be kept moist.
3. The vegetables can be placed inside the smaller pot.
4. Water from the moist sand evaporates through the porous earthen pots and produces a cooling effect.
5. Thus, the pot-in-pot arrangement can help keep the contents cool without using electricity.

4. Priya has equal amounts of water in a shallow plate and a bottle cap. She wants to find out whether exposed surface area affects evaporation. Describe how she should conduct the experiment.

Answer:

1. Priya should place equal amounts of water in a shallow plate and a bottle cap.
2. She should keep both containers under similar environmental conditions so that mainly the exposed surface area differs.
3. She should note the time taken for the water in each container to evaporate completely.
4. The water in the shallow plate will evaporate faster because it has a larger exposed surface area.
5. She can conclude that increasing the exposed surface area increases the rate of evaporation.

5. During summer, a gardener sprinkles water on the ground around a house. Explain scientifically how this practice can make the surroundings feel cooler.

Answer:

1. The sprinkled water spreads over the ground and exposes a large surface area to the surrounding air.
2. The water gradually changes into water vapour through evaporation.
3. Evaporation produces a cooling effect.
4. Therefore, the surface from which water evaporates becomes cooler.
5. This principle explains why sprinkling water can help cool the surroundings.

6. A student wants to find out whether sunlight affects evaporation. Design a simple experiment that the student can perform.

Answer:

1. Take two identical bottle caps and pour equal amounts of water into them.
2. Keep one bottle cap in sunlight and the other in shade while keeping other conditions as similar as possible.
3. Observe both bottle caps at regular intervals and record the time taken for complete evaporation.
4. The water kept in sunlight will evaporate faster than the water kept in shade.
5. The observations show that exposure to sunlight increases the rate of evaporation.

7. On a rainy day, Kavya notices that her washed clothes remain wet for a long time. Explain the reason and suggest suitable measures based on the chapter.

Answer:

1. Rainy days generally have high humidity, meaning that the air contains a large amount of water vapour.
2. High humidity slows down the evaporation of water from wet clothes.
3. Kavya can spread the clothes properly to increase the exposed surface area.
4. She can place them where there is greater movement of air, such as under a fan.

5. Increasing the exposed area and air movement can help the clothes dry faster even when natural evaporation is slow.

8. Your family has a clay surahi and a steel water container. Which would you choose for naturally cool drinking water in summer? Explain your choice.

Answer:

1. I would choose the clay surahi for keeping drinking water naturally cool.
2. A clay vessel has tiny pores through which a small amount of water can reach the outer surface.
3. The water reaching the outer surface undergoes evaporation.
4. Evaporation produces a cooling effect and helps cool the water remaining inside.
5. Therefore, a clay surahi can naturally keep water cool during summer.

9. Imagine you are planning an experiment to make water evaporate as quickly as possible without boiling it. How would you arrange the conditions?

Answer:

1. I would pour the water into a broad, shallow container to provide a large exposed surface area.
2. I would keep the container in sunlight rather than in shade.
3. I would place it in a location where there is good movement of air.
4. I would avoid highly humid surroundings because high humidity slows down evaporation.
5. Combining a larger exposed area, sunlight and greater air movement would help the water evaporate more quickly.

10. Suppose your village pond becomes polluted even though the area receives regular rainfall. As a student, explain why protecting the pond is important.

Answer:

1. Only a small portion of the water available on Earth is fit for use by plants, animals and humans.
2. Pollution can make available water sources unsuitable for use.
3. Therefore, rainfall alone does not ensure that sufficient usable water will always be available.
4. Water sources such as ponds should be protected from pollution, and water should be used wisely.
5. Conserving and protecting usable water helps reduce the possibility of water shortages.

8.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions

1. Three equal quantities of water are kept in a bottle cap, a cup and a wide plate under identical conditions. In which container is the water most likely to evaporate first?

A) Bottle cap
B) Cup
C) Wide plate
D) All at exactly the same time

Answer: C) Wide plate

Reason: The wide plate provides the largest exposed surface area, which increases evaporation.

2. Water droplets appear on the outside of a glass containing ice-cold water. Which process is mainly responsible?

A) Freezing
B) Melting

C) Evaporation
D) Condensation
Answer: D) Condensation
3. Which observation best proves that droplets outside a cold glass are not water leaking from inside?
A) The glass feels cold
B) Ice melts inside the glass
C) The marked water level inside does not decrease
D) The droplets are colourless
Answer: C) The marked water level inside does not decrease
4. Which sequence correctly represents the change when ice is heated and the resulting water is heated further?
A) Solid → Gas → Liquid
B) Solid → Liquid → Gas
C) Liquid → Solid → Gas
D) Gas → Liquid → Solid
Answer: B) Solid → Liquid → Gas
5. Which combination would most likely make wet clothes dry fastest?
A) Shade + high humidity + still air
B) Sunlight + moving air + clothes spread out
C) Shade + clothes folded together + still air
D) High humidity + clothes folded together
Answer: B) Sunlight + moving air + clothes spread out
6. Which of the following correctly matches the state of water with its property?
A) Ice – takes the shape of its container
B) Liquid water – has a fixed shape
C) Water vapour – spreads through available space
D) Water vapour – has a fixed shape
Answer: C) Water vapour – spreads through available space
7. Equal amounts of water are placed in identical bottle caps, P and Q. P is kept in sunlight and Q in shade. Which is the most likely observation?
A) Q evaporates faster
B) P evaporates faster
C) Both freeze
D) Neither evaporates
Answer: B) P evaporates faster
8. Which statement about water vapour is correct?
A) It is always visible as white smoke.
B) It has a fixed shape.
C) It is invisible and can be present in air.
D) It cannot spread through available space.
Answer: C) It is invisible and can be present in air.
9. The visible white mist commonly called steam mainly consists of:
A) Ice crystals only
B) Tiny liquid water droplets
C) Invisible water vapour only
D) Dust particles only
Answer: B) Tiny liquid water droplets
10. Which change is correctly paired with its name?
A) Ice → Water: Freezing

B) Water → Ice: Melting
C) Ice → Water: Melting
D) Water vapour → Water: Evaporation
Answer: C) Ice → Water: Melting
11. On which day are wet clothes most likely to take the longest time to dry?
A) Sunny and windy day
B) Dry and windy day
C) Humid rainy day
D) Sunny day with low humidity
Answer: C) Humid rainy day
Reason: High humidity slows evaporation.
12. Consider the statements:
I. Ice has a fixed shape.
II. Liquid water takes the shape of its container.
III. Water vapour spreads throughout the available space.
Which option is correct?
A) Only I
B) Only I and II
C) Only II and III
D) I, II and III
Answer: D) I, II and III
13. Why does water stored in an earthen pot remain comparatively cool?
A) The pot freezes the water.
B) Water evaporating from the outer surface produces cooling.
C) Clay prevents all evaporation.
D) Water inside changes completely into ice.
Answer: B) Water evaporating from the outer surface produces cooling.
14. A pot-in-pot cooler will become less effective if:
A) the sand between the pots is kept moist
B) water evaporates from the moist sand
C) the sand between the pots becomes dry
D) earthen pots are used
Answer: C) the sand between the pots becomes dry
15. Which factor does NOT favour faster evaporation according to the chapter?
A) Larger exposed surface area
B) Sunlight
C) Increased movement of air
D) High humidity
Answer: D) High humidity
16. A glass of cold water is placed on a balance. After some time, droplets collect on its outer surface. What is most likely to happen to the measured mass?
A) It increases
B) It becomes zero
C) It always decreases
D) It remains exactly unchanged
Answer: A) It increases
Reason: Condensed water from the surrounding air adds to the measured mass.
17. Which process changes water vapour into liquid water?
A) Evaporation
B) Freezing

C) Condensation
D) Melting
Answer: C) Condensation
18. Which statement best explains cloud formation?
A) Ice melts directly to form clouds.
B) Water vapour condenses into tiny droplets, generally around dust particles.
C) Rainwater rises unchanged into the sky.
D) Clouds form only from smoke.
Answer: B) Water vapour condenses into tiny droplets, generally around dust particles.
19. What happens when tiny water droplets in clouds combine and become sufficiently heavy?
A) They become water vapour immediately.
B) They remain permanently suspended.
C) They fall towards the Earth as rain.
D) They always become ice cubes.
Answer: C) They fall towards the Earth as rain.
20. Which sequence best represents part of the water cycle?
A) Evaporation → Condensation → Precipitation
B) Condensation → Freezing → Melting only
C) Precipitation → Melting → Freezing only
D) Freezing → Evaporation → Melting
Answer: A) Evaporation → Condensation → Precipitation
21. A student wants to investigate only the effect of exposed surface area on evaporation. Which setup is best?
A) Different amounts of water in different containers kept at different places
B) Equal amounts of water in containers with different exposed areas under similar conditions
C) Equal amounts of water, one in sunlight and one in a refrigerator
D) Different amounts of water in identical containers
Answer: B) Equal amounts of water in containers with different exposed areas under similar conditions
22. Which pair represents opposite changes of state?
A) Melting and freezing
B) Evaporation and melting
C) Freezing and cooling
D) Melting and heating
Answer: A) Melting and freezing
23. Water is transferred from a tall glass into a wide bowl without spilling. Which statement is correct?
A) Both its shape and volume must change.
B) Its shape changes, but its volume remains constant.
C) Its shape remains fixed, but its volume disappears.
D) Neither its shape nor its volume can change.
Answer: B) Its shape changes, but its volume remains constant.
24. Which condition would most likely produce the slowest evaporation?
A) Large surface area, sunlight and moving air
B) Small surface area, shade and high humidity
C) Large surface area and moving air
D) Sunlight and low humidity
Answer: B) Small surface area, shade and high humidity

25. What role do dust particles play in cloud formation?
A) They heat the atmosphere.
B) They change directly into water.
C) They provide surfaces around which water vapour can condense.
D) They stop water droplets from forming.
Answer: C) They provide surfaces around which water vapour can condense.
26. If water vapour in rising air does not cool sufficiently, which process would be directly reduced?
A) Condensation
B) Melting
C) Freezing of ice in a freezer
D) Flowing of liquid water
Answer: A) Condensation
27. Which observation best demonstrates the cooling effect of evaporation?
A) Ice retains its shape.
B) Water takes the shape of a container.
C) Water in an earthen pot remains cool as water evaporates from its surface.
D) Water freezes inside a freezer.
Answer: C) Water in an earthen pot remains cool as water evaporates from its surface.
28. Four students make the following statements. Who is correct?
A) Anu: "Evaporation occurs only when water boils."
B) Ravi: "Water vapour is always visible."
C) Neha: "Evaporation can occur even at room temperature."
D) Aman: "Humidity always speeds up evaporation."
Answer: C) Neha
29. If evaporation from oceans and other water bodies were greatly reduced, which consequence would be most reasonable?
A) More water vapour would enter the atmosphere.
B) Cloud formation and precipitation could decrease.
C) All liquid water would immediately freeze.
D) Humidity would always increase.
Answer: B) Cloud formation and precipitation could decrease.
30. Which statement best explains why water conservation is necessary even though water continuously moves through the water cycle?
A) The water cycle permanently destroys water.
B) All water on Earth is equally suitable for human use.
C) Only a small portion of Earth's water is fit for use, and usable sources can also become polluted.
D) Evaporation removes all water permanently from Earth.
Answer: C) Only a small portion of Earth's water is fit for use, and usable sources can also become polluted.

8.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching Grade 6 Students:
The following best practices are closely aligned with the chapter's emphasis on observation, experimentation, comparison, and everyday applications.

No.	Best Practice	Suggested Classroom Implementation
1	**Learning through Hands-on Experiments**	Demonstrate melting, evaporation and condensation using ice cubes, water, containers and a cold glass. Students should observe the changes and record what they see rather than only memorising definitions.
2	**Observe–Predict–Explain Method**	Before an activity, ask students to predict what will happen, conduct the activity, and then explain their observations. For example, ask them to predict whether water will evaporate faster from a plate or a bottle cap before performing the experiment.
3	**Connect Science with Daily Life**	Relate evaporation and condensation to drying clothes, mopped floors, water droplets on cold glasses, earthen pots, sanitiser and clouds. This helps students recognise that changes in the states of water occur around them every day.
4	**Comparative Experimentation**	Let students compare evaporation under different conditions—sunlight versus shade, large versus small exposed surface area, and moving versus still air. Encourage them to identify the condition being changed and keep other conditions similar.
5	**Observation and Data Recording**	Ask students to prepare simple observation tables showing time, mass or changes noticed during experiments. The chapter itself uses repeated mass measurements at five-minute intervals and records evaporation time, making data recording an important learning practice.
6	**Learning through Low-Cost Models**	Construct a simple **pot-in-pot cooler** using earthen pots, sand and water. Students can connect the working of the model with the cooling effect produced by evaporation.
7	**Concept Mapping**	Ask students to create a concept map connecting **ice → melting → water → evaporation → water vapour → condensation → water**, and extend it to cloud and rain formation. This reinforces relationships among the different processes described throughout the chapter.
8	**Weather-Based Learning**	Ask students to observe how quickly clothes dry on sunny, windy and rainy days and connect their observations with evaporation and humidity. This turns the local environment into a science laboratory.
9	**Water-Cycle Role Play**	Assign students roles such as the Sun, ocean, water vapour, cloud, rain and river and let them demonstrate the journey of water. Afterwards, students can arrange cards showing evaporation, condensation and precipitation in the correct sequence.
10	**Questioning and Scientific Reasoning**	Use questions such as, "Where do the droplets outside a cold glass come from?", "Why do clothes dry slowly on rainy days?" and "Why does water remain cool in an earthen pot?" Encourage students to support every answer with an observation or scientific reason.
11	**Collaborative Group Investigation**	Divide the class into groups and assign each group one investigation—surface area, sunlight, air movement, condensation or cooling by evaporation. Each group can present its observation, conclusion and real-life application to the class.

No.	Best Practice	Suggested Classroom Implementation
12	**Water-Conservation Practice**	Conclude the chapter with a classroom or home **Water Audit**, where students identify places where water is wasted and suggest practical conservation measures. This directly reinforces the chapter's message that usable water is limited and should be used wisely and protected from pollution.

Recommended Best-Practice Classroom Sequence
For this chapter, an effective sequence would be **Observe** → **Predict** → **Experiment** → **Record** → **Compare** → **Explain** → **Apply**. This approach closely reflects the activity-based nature of the uploaded chapter and helps Grade 6 students move from simple observation of water to understanding evaporation, condensation, changes of state, cloud formation and the water cycle.

8.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for Grade 6:
Here are innovative, student-friendly activities that can make the chapter more experiential, inquiry-oriented and engaging.

No.	Innovation	Suggested Teaching–Learning Activity
1	**Mini Water-Cycle Laboratory**	Students can create a miniature water-cycle model using a transparent container, water and a transparent cover. They observe evaporation and condensation and relate their observations to cloud and rain formation described in the chapter.
2	**Evaporation Detective Challenge**	Give groups equal quantities of water and different conditions such as a plate/bottle cap, sunlight/shade and moving/still air. Students predict which sample will disappear first, record evaporation time and justify their conclusions using evidence.
3	**DIY Eco-Friendly Pot-in-Pot Cooler**	Students can construct a small pot-in-pot cooler using two earthen pots, sand and water and investigate its cooling effect. The activity connects evaporation with a practical, electricity-free cooling technology.
4	**"Catch Water from Air" Challenge**	Students observe droplets forming on a glass containing ice-cold water and investigate where the water comes from. They can mark the water level inside the glass and use their observations to establish that atmospheric water vapour undergoes condensation.
5	**Water Molecule Role-Play**	Students themselves act as "water particles": standing closely together for ice, moving around while remaining relatively close for liquid water, and spreading throughout the available classroom space to represent water vapour. The activity can be followed by discussion of the chapter's observable properties of the three states.
6	**Digital Water Journey Story**	Students can create a short digital story titled **"My Journey as a Drop of Water"**, showing a drop travelling from an ocean or water body through evaporation, cloud formation, precipitation and back to the Earth's surface. This converts the water cycle into a creative storytelling activity.
7	**Weather–Evaporation Diary**	For one week, students can record whether the day is sunny, cloudy, windy or rainy and observe how quickly a small controlled sample

No.	Innovation	Suggested Teaching–Learning Activity
		of water evaporates. They can relate their observations to sunlight, movement of air and humidity discussed in the chapter.
8	**Cloud-in-a-Bottle Investigation**	Under teacher supervision, students can perform or observe the chapter's bottle activity and investigate how tiny particles assist the formation of cloud-like droplets. Students can then explain the role of dust particles in natural cloud formation.
9	**Water-State Concept Card Game**	Prepare cards containing terms such as **ice, water, water vapour, melting, freezing, evaporation and condensation**. Teams compete to arrange them into scientifically correct transformations and explain each connection.
10	**Student-as-a-Scientist Data Challenge**	Students can measure and record mass at fixed intervals during the cold-glass experiment or record the time required for evaporation under different conditions. They can convert their observations into simple tables or graphs and present their conclusions.
11	**Design-a-Drying-System Challenge**	Give students the problem: **“How can we dry a wet cloth as quickly as possible?”** Teams design a solution using ideas of exposed surface area, sunlight and movement of air, then explain why their design should work.
12	**Water-Saving Innovation Challenge**	Students conduct a simple school/home water audit and design a poster, model or prototype showing ways to reduce wastage and prevent pollution of water sources. This connects the scientific water cycle with the chapter's emphasis on wise use and conservation of usable water.

Particularly Suitable Innovations for Grade 6
For a Grade 6 classroom, the most engaging combination would be **Evaporation Detective Challenge + Catch Water from Air + DIY Pot-in-Pot Cooler + Water Molecule Role-Play + Digital Water Journey Story**. Together, these turn the chapter from a definition-based lesson into **observe → experiment → discover → create → apply** learning while remaining closely connected to the activities and concepts in the uploaded chapter.

8.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. The solid state of water is called __________.
   Answer: Ice

2. The gaseous state of water is called __________.
   Answer: Water vapour

3. The conversion of water into water vapour is called __________.
   Answer: Evaporation

4. The conversion of water vapour into liquid water is called __________.
   Answer: Condensation

5. The conversion of ice into liquid water is called __________.
   Answer: Melting

6. The conversion of liquid water into ice is called __________.
   Answer: Freezing

7. The amount of water vapour present in the air is called __________.
   Answer: Humidity

8. Water evaporates faster when a __________ surface area is exposed to air.
   Answer: Larger

9. Increased movement of __________ speeds up evaporation.
   Answer: Air

10. The continuous circulation of water between the Earth's surface and atmosphere is called the __________.
    Answer: Water cycle

B. One-Mark Descriptive Questions:

1. **What is evaporation?**
   Answer: Evaporation is the process of conversion of liquid water into water vapour.

2. **What is condensation?**
   Answer: Condensation is the conversion of water vapour into liquid water.

3. **What is humidity?**
   Answer: Humidity is the amount of water vapour present in the air.

4. **Name the three states of water.**
   Answer: The three states of water are solid, liquid and gaseous.

5. **Why do water droplets appear outside a cold glass?**
   Answer: Water vapour in the surrounding air condenses on the cold surface and forms water droplets.

6. **Why do clothes dry faster on a windy day?**
   Answer: Increased movement of air speeds up the evaporation of water from clothes.

7. **Why do clothes dry slowly on a rainy day?**
   Answer: High humidity on rainy days slows down evaporation.

8. **What is melting?**
   Answer: Melting is the conversion of a solid into its liquid state.

9. **What is freezing?**
   Answer: Freezing is the conversion of a liquid into its solid state.

10. **What happens to the shape of water when it is poured into another container?**
    Answer: Water takes the shape of the container into which it is poured.

C. Two-Mark Descriptive Questions:

1. **State two properties of ice.**
   Answer:
   - Ice has a fixed shape.
   - Ice does not flow or spread like liquid water.

2. **State two properties of liquid water.**
   Answer:
   - Liquid water has no fixed shape and takes the shape of its container.
   - It can flow and spread while its volume remains constant.
3. **Differentiate between evaporation and condensation.**
   Answer:
   - Evaporation changes liquid water into water vapour.
   - Condensation changes water vapour into liquid water.
4. **How does surface area affect evaporation?**
   Answer:
   - A larger exposed surface area increases evaporation.
   - Therefore, water in a wide plate evaporates faster than the same amount in a bottle cap.
5. **How do sunlight and movement of air affect evaporation?**
   Answer:
   - Water evaporates faster in sunlight than in shade.
   - Increased movement of air also speeds up evaporation.
6. **Why does an earthen pot keep water cool?**
   Answer:
   - A small amount of water reaches the outer surface through the tiny pores of the pot.
   - This water evaporates and produces a cooling effect.
7. **How are clouds formed?**
   Answer:
   - Rising moist air cools, causing water vapour to condense around tiny dust particles.
   - The resulting tiny water droplets remain suspended together and form clouds.
8. **How does rain form from clouds?**
   Answer:
   - Tiny water droplets in clouds combine to form larger drops.
   - When they become sufficiently heavy, they fall towards the Earth as rain.

D. Three-Mark Descriptive Questions:

1. **Describe the three states of water and one property of each.**
   Answer:
   - Ice is the solid state and has a fixed shape.
   - Liquid water has no fixed shape and takes the shape of its container.
   - Water vapour is the gaseous state and spreads throughout the available space.

2. **Explain three factors that affect evaporation.**
   Answer:
   - A larger exposed surface area increases evaporation.
   - Sunlight helps water evaporate faster.
   - Increased movement of air speeds up evaporation.
3. **Explain the formation of water droplets on the outside of a cold glass.**
   Answer:
   - Water vapour is present in the surrounding air.
   - It cools when it comes in contact with the cold surface of the glass.
   - The vapour condenses into liquid water droplets on the outer surface.
4. **Explain how heating and cooling change the states of water.**
   Answer:
   - Heating ice causes it to melt into liquid water.
   - Further heating changes water into water vapour.
   - Cooling liquid water sufficiently changes it into solid ice.
5. **Explain how an earthen pot keeps water cool.**
   Answer:
   - A small quantity of water seeps through the tiny pores of the earthen pot.
   - This water reaches the outer surface and evaporates.
   - Evaporation produces a cooling effect that keeps the water inside cool.
6. **Describe cloud formation in three stages.**
   Answer:
   - Moist air rises and becomes cooler.
   - Water vapour condenses around tiny dust particles to form water droplets.
   - These droplets remain suspended together in the atmosphere and form clouds.
7. **Why do wet clothes dry differently on sunny, windy and rainy days?**
   Answer:
   - Sunlight increases evaporation and helps clothes dry faster.
   - Increased air movement on a windy day also speeds up evaporation.
   - High humidity on a rainy day slows evaporation and makes clothes dry slowly.

E. Five-Mark Descriptive Questions:

1. **Explain the three states of water and how water changes from one state to another.**
   Answer:
   - Water exists as solid ice, liquid water and gaseous water vapour.
   - Ice has a fixed shape, while liquid water takes the shape of its container.

- Water vapour spreads throughout the available space.
- Heating causes ice to melt into water and water to change into water vapour.
- Cooling can change water back into ice, while condensation changes water vapour into liquid water.

2. **Describe an experiment to show that exposed surface area affects evaporation.**
   Answer:
   - Take the same amount of water in a bottle cap and a plate.
   - Keep both under similar environmental conditions.
   - Observe them regularly and record the time taken for complete evaporation.
   - Water in the plate evaporates faster because it has a larger exposed surface area.
   - Thus, the experiment shows that a larger exposed surface area increases evaporation.
3. **Explain the factors affecting the drying of wet clothes.**
   Answer:
   - Spreading clothes increases the surface area exposed to air.
   - Water evaporates faster in sunlight than in shade.
   - Greater movement of air helps water evaporate faster.
   - High humidity slows down evaporation.
   - Therefore, clothes generally dry fastest when spread out under sunny and windy conditions.
4. **Explain the formation of clouds and rain.**
   Answer:
   - Moist air containing water vapour rises in the atmosphere.
   - As it rises, the air becomes cooler.
   - Water vapour condenses around tiny dust particles to form small water droplets.
   - These droplets together form clouds and gradually combine into larger drops.
   - When the drops become sufficiently heavy, they fall towards the Earth as rain.
5. **Describe the water cycle and explain its importance.**
   Answer:
   - Water from oceans and the Earth's surface evaporates into the atmosphere.
   - The water vapour rises, cools and condenses to contribute to cloud formation.
   - Water returns to the Earth as precipitation such as rain, hail or snow.
   - It eventually flows back towards water bodies and continues circulating.
   - This continuous circulation is the water cycle, but usable water is limited and therefore must be used wisely and protected from pollution.

6. **Explain the working and usefulness of a pot-in-pot cooler.**
Answer:

- A smaller earthen pot is placed inside a larger earthen pot.
- The space between the pots is filled with sand.
- The sand is kept moist with water.
- Evaporation of this water through the porous earthen pots produces a cooling effect.
- Thus, the inner pot can keep its contents cool without using electricity.

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6th Standard Science Book Chapter 9

Chapter 9: Methods of Separation in Everyday Life

9.1 Summary of the Chapter:

Summary:

(1) **Separation of substances** is an important activity in everyday life. We separate the components of mixtures either to **remove unwanted substances** or to obtain **different useful components**.

(2) **Handpicking** is used when unwanted solid particles are present in small quantities and can be easily picked by hand. It works mainly on differences in **size, colour, and shape**, such as removing stones from grains.

(3) **Threshing** is the process of separating grains from harvested stalks by beating the stalks. Modern threshing machines can also perform threshing and winnowing together.

(4) **Winnowing** separates the **lighter and heavier components** of a mixture using wind or blowing air. For example, lighter husk is blown away while the heavier grains fall nearby.

(5) **Sieving** is used to separate solid particles of different sizes. Smaller particles pass through the holes of the sieve, while larger particles remain on it; for example, bran can be separated from flour.

(6) **Evaporation** helps separate a dissolved solid from a liquid. When seawater or a salt solution is allowed to evaporate, the water changes into vapour and the salt remains behind.

(7) **Sedimentation and decantation** are useful for separating insoluble substances from liquids. In sedimentation, heavier insoluble particles settle at the bottom; in decantation, the liquid above them is carefully poured off.

(8) **Filtration** separates an insoluble solid from a liquid using materials having small pores, such as cloth, strainers, or filter paper. In filtering muddy water, mud remains as the **residue**, while clear water collected after passing through the filter is the **filtrate**.

(9) **Churning** is used to separate butter from curd. During churning, the lighter butter collects or floats at the top, while buttermilk remains behind.

(10) **Magnetic separation** is used to separate magnetic materials from non-magnetic materials. For example, a magnet can separate iron nails from sawdust, and magnets are also used to recover scrap iron from waste for recycling.

In short: The chapter introduces **handpicking, threshing, winnowing, sieving, evaporation, sedimentation, decantation, filtration, churning, and magnetic separation**, showing how the appropriate method is chosen according to the properties of the components in a mixture.

9.2 Important Formulas:

This chapter is mainly **conceptual and activity-based** and does **not prescribe specific mathematical formulas**. Its focus is on choosing separation methods according to properties such as particle size, weight, solubility, and magnetism.

However, the following **simple mathematical relationships** are useful for creating and solving quantitative/application-based problems related to the chapter.

No.	Quantity / Concept	Formula / Relationship
1	**Total mass of a mixture**	**Mass of mixture = Mass of component 1 + Mass of component 2 + …**

No.	Quantity / Concept	Formula / Relationship
2	Mass of separated component	Mass of component = Mass of mixture − Mass of other component(s)
3	Percentage of a component	Percentage = (Mass of component ÷ Total mass of mixture) × 100
4	Percentage of impurity	Impurity % = (Mass of impurity ÷ Mass of mixture) × 100
5	Percentage of useful material	Useful material % = (Mass of useful material ÷ Mass of mixture) × 100
6	Mass recovered after separation	Mass recovered = Final mass of separated substance
7	Percentage recovery	Recovery % = (Mass recovered ÷ Initial mass of substance) × 100
8	Loss during separation	Mass lost = Initial mass − Total mass recovered
9	Percentage loss	Loss % = (Mass lost ÷ Initial mass) × 100
10	Amount of liquid evaporated	Liquid evaporated = Initial quantity of solution − Quantity remaining
11	Filtration relationship	Mixture → Residue + Filtrate
12	Mass balance during filtration	Mass of mixture ≈ Mass of residue + Mass of filtrate
13	Filtration rate	Filtration rate = Volume of filtrate ÷ Time taken
14	Average separation rate	Separation rate = Quantity separated ÷ Time taken
15	Percentage separated	% separated = (Quantity separated ÷ Initial quantity) × 100

Chapter-specific applications:
Evaporation: The chapter demonstrates obtaining salt from salt solution by evaporating the water.
Mass of water evaporated = Initial mass of salt solution − Mass of salt remaining
For example, if 100 g of salt solution leaves 8 g of salt:
Mass of water evaporated = 100 − 8 = 92 g
Filtration: Muddy water passes through filter paper, producing **mud as residue** and clearer water as **filtrate**.
Total mixture ≈ Residue + Filtrate
Winnowing: The method separates lighter material such as husk from heavier grains.
For numerical questions:
Mass of husk = Mass of original mixture − Mass of grains obtained
Sieving: Different-sized solid particles are separated using a sieve.
Mass retained + Mass passing through sieve ≈ Initial mass of mixture
Churning: Butter is separated from curd, with the lighter butter collecting at the top.
Butter yield % = (Mass of butter obtained ÷ Mass of curd used) × 100
Magnetic separation: Magnetic materials such as iron can be separated from non-magnetic substances such as sawdust.
Magnetic material % = (Mass of magnetic material separated ÷ Initial mass of mixture) × 100
Important unit conversions
For Grade 6 quantitative questions, students should also remember:

1 kg = 1000 g
1 g = 1000 mg
1 L = 1000 mL
1 minute = 60 seconds
Percentage = Fraction × 100
Most important formulas for examination practice
The **five most useful relationships** for numerical problems based on this chapter are:
1. Mass of mixture = Sum of masses of all components
2. Mass of separated substance = Initial mass − Mass of remaining substance
3. Percentage of component = (Mass of component / Mass of mixture) × 100
4. Percentage recovery = (Mass recovered / Initial mass) × 100
5. Separation/filtration rate = Quantity separated / Time taken
These are **supporting quantitative relationships rather than formulas explicitly given in the textbook**; the chapter itself emphasizes identifying and applying appropriate separation methods.

9.3 Fill-Up the Blank LOTS type questions with Answers: (30 Questions)

LOTS – Fill in the Blanks with Answers:

1. The method of picking unwanted substances from a mixture by hand is called __________.
   Answer: Handpicking
2. Handpicking is based on differences in size, colour and __________ of particles.
   Answer: Shape
3. The process of separating grains from stalks is called __________.
   Answer: Threshing
4. In threshing, harvested stalks are __________ to separate the grains.
   Answer: Beaten
5. The method of separating heavier and lighter components using wind or blowing air is called __________.
   Answer: Winnowing
6. During winnowing, the lighter __________ is blown away from the heavier grains.
   Answer: Husk
7. Traditionally, a __________ or bamboo tray is used for winnowing.
   Answer: Soop
8. The method used to separate solid particles of different sizes using a sieve is called __________.
   Answer: Sieving
9. During sieving of flour, fine flour particles pass through the __________ of the sieve.
   Answer: Holes
10. Seawater is a mixture containing salts and other substances dissolved in __________.
    Answer: Water
11. The conversion of a liquid into its vapour is called __________.
    Answer: Evaporation
12. Common salt can be obtained from seawater by allowing the water to __________.
    Answer: Evaporate
13. The settling down of a heavier insoluble component at the bottom of a liquid is called __________.
    Answer: Sedimentation

14. The process of removing a liquid by carefully tilting the vessel after sedimentation is called __________.
    Answer: Decantation
15. The process of separating tea leaves from prepared tea using a strainer is called __________.
    Answer: Filtration
16. A filter paper contains very fine __________ through which liquid can pass.
    Answer: Pores
17. The solid material left behind on the filter paper after filtration is called the __________.
    Answer: Residue
18. The liquid that passes through the filter paper and is collected is called the __________.
    Answer: Filtrate
19. Cotton, charcoal and __________ can also be used as filtering materials.
    Answer: Sand
20. The choice of a filter depends upon the __________ of the particles to be removed.
    Answer: Size
21. The process used to separate butter from curd is called __________.
    Answer: Churning
22. During churning, butter being __________ floats at the top.
    Answer: Lighter
23. Substances that are attracted towards a magnet are called __________ substances.
    Answer: Magnetic
24. __________ is a common example of a magnetic substance.
    Answer: Iron
25. The separation of magnetic and non-magnetic substances using a magnet is called __________.
    Answer: Magnetic separation
26. Iron nails can be separated from __________ using a magnet.
    Answer: Sawdust
27. Modern machines used for separating grains from stalks are called __________.
    Answer: Threshers
28. Threshing machines can perform both threshing and __________ simultaneously.
    Answer: Winnowing
29. Decantation is also used while washing and cleaning rice and __________.
    Answer: Pulses
30. A mixture containing more than two components may require a __________ of several separation methods.
    Answer: Combination

9.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS – Fill in the Blanks with Answers:

1. A farmer wants to separate a large quantity of light husk from heavier wheat grains. The most suitable method is __________.
   Answer: Winnowing
2. If wheat grains contain only a few visible stones of different sizes and colours, the most convenient separation method is __________.
   Answer: Handpicking

3. If there is no natural wind during winnowing, the separation can still be carried out by __________ **air**.
   Answer: Blowing
4. A mixture of flour and bran can be separated because their particles differ mainly in __________.
   Answer: Size
5. If the holes of a sieve are larger than both components of a mixture, effective __________ will not occur.
   Answer: Sieving
6. A student leaves salt solution in sunlight for several days. The water disappears and salt remains because of __________.
   Answer: Evaporation
7. To recover salt from a salt solution, the component that must be removed by evaporation is __________.
   Answer: Water
8. White patches appearing on dark clothes after sweat dries indicate that water has __________, leaving dissolved substances behind.
   Answer: Evaporated
9. Muddy water kept undisturbed for some time develops a layer of mud at the bottom due to __________.
   Answer: Sedimentation
10. After mud settles at the bottom of a container, the clearer upper water can be carefully separated by __________.
    Answer: Decantation
11. A mixture of oil and water is allowed to stand until separate layers form. The upper layer can then be removed using __________.
    Answer: Decantation
12. Decantation may leave some fine solid particles in the liquid; therefore, __________ can be used for more effective separation.
    Answer: Filtration
13. When muddy water is passed through filter paper, the mud left on the paper is called the __________.
    Answer: Residue
14. In the same filtration experiment, the water collected in the conical flask is called the __________.
    Answer: Filtrate
15. If impurities pass through a filter because they are extremely small, a filter having __________ pores should be used.
    Answer: Smaller
16. A student uses cloth instead of filter paper to clean muddy water. The cloth works as a filter because it has tiny __________ between its woven threads.
    Answer: Pores
17. When curd is churned, butter comes to the top because butter is __________ than buttermilk.
    Answer: Lighter
18. To obtain butter from curd, __________ would be more appropriate than filtration.
    Answer: Churning
19. If iron nails accidentally fall into sawdust, using a __________ is more efficient than picking each nail by hand.
    Answer: Magnet

20. Iron nails can be separated from sawdust because iron is a __________ substance.
    Answer: Magnetic
21. A mixture of iron powder and sawdust can be separated by exploiting the difference in their __________ **properties**.
    Answer: Magnetic
22. Recyclers can recover iron objects from mixed waste using __________ **separation**.
    Answer: Magnetic
23. A mixture containing stones, iron nails and sand would require more than one method because it contains __________ components with different properties.
    Answer: Several
24. To separate iron nails, sand, stones, salt and water completely, a __________ **of separation methods** would be required.
    Answer: Combination
25. If a mixture contains large potatoes and fine salt, the difference in their __________ can be used for separation.
    Answer: Size
26. A fishing net allows water to pass through its mesh while retaining fish; this action is similar to __________.
    Answer: Filtration
27. If fine flour passes through a sieve while bran remains behind, the component with the **__________ particle size passes through the sieve.
    Answer: Smaller
28. When harvested wheat stalks are beaten first and the resulting grains and husk are later exposed to wind, the two methods used in sequence are __________ **and winnowing**.
    Answer: Threshing
29. A modern thresher can save labour because it can perform threshing and __________ **simultaneously**.
    Answer: Winnowing
30. The choice of an appropriate separation method depends mainly on the __________ **of the components of the mixture**.
    Answer: Properties

These HOTS fill-ups require students to **analyse a situation, identify the relevant property of the substances, and then select or infer the appropriate separation method**, rather than simply recalling definitions. The chapter itself encourages this kind of reasoning by asking students to determine the correct sequence and properties needed to separate multicomponent mixtures.

9.5 One-mark questions with Answers of LOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers — LOTS Type:

1. **What is a mixture?**
   Answer: A mixture is formed when two or more substances are mixed together.
2. **What is handpicking?**
   Answer: Handpicking is the method of separating unwanted particles from a mixture by picking them by hand.
3. **On what basis are substances separated by handpicking?**
   Answer: Handpicking separates substances based on differences in their size, colour and shape.

4. **What is threshing?**
   Answer: Threshing is the process of separating grains from stalks by beating the stalks.
5. **Why are harvested stalks sometimes dried before threshing?**
   Answer: Harvested stalks are dried to facilitate the separation of grains from the stalks.
6. **What is winnowing?**
   Answer: Winnowing is the method of separating heavier and lighter components of a mixture using wind or blowing air.
7. **Which traditional device is used for winnowing?**
   Answer: A *soop* or bamboo tray is traditionally used for winnowing.
8. **What happens to the husk during winnowing?**
   Answer: The lighter husk is blown away while the heavier grains fall nearby.
9. **What is sieving?**
   Answer: Sieving is the process of separating solid components of different particle sizes using a sieve.
10. **What remains on the sieve when flour containing bran is sieved?**
    Answer: Larger particles such as bran and small stones remain on the sieve.
11. **What is evaporation?**
    Answer: Evaporation is the process in which a liquid changes into its vapour.
12. **How can common salt be obtained from seawater?**
    Answer: Common salt can be obtained by allowing the water in seawater to evaporate and then further purifying the remaining solid mixture.
13. **What is sedimentation?**
    Answer: Sedimentation is the process in which a heavier insoluble component settles at the bottom of a liquid.
14. **What is decantation?**
    Answer: Decantation is the process of removing a liquid by carefully tilting the vessel after the heavier component has settled.
15. **Give one household use of decantation.**
    Answer: Decantation is used while washing and cleaning rice and pulses.
16. **What is filtration?**
    Answer: Filtration is a method used to separate an insoluble solid component from a liquid.
17. **Why can a piece of cloth be used as a filter?**
    Answer: A piece of cloth can act as a filter because it has small pores between its woven threads.
18. **What is residue in filtration?**
    Answer: Residue is the solid material that remains on the filter after filtration.
19. **What is filtrate?**
    Answer: Filtrate is the liquid that passes through the filter and is collected after filtration.
20. **Name any two materials other than filter paper that can be used as filters.**
    Answer: Cotton and sand can be used as filtering materials.
21. **What determines the choice of a filter?**
    Answer: The choice of a filter depends on the size of the particles to be removed.
22. **What is churning?**
    Answer: Churning is a method used to separate butter from curd.
23. **Why does butter float at the top during churning?**
    Answer: Butter floats at the top because it is lighter than buttermilk.

24. **What are magnetic substances?**
    Answer: Substances that are attracted towards a magnet are called magnetic substances.
25. **Give one example of a magnetic substance.**
    Answer: Iron is a common example of a magnetic substance.
26. **What is magnetic separation?**
    Answer: Magnetic separation is the separation of magnetic and non-magnetic substances using a magnet.
27. **How can iron nails be separated from sawdust?**
    Answer: Iron nails can be separated from sawdust by using a magnet.
28. **How is magnetic separation useful in recycling?**
    Answer: Magnets are used to separate scrap iron from waste so that the iron can be recycled and reused.
29. **What are threshers?**
    Answer: Threshers are machines used to separate grains from stalks and husk.
30. **Which two separation processes can modern threshing machines perform simultaneously?**
    Answer: Modern threshing machines can perform threshing and winnowing simultaneously.
31. **Name the method used to separate tea leaves from tea.**
    Answer: Filtration is used to separate tea leaves from tea.
32. **Name the method used to separate pebbles from sand.**
    Answer: Sieving can be used to separate pebbles from sand.
33. **Name the method used to separate oil from water after the layers have formed.**
    Answer: Decantation can be used to separate oil from water.
34. **Name the method used to separate salt from a salt solution.**
    Answer: Evaporation is used to separate salt from a salt solution.
35. **Why may more than one separation method be required for a complex mixture?**
    Answer: A mixture containing more than two components may require a combination of several separation methods.

9.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers — HOTS Type:

1. **Why is handpicking suitable for removing a few stones from rice?**
   Answer: Handpicking is suitable because the stones are present in small quantities and can be easily distinguished and picked by hand.
2. **A farmer has a large quantity of grains mixed with husk; why is handpicking unsuitable?**
   Answer: Handpicking is unsuitable because separating a large quantity of husk manually would be difficult and time-consuming.
3. **Which method would you choose to separate husk from wheat grains and why?**
   Answer: Winnowing should be used because the lighter husk can be blown away while the heavier grains fall nearby.
4. **Valli cannot winnow rice and husk in a closed room; how can she solve the problem?**
   Answer: She can use a fan or blow air to provide the moving air required for winnowing.

5. **Why is threshing used before winnowing while processing harvested wheat?**
   Answer: Threshing first separates grains from the stalks, after which winnowing can separate the lighter husk from the heavier grains.
6. **Why can flour and bran be separated by sieving?**
   Answer: Flour and bran can be separated by sieving because their particles differ in size.
7. **What would happen if the holes of a sieve were larger than both components of a mixture?**
   Answer: Both components would pass through the sieve, so they would not be separated effectively.
8. **Why is evaporation suitable for obtaining salt from a salt solution?**
   Answer: Evaporation removes the water as vapour and leaves the dissolved salt behind.
9. **Why does salt remain in a dish after a salt solution is heated until the water boils away?**
   Answer: Salt remains because the water is removed while the dissolved salt does not evaporate with it.
10. **Why do white patches sometimes appear on dark clothes after sweat dries?**
    Answer: White patches appear because water in the sweat evaporates and leaves dissolved substances behind.
11. **Why should muddy water be left undisturbed before decantation?**
    Answer: Muddy water should be left undisturbed so that the heavier insoluble mud particles can settle at the bottom by sedimentation.
12. **Why may decantation fail to remove all tea leaves from tea?**
    Answer: Decantation may leave some tea leaves in the liquid because it does not completely separate all the solid particles.
13. **Why is filtration more effective than decantation for removing small tea leaves from tea?**
    Answer: Filtration is more effective because the strainer retains the tea leaves while allowing the liquid tea to pass through.
14. **Why can a piece of cloth be used to filter muddy water?**
    Answer: Cloth can filter muddy water because the small pores between its woven threads can retain some insoluble particles.
15. **If fine mud passes through a cloth filter, what should you use instead?**
    Answer: A filter with finer pores, such as filter paper, should be used to retain the smaller mud particles.
16. **Why does filter paper give clearer water than a filter having larger pores?**
    Answer: Filter paper has very fine pores that can retain smaller insoluble particles.
17. **How is a fishing net similar to a filter?**
    Answer: A fishing net allows water to pass through its mesh while retaining larger objects such as fish.
18. **Why does the choice of filter depend on the size of impurities?**
    Answer: The filter must have suitable pores to retain the particles that need to be removed.
19. **Why does butter collect at the top when curd is churned?**
    Answer: Butter collects at the top because it is lighter than the buttermilk.
20. **A carpenter drops iron nails into sawdust; why is a magnet better than handpicking?**
    Answer: A magnet can quickly attract and remove the magnetic iron nails from the non-magnetic sawdust.

21. **Why can magnetic separation not be used to separate sand from sawdust?**
Answer: Magnetic separation cannot be used because neither sand nor sawdust is attracted to a magnet.
22. **How does magnetic separation help in recycling waste?**
Answer: Magnetic separation removes scrap iron from mixed waste so that the iron can be recycled and reused.
23. **Which method would you use first to separate iron nails from a mixture of iron nails and sand?**
Answer: Magnetic separation should be used first because iron nails are attracted by a magnet.
24. **A mixture contains large potatoes and fine salt; which property can help separate them?**
Answer: The difference in the sizes of potatoes and salt can be used for their separation.
25. **Why is decantation suitable for separating oil and water?**
Answer: Decantation is suitable because oil and water do not mix and form separate layers when left undisturbed.
26. **Which method would you choose to separate pebbles from fine sand and why?**
Answer: Sieving should be chosen because pebbles and sand have different particle sizes.
27. **Why can one separation method be insufficient for a mixture containing several substances?**
Answer: Different components may have different properties, so a combination of separation methods may be required.
28. **How would you separate iron nails first from a mixture containing iron nails, sand and salt?**
Answer: A magnet should first be used to attract and remove the iron nails.
29. **Which property should you examine before choosing a method of separation?**
Answer: The relevant differences in the components' properties, such as size, weight, solubility or magnetic behaviour, should be examined before selecting a method.
30. **Why are modern threshers more efficient than performing threshing and winnowing separately?**
Answer: Modern threshers are more efficient because they can perform threshing and winnowing simultaneously.

9.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers — LOTS Type:

1. **What is handpicking? When is it useful?**
Answer:
    1. Handpicking is the method of separating unwanted particles from a mixture by picking them by hand.
    2. It is useful when the unwanted particles are present in small quantities and differ in size, colour or shape.
2. **What is threshing? Give one example of its use.**
Answer:
    1. Threshing is the process of separating grains from harvested stalks by beating the stalks.
    2. It is commonly used to separate wheat grains from wheat stalks.

3. **What is winnowing? On what difference does it work?**
   Answer:
   1. Winnowing is the method of separating heavier and lighter components of a mixture using wind or blowing air.
   2. It works on the difference between the heavier grains and lighter components such as husk.
4. **What happens to grains and husk during winnowing?**
   Answer:
   1. The lighter husk is carried away by the wind or blown air.
   2. The heavier grains fall down closer to the person performing the winnowing.
5. **What are threshers? What functions do they perform?**
   Answer:
   1. Threshers are machines developed for separating grains from stalks and husk.
   2. They can perform both threshing and winnowing simultaneously.
6. **What is sieving? Give one example.**
   Answer:
   1. Sieving is the process of separating solid components of a mixture based on differences in particle size.
   2. For example, a sieve can separate fine flour from larger particles such as bran and small stones.
7. **Explain how a sieve separates bran from flour.**
   Answer:
   1. Fine flour particles pass through the holes of the sieve.
   2. Larger particles such as bran remain on the sieve.
8. **What is evaporation? How is it useful in separation?**
   Answer:
   1. Evaporation is the process in which a liquid changes into its vapour.
   2. It can be used to separate a dissolved solid from a liquid, such as salt from salt solution.
9. **How is common salt obtained from seawater?**
   Answer:
   1. Seawater is kept in shallow pits and exposed to sunlight and air so that the water evaporates.
   2. The solid mixture left behind is further purified to obtain common salt.
10. **What is sedimentation? What happens during this process?**
    Answer:
    1. Sedimentation is the process in which a heavier insoluble component settles at the bottom of a liquid.
    2. On keeping the mixture undisturbed, the heavier particles gradually collect at the bottom.
11. **What is decantation? Mention one everyday use.**
    Answer:
    1. Decantation is the process of removing a liquid by carefully tilting the vessel after the heavier component has settled.
    2. It is used while washing and cleaning rice and pulses.
12. **What is filtration? Give one example.**
    Answer:
    1. Filtration is a process used to separate an insoluble solid component from a liquid.
    2. For example, tea leaves can be separated from prepared tea using a strainer.

13. **What are residue and filtrate?**
    Answer:
    1. The solid substance retained on the filter paper after filtration is called the **residue**.
    2. The liquid that passes through the filter paper and is collected is called the **filtrate**.
14. **Why can a piece of cloth be used as a filter? What can be used for finer impurities?**
    Answer:
    1. A piece of cloth can act as a filter because it contains small pores between its woven threads.
    2. For finer impurities, filter paper with very fine pores can be used.
15. **Name some materials that can be used as filters. What determines the choice of filter?**
    Answer:
    1. Filter paper, cotton, charcoal and sand are examples of materials that can be used as filters.
    2. The choice of filter depends upon the size of the particles that need to be removed.
16. **What is churning? What happens to butter during churning?**
    Answer:
    1. Churning is the process used to separate butter from curd.
    2. The butter, being lighter, floats at the top while the buttermilk is left behind.
17. **What are magnetic substances? Give one example.**
    Answer:
    1. Substances that are attracted towards a magnet are called magnetic substances.
    2. Iron is a common example of a magnetic substance.
18. **What is magnetic separation? Give one example.**
    Answer:
    1. Magnetic separation is the separation of magnetic and non-magnetic substances using a magnet.
    2. For example, iron nails can be separated from sawdust using a magnet.
19. **How is magnetic separation used in recycling?**
    Answer:
    1. Magnets are used to separate iron articles or scrap iron from heaps of waste materials.
    2. The separated scrap iron can then be recycled and reused.
20. **State the two main purposes of separating substances.**
    Answer:
    1. Separation may be carried out to obtain two different but useful components of a mixture.
    2. It may also be carried out to remove a component that is not useful.
21. **Differentiate between sedimentation and decantation.**
    Answer:
    1. Sedimentation involves the settling of heavier insoluble particles at the bottom of a liquid.
    2. Decantation involves carefully pouring off the liquid after the particles have settled.
22. **Differentiate between threshing and winnowing.**
    Answer:

1. Threshing separates grains from stalks by beating the harvested stalks.
2. Winnowing separates lighter husk from heavier grains using wind or blowing air.

23. **How are flour and bran separated using a sieve?**
    Answer:
    1. The smaller flour particles pass through the holes of the sieve.
    2. The larger bran particles remain on the sieve and are thus separated.
24. **What happens when muddy water is passed through filter paper?**
    Answer:
    1. Mud particles remain on the filter paper as residue.
    2. Clearer water passes through the filter paper and is collected as filtrate.
25. **Why may a mixture containing several components require more than one separation method?**
    Answer:
    1. Different components of a mixture may have different properties that can be used for their separation.
    2. Therefore, a mixture containing several components may require a combination of separation methods.

9.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers — HOTS Type:

1. **A bowl of rice contains a few visible stones. Which separation method would you choose and why?**
   Answer:
   1. I would use **handpicking** to remove the stones from the rice.
   2. This method is suitable because the stones are few in number and can be easily distinguished from the rice grains.
2. **Why is winnowing more suitable than handpicking for separating husk from a large quantity of grains?**
   Answer:
   1. Winnowing uses moving air to carry away the lighter husk while the heavier grains fall nearby.
   2. It is therefore more convenient than picking a large quantity of husk by hand.
3. **A farmer has separated grains from stalks, but the grains are still mixed with husk. What should be done next and why?**
   Answer:
   1. The farmer should use **winnowing** after threshing.
   2. Winnowing will separate the lighter husk from the heavier grains using wind or blowing air.
4. **Why are threshing and winnowing often used one after another?**
   Answer:
   1. Threshing first separates the grains from the harvested stalks.
   2. Winnowing then separates the lighter husk from the heavier grains.
5. **A student tries to separate flour and bran by handpicking. Suggest a better method and justify your answer.**
   Answer:
   1. The student should use **sieving** because flour and bran differ in particle size.
   2. Fine flour passes through the sieve holes while the larger bran particles remain on the sieve.

6. **What would happen if the holes of a sieve were too large while separating flour from bran? Explain.**
   Answer:
   1. Some or all of the larger bran particles could pass through the sieve along with the flour.
   2. Therefore, effective separation requires a sieve with appropriately sized holes.
7. **A student wants to obtain salt from salt water. Which method should be used and why?**
   Answer:
   1. The student should use **evaporation** to remove the water from the salt solution.
   2. As the water evaporates, the dissolved salt remains behind as a solid.
8. **Why are shallow pits useful for obtaining salt from seawater?**
   Answer:
   1. Seawater in shallow pits is exposed to sunlight and air, allowing the water to evaporate.
   2. After evaporation, solid salts remain behind for further purification.
9. **Muddy water is kept undisturbed for some time. What changes would you expect and why?**
   Answer:
   1. The heavier insoluble mud particles will settle at the bottom due to **sedimentation**.
   2. The clearer upper layer of water can then be separated by **decantation**.
10. **Why should muddy water not be shaken immediately before decantation?**
    Answer:
    1. Shaking would mix the settled mud particles back into the water.
    2. The mixture must remain undisturbed so that sedimentation occurs before decantation.
11. **A student finds that decanted muddy water still contains fine particles. What should be done next?**
    Answer:
    1. The decanted water should be passed through a suitable filter, such as filter paper.
    2. Filtration can retain finer insoluble particles and allow clearer water to pass through.
12. **Why is a tea strainer more useful than decantation for separating tea leaves from prepared tea?**
    Answer:
    1. A tea strainer retains the tea leaves while allowing the liquid tea to pass through its holes.
    2. Decantation may not remove all the tea leaves as effectively as filtration.
13. **A cloth filter fails to remove very fine mud particles from water. What change would you suggest and why?**
    Answer:
    1. A filter paper with finer pores should be used instead of the cloth.
    2. Its fine pores can retain smaller insoluble particles that may pass through the cloth.
14. **Why is the same type of filter not suitable for separating every mixture?**
    Answer:
    1. Different mixtures contain particles of different sizes.

2. Therefore, a filter should be chosen according to the size of the particles that need to be removed.

15. **How is a fishing net similar to a filter used in the laboratory?**
    Answer:
    1. A fishing net allows water to pass through its openings while retaining larger objects such as fish.
    2. Similarly, a filter allows liquid to pass while retaining solid particles of suitable size.
16. **Why is churning preferred for separating butter from curd?**
    Answer:
    1. Churning causes butter to separate from the curd and collect at the top.
    2. The separated butter floats because it is lighter than the buttermilk.
17. **A box contains iron nails mixed with sawdust. How would you separate them and what property would you use?**
    Answer:
    1. A magnet should be moved over the mixture to attract and remove the iron nails.
    2. This method uses the magnetic property of iron, while sawdust is not attracted to the magnet.
18. **Why would a magnet not be useful for separating two non-magnetic substances?**
    Answer:
    1. A magnet can separate a mixture only when at least one component is attracted to it.
    2. If both substances are non-magnetic, neither will be attracted by the magnet.
19. **How does magnetic separation make recycling of iron easier?**
    Answer:
    1. Magnets can separate scrap iron from heaps containing different waste materials.
    2. The separated iron can then be collected for recycling and reuse.
20. **Oil and water are kept together in a vessel and form two layers. How can they be separated?**
    Answer:
    1. The mixture should first be allowed to remain undisturbed until distinct layers are formed.
    2. One layer can then be carefully separated from the other by **decantation**.
21. **A mixture contains iron nails, sand and small stones. Why may one separation method not be enough?**
    Answer:
    1. The components have different properties, so a magnet can first separate the iron nails.
    2. Another suitable method based on particle size would then be required to separate the sand and stones.
22. **Why is it important to study the properties of the components before selecting a separation method?**
    Answer:
    1. Separation methods work by making use of differences in properties such as size, weight or magnetic behaviour.
    2. Identifying these differences helps us select the most appropriate method for a mixture.

23. **Why can a modern thresher save farmers both time and labour?**
    Answer:
    1. A modern thresher can separate grains from stalks mechanically instead of relying entirely on manual work.
    2. It can also perform threshing and winnowing simultaneously, making the process more efficient.
24. **Suppose you have a mixture of large stones, flour and bran. How could you begin separating it?**
    Answer:
    1. The large, easily visible stones can first be removed by handpicking.
    2. The remaining flour and bran can then be separated by sieving because they differ in particle size.
25. **Why might a combination of separation methods be necessary for a complex mixture?**
    Answer:
    1. A complex mixture may contain several components that differ from one another in different properties.
    2. Therefore, the components may need to be separated step by step using more than one suitable method.

9.9. Three-mark questions with Answers of LOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers — LOTS Type:
1. What is handpicking? Explain when it is useful.
Answer:
1. Handpicking is a method in which components of a mixture are separated by picking them by hand.
2. It is useful when unwanted particles are present in a small quantity and can be easily picked.
3. The components may be identified by differences in their size, colour or shape.

2. Explain the process of threshing.
Answer:
1. Threshing is the process of separating grains from harvested stalks.
2. In this method, the harvested stalks are beaten to separate the grains from them.
3. Machines called threshers can also be used to carry out this process.

3. Explain the process of winnowing.
Answer:
1. Winnowing is used to separate heavier and lighter components of a mixture using wind or blowing air.
2. The mixture of grains and husk is dropped from a height while air is blowing.
3. The lighter husk is carried farther away while the heavier grains fall nearby.

4. Describe how sieving is used to separate flour from bran.
Answer:
1. Sieving is used when solid components of a mixture have different particle sizes.
2. During sieving, fine flour particles pass through the holes of the sieve.
3. Larger particles such as bran and small stones remain on the sieve.

5. Explain how common salt is obtained from seawater.
Answer:
1. Seawater is allowed to collect in shallow pits and is exposed to sunlight and air.
2. The water gradually evaporates, leaving a mixture of solid salts behind.

3. This solid mixture is further purified to obtain common salt.

6. What is evaporation? Explain its use in separation.

Answer:

1. Evaporation is the process by which a liquid changes into its vapour.
2. It can be used to separate a solid substance dissolved in a liquid.
3. For example, when water evaporates from a salt solution, the salt remains behind.

7. Explain sedimentation and decantation.

Answer:

1. Sedimentation is the process in which a heavier insoluble component settles at the bottom of a liquid.
2. After sedimentation, the clearer liquid remains above the settled material.
3. Carefully removing this liquid by tilting the vessel is called decantation.

8. Describe filtration with the example of muddy water.

Answer:

1. Filtration is used to separate an insoluble solid from a liquid using a suitable filter.
2. When muddy water is passed through filter paper, the mud particles are retained on the paper.
3. The clearer water passes through the filter paper and is collected in another container.

9. What are residue and filtrate? Explain with an example.

Answer:

1. The solid substance retained on a filter after filtration is called the **residue**.
2. The liquid that passes through the filter and is collected is called the **filtrate**.
3. During filtration of muddy water, mud is the residue and the water collected below is the filtrate.

10. Explain how different materials can be used as filters.

Answer:

1. Materials such as cloth, filter paper, cotton, charcoal and sand can be used for filtration.
2. A cloth acts as a filter because it has small pores between its woven threads.
3. The choice of a suitable filter depends on the size of the particles that have to be removed.

11. Explain how butter is separated from curd.

Answer:

1. Butter can be separated from curd by the process of **churning**.
2. During churning, butter separates from the curd and collects at the top.
3. Butter floats at the top because it is lighter than the buttermilk.

12. What is magnetic separation? Explain with an example.

Answer:

1. Magnetic separation is a method used to separate magnetic substances from non-magnetic substances.
2. A magnet attracts magnetic materials such as iron.
3. For example, iron nails can be separated from sawdust using a magnet.

13. How is magnetic separation useful in recycling?

Answer:

1. Waste materials may contain iron objects mixed with other substances.
2. Magnets are used to separate scrap iron from heaps of waste materials.
3. The separated iron can then be recycled and reused.

14. Explain the two main purposes of separation of substances.

Answer:

1. Separation may be carried out to remove an unwanted component from a mixture.
2. It may also be used to separate two or more useful components from one another.

3. Thus, separation helps us obtain the required or useful substances from mixtures.

15. Differentiate between threshing, winnowing and sieving.
Answer:
1. **Threshing** separates grains from harvested stalks by beating the stalks.
2. **Winnowing** separates lighter husk from heavier grains with the help of wind or blowing air.
3. **Sieving** separates solid components based on differences in their particle sizes.

16. Describe three methods commonly used for separating insoluble solids from liquids.
Answer:
1. In **sedimentation**, heavier insoluble particles are allowed to settle at the bottom of the liquid.
2. In **decantation**, the upper liquid is carefully poured away after sedimentation.
3. In **filtration**, the mixture is passed through a filter that retains the insoluble solid.

17. Explain how a filter paper works during filtration.
Answer:
1. Filter paper contains very fine pores through which the liquid can pass.
2. Insoluble solid particles larger than the pores are retained on the filter paper as residue.
3. The liquid passing through the filter paper is collected as the filtrate.

18. Describe the role of particle size in separation methods.
Answer:
1. Differences in particle size can be used to separate components of a mixture.
2. In sieving, smaller particles pass through the sieve while larger particles remain behind.
3. In filtration, the choice of filter depends on the size of the particles to be removed.

19. Explain how a modern thresher helps farmers.
Answer:
1. A thresher is a machine used for separating grains from harvested stalks.
2. Modern threshing machines can perform threshing and winnowing simultaneously.
3. Thus, they help separate the grains from both stalks and lighter husk.

20. Name and explain any three methods of separation used in everyday life.
Answer:
1. **Handpicking** is used to manually remove easily identifiable unwanted particles from a mixture.
2. **Filtration** is used to separate an insoluble solid from a liquid, such as tea leaves from tea.
3. **Churning** is used to separate butter from curd.

9.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers — HOTS Type:

1. A farmer has a mixture of wheat grains, husk and a few stones. How can the components be separated?
Answer:
1. The visible stones can first be removed from the mixture by **handpicking**.
2. The remaining grains and husk can then be subjected to **winnowing**.
3. The lighter husk is blown away by air while the heavier wheat grains fall nearby.

2. A student uses a sieve to separate flour and bran, but both pass through it. What could be the reason, and how can the problem be solved?
Answer:
1. The holes of the sieve may be too large to retain the bran particles.
2. A sieve with appropriately smaller holes should be selected.

3. The fine flour will then pass through while the larger bran particles remain on the sieve.

3. Why would handpicking not be a suitable method for separating a large quantity of husk from grains? Suggest a better method.

Answer:

1. Handpicking is convenient when unwanted particles are present in small quantities and can be easily picked.
2. Separating a large amount of husk by hand would therefore be inconvenient.
3. **Winnowing** is more suitable because moving air carries away the lighter husk from the heavier grains.

4. A farmer has harvested wheat plants and wants clean grains. Explain the sequence of separation methods that can be used.

Answer:

1. **Threshing** is first used to separate the grains from the harvested stalks.
2. **Winnowing** is then used to separate the lighter husk from the heavier grains.
3. Modern threshing machines can perform threshing and winnowing simultaneously.

5. Muddy water is kept undisturbed and the mud settles at the bottom. How would you obtain clearer water from it?

Answer:

1. The settling of the heavier mud particles at the bottom is called **sedimentation**.
2. The clearer upper layer of water can first be carefully poured off by **decantation**.
3. If fine mud particles still remain, the water can be passed through a suitable filter.

6. A student filters muddy water using cloth, but the collected water still contains very fine mud particles. Explain why and suggest a solution.

Answer:

1. Some mud particles may be small enough to pass through the pores present between the woven threads of the cloth.
2. A filter with finer pores, such as filter paper, should be used for finer particles.
3. The choice of filter should therefore depend on the size of the particles to be removed.

7. Explain how you would obtain salt from a salt solution and why filtration would not achieve the same result.

Answer:

1. The salt solution can be exposed to suitable conditions so that the water is removed by **evaporation**.
2. After the water evaporates, the dissolved salt remains behind.
3. Filtration is not suitable for this purpose because dissolved salt passes along with water through the filter.

8. Why are shallow pits used in the process of obtaining salt from seawater?

Answer:

1. Seawater is collected in shallow pits where it is exposed to sunlight and air.
2. The water gradually evaporates from these pits, leaving solid salts behind.
3. The remaining solid mixture is further purified to obtain common salt.

9. A mixture contains iron nails and sawdust. Compare handpicking and magnetic separation for separating them.

Answer:

1. Iron nails could be picked manually if they were few and easily visible.
2. A magnet provides a convenient method because iron is attracted towards it while sawdust is not.
3. Hence, **magnetic separation** can be used to separate the iron nails from the sawdust.

10. Why is decantation alone sometimes insufficient for cleaning muddy water?

Answer:

1. Decantation removes the upper liquid after the heavier insoluble particles have settled.
2. Very fine suspended particles may still remain in the decanted water.
3. Filtration can then be used to retain these insoluble particles and obtain clearer water.

11. A mixture of oil and water forms two distinct layers after being left undisturbed. Explain how this observation helps in separation.

Answer:

1. Oil and water form separate layers when the mixture is allowed to stand.
2. This makes it possible to distinguish one liquid layer from the other.
3. The liquids can then be carefully separated using **decantation**.

12. A student wants to separate butter from curd. Why would churning be more appropriate than sieving?

Answer:

1. **Churning** causes butter to separate from the curd and collect at the top.
2. The butter floats because it is lighter than the buttermilk.
3. Sieving is instead used mainly to separate solid components that differ in particle size.

13. A waste heap contains iron scraps mixed with non-magnetic waste. Explain how separation can make the waste more useful.

Answer:

1. A magnet can attract and separate the iron scraps from the other waste materials.
2. This process is called **magnetic separation** and uses the magnetic property of iron.
3. The separated scrap iron can then be recycled and reused.

14. How does particle size influence the choice between sieving and filtration?

Answer:

1. **Sieving** separates solid components when they have different particle sizes.
2. **Filtration** separates insoluble solid particles from a liquid by passing the mixture through a filter.
3. In filtration, the filter must be selected according to the size of the particles that need to be removed.

15. Why is it important to identify the properties of substances before selecting a separation method?

Answer:

1. Different separation methods make use of different properties of the components of a mixture.
2. Properties such as particle size, relative heaviness and magnetic behaviour can help determine a suitable method.
3. A complex mixture may therefore require a sequence of methods based on different properties.

16. A mixture contains stones, iron nails and fine sand. Suggest a suitable sequence for separating the components.

Answer:

1. The iron nails can first be removed using a **magnet** because iron is magnetic.
2. The easily visible larger stones can then be removed by **handpicking**.
3. Fine sand is left behind after the other two components have been separated.

17. Why does a fishing net illustrate the basic idea of filtration?

Answer:

1. Water can pass through the openings of a fishing net while larger fish are retained.
2. Similarly, during filtration, liquid passes through the pores of a filter while suitable solid particles are retained.
3. Thus, both processes depend on openings that allow smaller components to pass while retaining larger ones.

18. A student says that one separation method should be enough for every mixture. Why is this statement incorrect?

Answer:

1. Mixtures can contain components having different physical properties.
2. A single separation method may not be able to separate every component of a complex mixture.
3. Therefore, several methods may need to be applied in a suitable sequence.

19. Why is winnowing affected by the relative heaviness of grains and husk?

Answer:

1. During winnowing, both grains and husk are exposed to moving air.
2. The lighter husk is carried farther away by the air while the heavier grains fall closer.
3. Thus, the difference between the lighter and heavier components enables their separation.

20. A student has a mixture of salt, sand and water. Suggest a logical sequence to separate the components.

Answer:

1. **Filtration** can first separate the insoluble sand from the salt solution.
2. The water in the filtrate can then be removed by **evaporation**.
3. After evaporation, the dissolved salt remains behind as a solid.

9.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers — LOTS Type:

1. Explain the method of handpicking and its uses in separating mixtures.

Answer:

1. **Handpicking** is a simple method in which components of a mixture are separated by picking them by hand.
2. It is useful when the unwanted particles are present in a relatively small quantity.
3. The particles to be separated should be large enough to be easily seen and picked.
4. Differences in **size, colour or shape** help us identify the components to be removed.
5. Thus, handpicking is a convenient method for separating easily distinguishable components of a mixture.

2. Explain threshing and winnowing as methods of separation.

Answer:

1. **Threshing** is the process of separating grains from harvested stalks by beating the stalks.
2. After threshing, the grains may still be mixed with lighter materials such as husk.
3. **Winnowing** is used to separate the heavier grains from the lighter husk with the help of wind or blowing air.
4. During winnowing, the lighter husk is carried farther away while the heavier grains fall nearby.
5. Modern threshing machines can perform threshing and winnowing simultaneously.

3. Explain sieving and describe how it is useful in everyday life.

Answer:

1. **Sieving** is a separation method used when solid components of a mixture have different particle sizes.
2. A sieve contains holes of a particular size through which smaller particles can pass.
3. When flour containing bran is sieved, the fine flour particles pass through the holes.
4. Larger particles such as bran and small stones remain on the sieve.

5. Therefore, sieving separates solid components by making use of differences in their particle sizes.

4. Explain evaporation and describe how it is used to obtain salt.

Answer:

1. **Evaporation** is the process in which a liquid changes into its vapour.
2. It can be used to separate a dissolved solid substance from a liquid.
3. Seawater contains salts and other substances dissolved in water.
4. Seawater is kept in shallow pits exposed to sunlight and air so that the water evaporates.
5. The solid salts left behind are further purified to obtain common salt.

5. Explain sedimentation and decantation with their applications.

Answer:

1. **Sedimentation** is the process in which a heavier insoluble component settles at the bottom of a liquid.
2. The mixture is kept undisturbed for some time to allow the heavier particles to settle.
3. The clearer liquid remains above the settled material.
4. Carefully removing the upper liquid by tilting the vessel is called **decantation**.
5. Decantation is also used in everyday life while washing and cleaning rice and pulses.

6. Explain filtration and the terms residue and filtrate.

Answer:

1. **Filtration** is a method used to separate an insoluble solid component from a liquid.
2. During filtration, the mixture is passed through a suitable filter such as filter paper or cloth.
3. The insoluble solid that remains on the filter is called the **residue**.
4. The liquid that passes through the filter and is collected is called the **filtrate**.
5. For example, when muddy water is filtered, mud forms the residue while the clearer water collected is the filtrate.

7. Describe different filtering materials and explain how a suitable filter is selected.

Answer:

1. A piece of cloth can be used as a filter because it has small pores between its woven threads.
2. **Filter paper** has very fine pores and can be used for separating finer insoluble particles.
3. Materials such as **cotton, charcoal and sand** can also be used for filtration.
4. Different filtering materials have pores or spaces that allow some components to pass while retaining others.
5. Therefore, the choice of filter depends on the **size of the particles** that need to be removed.

8. Explain the process of churning and how it separates butter from curd.

Answer:

1. **Churning** is a separation method used to separate butter from curd.
2. The curd is churned so that the butter separates from the remaining liquid.
3. During this process, butter begins to collect separately from the buttermilk.
4. Butter is lighter than buttermilk and therefore floats at the top.
5. The floating butter can then be collected separately.

9. Explain magnetic separation and its applications.

Answer:

1. Some substances, such as iron, are attracted towards a magnet and are called **magnetic substances**.
2. This property can be used to separate magnetic substances from non-magnetic substances.
3. The method of using a magnet for this purpose is called **magnetic separation**.

4. For example, a magnet can separate iron nails from sawdust.
5. Magnets are also used to separate scrap iron from waste so that the iron can be recycled and reused.

10. Describe the major methods of separation discussed in the chapter.
Answer:
1. **Handpicking, threshing and winnowing** are used to separate components based on visible differences or differences in heaviness.
2. **Sieving** separates solid components having different particle sizes.
3. **Evaporation** can separate a dissolved solid from a liquid by removing the liquid as vapour.
4. **Sedimentation, decantation and filtration** are useful for separating suitable components involving liquids and insoluble substances.
5. **Churning and magnetic separation** are used respectively for separating butter from curd and magnetic substances from non-magnetic substances.

9.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

Five-Mark Descriptive Questions with Answers — HOTS Type:
1. A farmer has a mixture of wheat grains, husk, and a few stones. Suggest suitable methods to obtain clean wheat grains and justify the sequence.
Answer:
1. The farmer should first use **handpicking** to remove the few visible stones from the mixture.
2. Handpicking is suitable because the stones can be distinguished from the grains by their size, colour, or shape.
3. The remaining mixture of wheat grains and husk should then be subjected to **winnowing**.
4. During winnowing, the lighter husk is carried away by moving air while the heavier grains fall nearby.
5. Thus, using handpicking followed by winnowing helps obtain clean wheat grains efficiently.

2. A student has a mixture of salt, sand, and water. Explain how the three components can be separated.
Answer:
1. The mixture should first be passed through a suitable filter to separate the insoluble sand from the salt solution.
2. The sand remains on the filter as the **residue**, while the salt solution passes through as the **filtrate**.
3. The filtrate can then be subjected to **evaporation**.
4. During evaporation, the water changes into vapour and leaves the dissolved salt behind.
5. Thus, filtration followed by evaporation can separate the sand and salt from the mixture.

3. A student filters muddy water through a piece of cloth, but the collected water still looks muddy. Analyse the problem and suggest a better method.
Answer:
1. The cloth has pores through which some very fine mud particles may pass along with the water.
2. Therefore, filtration through cloth may not remove all the smaller insoluble particles.
3. The student should use a filter having finer pores, such as **filter paper**.
4. The finer mud particles will be retained as residue while clearer water will pass through as filtrate.

5. This shows that the choice of a filter depends on the size of the particles that need to be removed.

4. A farmer has harvested a large quantity of wheat. Explain how threshing and winnowing can be used together to obtain grains.

Answer:

1. The harvested stalks should first be subjected to **threshing** to separate the grains from the stalks.
2. After threshing, the grains may still remain mixed with lighter materials such as husk.
3. The mixture should then be subjected to **winnowing** using wind or blowing air.
4. The lighter husk is carried farther away while the heavier grains fall closer to the person winnowing.
5. Modern threshing machines can make the process more efficient by performing threshing and winnowing simultaneously.

5. A mixture contains iron nails, small stones, and sawdust. Plan a suitable method to separate all three components.

Answer:

1. A **magnet** should first be moved over the mixture to attract the iron nails.
2. Iron nails are separated because iron is magnetic, whereas stones and sawdust are not attracted to the magnet.
3. The remaining visible stones can then be removed from the sawdust by **handpicking**, provided they are few and easily distinguishable.
4. Handpicking uses visible differences such as size, colour, or shape to separate components.
5. Thus, magnetic separation followed by handpicking can separate the three components.

6. Muddy water is kept undisturbed for some time. Explain how sedimentation, decantation, and filtration can be used together to obtain clearer water.

Answer:

1. The muddy water should first be kept undisturbed so that the heavier insoluble mud particles settle at the bottom by **sedimentation**.
2. The clearer upper layer of water can then be carefully poured into another container by **decantation**.
3. The decanted water may still contain some fine suspended mud particles.
4. It can therefore be passed through a suitable filter to remove these remaining insoluble particles.
5. Hence, sedimentation, decantation, and filtration can be used sequentially for more effective separation.

7. A student tries to obtain salt from salt water using filtration but does not succeed. Explain the reason and suggest the correct method.

Answer:

1. Filtration is useful for separating an **insoluble solid** from a liquid.
2. Salt is dissolved in water, so it passes through the filter along with the water instead of remaining on it.
3. Therefore, filtration cannot be used to recover dissolved salt from salt water.
4. The salt solution should instead be subjected to **evaporation**, during which the water changes into vapour.
5. After the water evaporates, the dissolved salt remains behind as a solid.

8. A mixture of flour and bran is passed through a sieve, but the separation is poor. Analyse the possible reason and explain how to improve it.

Answer:

1. Sieving works when the components of a mixture have different particle sizes.

2. Fine flour should pass through the sieve holes while larger bran particles should remain behind.
3. If separation is poor, the selected sieve may not have holes suitable for the sizes of the particles.
4. A sieve with appropriately sized holes should therefore be selected.
5. This will allow the finer flour to pass through while retaining the larger bran particles.

9. Explain why different separation methods are needed for different mixtures, giving suitable examples.

Answer:

1. Different mixtures contain components that differ from one another in different physical properties.
2. **Sieving** can be used when solid components differ sufficiently in particle size, as in flour and bran.
3. **Winnowing** can separate lighter husk from heavier grains with the help of moving air.
4. **Magnetic separation** can separate magnetic iron objects from non-magnetic materials.
5. Therefore, the separation method must be selected according to the useful difference between the components of the mixture.

10. A mixture contains several components that cannot be separated by a single method. Explain how you would decide the correct sequence of separation.

Answer:

1. First, the different components of the mixture should be identified along with their observable properties.
2. A suitable property such as size, relative heaviness, insolubility, or magnetic behaviour can then be used for the first separation.
3. After one component is removed, the properties of the remaining components should be considered for the next step.
4. Different methods can therefore be applied one after another until the required components are separated.
5. Thus, complex mixtures may require a carefully selected **combination and sequence of separation methods**.

9.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers — Applied Type:

1. Riya finds rice mixed with small stones and husk in her kitchen. Explain how she can obtain clean rice using suitable separation methods.

Answer:

1. Riya should first observe the mixture and identify the components that need to be removed.
2. She can remove the few visible stones by **handpicking** because they can be distinguished from rice grains by size, colour, or shape.
3. The remaining rice and husk can then be subjected to **winnowing**.
4. During winnowing, moving air carries the lighter husk away while the heavier rice grains fall nearby.
5. Thus, handpicking followed by winnowing can be applied to obtain cleaner rice.

2. During a picnic, a container of water accidentally gets mixed with sand and small stones. How would you separate the components?

Answer:

1. The larger, easily visible stones can first be removed by **handpicking**.
2. The remaining mixture contains insoluble sand mixed with water.

3. It can be kept undisturbed so that the heavier sand settles at the bottom by **sedimentation**.
4. The upper water can then be carefully removed by **decantation**.
5. If fine sand particles remain, the water can be passed through a suitable filter for further separation.

3. Meera prepares tea for her family and notices tea leaves in the prepared tea. Explain how she can separate them and relate the process to filtration.

Answer:

1. Meera can pour the prepared tea through a **tea strainer**.
2. The liquid tea passes through the holes of the strainer while the tea leaves are retained.
3. This is an everyday example of **filtration**, in which an insoluble solid is separated from a liquid.
4. The strainer acts as a filter by allowing the liquid to pass while retaining the larger solid particles.
5. Therefore, filtration is a useful separation technique commonly applied while preparing tea.

4. A student accidentally mixes iron nails with sawdust during a craft activity. Explain the easiest way to recover the nails.

Answer:

1. The student should bring a **magnet** close to the mixture of iron nails and sawdust.
2. The iron nails will be attracted towards the magnet because iron is a magnetic substance.
3. Sawdust will remain behind because it is not attracted towards the magnet.
4. The attracted nails can then be removed from the magnet and collected separately.
5. This application of a magnet to separate magnetic and non-magnetic substances is called **magnetic separation**.

5. A family wants to separate butter from homemade curd. Describe the method they should use and explain what happens.

Answer:

1. The family should use the process of **churning** to separate butter from curd.
2. The curd is churned so that the butter begins to separate from the remaining liquid.
3. The separated butter gradually collects at the top.
4. Butter floats because it is lighter than the buttermilk.
5. The floating butter can then be collected separately for use.

6. A student has a mixture of salt, sand, and water. Describe how the student can separate the components using methods learned in the chapter.

Answer:

1. The mixture should first be passed through **filter paper** to separate the insoluble sand.
2. The sand remains on the filter as residue, while the salt solution passes through as filtrate.
3. The collected salt solution should then be subjected to **evaporation**.
4. During evaporation, the water changes into vapour and the dissolved salt remains behind.
5. Thus, filtration followed by evaporation can be applied to separate the components of the mixture.

7. After heavy rain, a bucket of collected water contains a lot of mud. Explain how the methods in the chapter can be applied to obtain clearer water.

Answer:

1. The muddy water should first be kept undisturbed so that the heavier mud particles settle at the bottom by **sedimentation**.

2. The clearer upper layer can then be carefully poured into another vessel by **decantation**.
3. Some finer suspended particles may still remain in the decanted water.
4. The water can therefore be passed through a suitable filter, such as filter paper, to remove these particles.
5. Hence, sedimentation, decantation, and filtration can be applied sequentially for better separation.

8. A flour mill receives flour containing bran and a few small stones. How can the flour be made suitable for further use?

Answer:

1. The mixture should be passed through a **sieve** having appropriately sized holes.
2. Fine flour particles will pass through the holes of the sieve.
3. Larger particles such as bran and small stones will remain on the sieve.
4. The retained unwanted materials can then be removed and the fine flour collected separately.
5. This demonstrates the practical use of differences in **particle size** for separation.

9. A recycling centre receives waste containing pieces of iron mixed with other materials. Explain how the centre can recover the iron efficiently.

Answer:

1. The waste can be exposed to a strong **magnet** to identify and attract magnetic materials.
2. Iron pieces present in the waste will be attracted towards the magnet.
3. Non-magnetic waste materials will not be attracted and will remain behind.
4. The separated scrap iron can then be collected for recycling and reuse.
5. Thus, **magnetic separation** provides a practical method of recovering useful iron from mixed waste.

10. Imagine you are given a mixture containing iron nails, stones, sand, and salt water. Develop a sequence of separation methods to separate the components.

Answer:

1. First, use **magnetic separation** to remove the iron nails because iron is attracted by a magnet.
2. Next, remove the easily visible larger stones by **handpicking**.
3. Pass the remaining mixture through a suitable filter to separate the insoluble sand from the salt solution.
4. Subject the collected salt solution to **evaporation** so that the water is removed and the salt remains behind.
5. This example shows that a complex mixture may require a carefully planned **sequence of different separation methods** based on the properties of its components.

9.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

1. A mixture contains wheat grains, husk and a few large stones. Which sequence is most suitable for obtaining clean wheat grains?

A) Sieving → Evaporation
B) Handpicking → Winnowing
C) Filtration → Churning
D) Sedimentation → Decantation

Answer: B) Handpicking → Winnowing

2. Which property is mainly used during winnowing?

A) Magnetic nature
B) Solubility in water
C) Difference in heaviness of components
D) Difference in colour only
Answer: C) Difference in heaviness of components
3. A farmer has already separated wheat grains from their stalks. The grains are still mixed with husk. Which method should be used next?
A) Churning
B) Filtration
C) Winnowing
D) Evaporation
Answer: C) Winnowing
4. Which of the following correctly describes threshing?
A) Separating dissolved salt from water
B) Separating grains from stalks by beating
C) Separating butter from curd
D) Separating iron from sawdust
Answer: B) Separating grains from stalks by beating
5. Which mixture is most appropriately separated by sieving?
A) Salt and water
B) Oil and water
C) Flour and bran
D) Butter and buttermilk
Answer: C) Flour and bran
6. A sieve fails to separate bran from flour because both pass through it. What is the most likely reason?
A) The sieve holes are too large.
B) The flour is magnetic.
C) The bran has dissolved in flour.
D) The mixture needs to be churned.
Answer: A) The sieve holes are too large.
7. Which method depends most directly on a difference in particle size?
A) Winnowing
B) Sieving
C) Churning
D) Evaporation
Answer: B) Sieving
8. Seawater is placed in shallow pits and exposed to sunlight and air. What is the main separation process involved?
A) Filtration
B) Sedimentation
C) Evaporation
D) Handpicking
Answer: C) Evaporation
9. Which statement best explains why salt remains after salt solution is heated?
A) Salt changes into water.
B) Water evaporates while the salt remains behind.
C) Salt passes through a filter.
D) Water becomes heavier than salt.
Answer: B) Water evaporates while the salt remains behind.

10. Muddy water is left undisturbed for some time. Mud collects at the bottom. This process is called:
A) Decantation
B) Sedimentation
C) Winnowing
D) Churning
Answer: B) Sedimentation
11. After sedimentation of muddy water, which method can be used to remove the clearer upper liquid?
A) Threshing
B) Sieving
C) Decantation
D) Churning
Answer: C) Decantation
12. Consider the following steps:
I. Keep muddy water undisturbed.
II. Carefully pour the upper water into another vessel.
III. Pass the poured water through filter paper.
Which sequence of processes is represented?
A) Sedimentation → Decantation → Filtration
B) Filtration → Sedimentation → Winnowing
C) Decantation → Churning → Filtration
D) Sieving → Decantation → Evaporation
Answer: A) Sedimentation → Decantation → Filtration
13. Which pair of liquids can form separate layers and be separated by careful decantation?
A) Salt solution and water
B) Oil and water
C) Sugar solution and water
D) Salt solution and sugar solution
Answer: B) Oil and water
14. During filtration of muddy water, the mud left on the filter paper is called:
A) Filtrate
B) Residue
C) Vapour
D) Sediment only
Answer: B) Residue
15. The liquid collected after passing through filter paper is called:
A) Residue
B) Husk
C) Filtrate
D) Sediment
Answer: C) Filtrate
16. A cloth filter allows very fine mud particles to pass through. Which change would improve separation?
A) Use a filter with finer pores.
B) Use a magnet.
C) Increase the size of the pores.
D) Add more mud to the mixture.
Answer: A) Use a filter with finer pores.

17. Which factor is most important when choosing an appropriate filter?
A) Colour of the liquid
B) Shape of the container
C) Size of the particles to be removed
D) Quantity of sunlight available
Answer: C) Size of the particles to be removed
18. A fishing net and filter paper are similar because both:
A) separate substances using magnetism.
B) allow smaller components to pass while retaining larger ones.
C) cause liquids to evaporate.
D) separate components using wind.
Answer: B) Allow smaller components to pass while retaining larger ones.
19. Which method is most suitable for separating butter from curd?
A) Winnowing
B) Sieving
C) Churning
D) Handpicking
Answer: C) Churning
20. Why does butter collect at the top during churning?
A) Butter is magnetic.
B) Butter is lighter than buttermilk.
C) Butter evaporates quickly.
D) Butter passes through pores.
Answer: B) Butter is lighter than buttermilk.
21. A mixture contains iron nails and sawdust. Which method gives the quickest separation?
A) Evaporation
B) Magnetic separation
C) Sedimentation
D) Winnowing
Answer: B) Magnetic separation
22. Which property of iron makes magnetic separation possible?
A) Iron dissolves in water.
B) Iron is lighter than air.
C) Iron is attracted towards a magnet.
D) Iron evaporates on heating.
Answer: C) Iron is attracted towards a magnet.
23. In a recycling centre, magnets would be most useful for separating:
A) glass from plastic.
B) paper from leaves.
C) scrap iron from other waste.
D) sand from stones.
Answer: C) Scrap iron from other waste
24. Which combination is correctly matched?

Method	**Separation**
A) Churning	Husk from grains
B) Winnowing	Butter from curd
C) Magnetic separation	Iron nails from sawdust
D) Evaporation	Bran from flour

Answer: C) Magnetic separation — Iron nails from sawdust
25. A mixture contains sand and salt dissolved in water. Which sequence is most suitable for obtaining the salt?
A) Winnowing → Churning
B) Filtration → Evaporation
C) Handpicking → Sieving
D) Sedimentation → Magnetic separation
Answer: B) Filtration → Evaporation
26. Which of the following cannot be achieved effectively by filtration alone?
A) Separating tea leaves from tea
B) Separating mud from water
C) Separating dissolved salt from water
D) Separating an insoluble solid from a liquid
Answer: C) Separating dissolved salt from water
27. Study the statements:
Statement I: Winnowing uses moving air for separation.
Statement II: Lighter husk is carried farther than heavier grains.
Which option is correct?
A) Only Statement I is correct.
B) Only Statement II is correct.
C) Both statements are correct.
D) Both statements are incorrect.
Answer: C) Both statements are correct.
28. Which sequence would best separate a mixture of iron nails, large stones, sand and salt water?
A) Magnet → Handpicking → Filtration → Evaporation
B) Evaporation → Winnowing → Churning → Sieving
C) Filtration → Churning → Magnet → Threshing
D) Winnowing → Evaporation → Sedimentation → Churning
Answer: A) Magnet → Handpicking → Filtration → Evaporation
29. Which separation method is based on a property different from the other three?
A) Sieving flour and bran
B) Handpicking stones from grains
C) Magnetic separation of iron and sawdust
D) Winnowing husk and grains
Answer: C) Magnetic separation of iron and sawdust
Reason: It specifically uses **magnetic behaviour**, whereas the others use visible physical differences such as size, shape or relative heaviness.
30. Why may a complex mixture require several separation methods?
A) Every method works only in sunlight.
B) Different components may need separation based on different properties.
C) All components have identical properties.
D) One method always changes the substances chemically.
Answer: B) Different components may need separation based on different properties.
31. Which set contains only separation methods discussed in the chapter?
A) Winnowing, filtration, churning, magnetic separation
B) Distillation, chromatography, sublimation, crystallisation
C) Centrifugation, distillation, chromatography, sieving
D) Sublimation, crystallisation, threshing, distillation
Answer: A) Winnowing, filtration, churning, magnetic separation

32. Which observation best demonstrates evaporation as a separation process?
A) Iron nails stick to a magnet.
B) Bran remains on a sieve.
C) Salt remains after water from a salt solution disappears.
D) Mud settles at the bottom of water.
Answer: C) Salt remains after water from a salt solution disappears.
33. Which pair represents two processes that are commonly performed one after another?
A) Sedimentation and decantation
B) Churning and magnetic separation
C) Winnowing and filtration
D) Evaporation and handpicking
Answer: A) Sedimentation and decantation
34. A student wants to choose between sieving and filtration. What should the student first determine?
A) Whether the mixture contains only gases
B) The nature and particle size of the components
C) The colour of the container
D) The time of day
Answer: B) The nature and particle size of the components
35. Which statement gives the best overall principle for selecting a separation method?
A) Always use filtration first.
B) Always use the fastest method available.
C) Select a method based on useful differences in the properties of the components.
D) Every mixture can be separated using handpicking.
Answer: C) Select a method based on useful differences in the properties of the components.

9.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
The following best practices are closely aligned with the chapter's emphasis on **everyday examples, observation, experimentation, selection of suitable methods, and sequential separation**.

(1) Learning by Doing – Hands-on Separation Activities:
Provide students with simple mixtures such as rice and stones, flour and bran, or iron nails and sawdust, and let them actually perform **handpicking, sieving and magnetic separation**. This makes the concepts concrete and helps students connect each method with the physical property used for separation.

(2) Use Everyday-Life Examples:
Begin each separation method with familiar situations such as removing stones from grains, straining tea, sieving flour, washing rice, churning curd, or obtaining salt from seawater. Ask students to identify separation methods they have observed at home and explain why each method works.

(3) Demonstration–Observation–Explanation Approach:
Demonstrate a process first and ask students to carefully observe what happens before giving the scientific explanation. For example, allow muddy water to stand, observe the settling of mud, pour off the upper water, and then introduce the terms **sedimentation** and **decantation**.

(4) Separation Method–Property Mapping:

(5) Encourage students to connect every method with the property that makes separation possible: **particle size → sieving; relative heaviness → winnowing; magnetic property → magnetic separation; insolubility → filtration; dissolved solid and evaporation → evaporation**. A classroom chart linking “Mixture → Property → Method → Result” can strengthen conceptual understanding.

(6) **Problem-Based Learning with Mixed Materials:**
Give groups a complex mixture and ask them to plan a logical sequence of separation methods rather than telling them the procedure. Students should explain why each method is selected and why the order matters, reflecting the chapter’s emphasis on choosing methods for multicomponent mixtures.

(7) **Compare and Contrast Similar Methods:**
Use comparison exercises for **sedimentation vs. decantation**, **sieving vs. filtration**, and **threshing vs. winnowing**. Students can prepare simple tables showing the purpose, principle, materials involved and examples for each method.

(8) **Filtration Investigation:**
Let students compare cloth and filter paper as filtering materials and observe differences in the filtrate. Guide them to infer that the **choice of filter depends on the size of particles to be removed**, rather than simply memorising the definition of filtration.

(9) **Agriculture-to-Classroom Connection:**
Use pictures, demonstrations or locally available examples to explain **threshing and winnowing**. Students can compare traditional practices with modern threshers that perform threshing and winnowing together.

(10) **Waste Segregation and Recycling Activity:**
Create a safe classroom mixture containing iron objects and non-magnetic materials and ask students to recover the iron using a magnet. Connect the activity to the chapter’s example of magnets being used to separate scrap iron for **recycling and reuse**.

(11) **Concept Maps and Flowcharts for Revision:**
At the end of the lesson, students can prepare a concept map connecting **Handpicking → Threshing → Winnowing → Sieving → Evaporation → Sedimentation → Decantation → Filtration → Churning → Magnetic Separation** with suitable examples. This provides a quick visual revision of the major methods presented in the chapter.

(12) **Think–Pair–Share Questions:**
Present situations such as, “How would you separate salt, sand and water?” or “Why can't filtration separate dissolved salt from water?” Students first think individually, discuss with a partner, and then justify their method to the class.

(13) **Maintain a Science Activity Record:**
For each practical activity, students can record **Aim – Materials – Procedure – Observation – Separation Method – Property Used – Conclusion**. This develops scientific observation, reasoning and communication skills while reinforcing the separation concepts in the chapter.

9.16 Innovations Opportunity List from the Chapter: (10 Ideas)

“Innovations” Opportunities in Teaching–Learning for Grade 6:
The chapter provides excellent opportunities for innovative, activity-oriented learning because it connects separation methods such as **handpicking, threshing, winnowing, sieving, evaporation, sedimentation, decantation, filtration, churning and magnetic separation** with everyday situations.

(1) **DIY “Separation Challenge” Lab:**

Give student teams a safe mixture containing materials such as grains, paper pieces, sand, small stones and iron objects. Instead of providing instructions, challenge them to design a sequence of separation methods, identify the property used at each stage and explain their choices. This converts the lesson into an inquiry-based problem-solving activity.

(2) Build a Mini Water-Filtering Model:
Students can construct simple filtration models using safe materials such as cloth, cotton and sand and compare the appearance of water before and after filtration. They can investigate how different filtering materials affect separation and relate their observations to the chapter's idea that filter choice depends on particle size. The activity should be treated as a separation demonstration, **not as a method for producing drinking water**.

(3) "Become a Separation Scientist" Mystery Box:
Give each group an unknown visible mixture and ask them to act as scientists: **Observe → Identify components → Identify differences in properties → Select a method → Separate → Explain**. Students earn points for selecting the most appropriate method rather than merely completing the separation.

(4) Separation Method Decision Tree:
Students can collaboratively design a decision tree beginning with questions such as: "Are both components solids?", "Are the particles different in size?", "Is one component magnetic?", and "Is a solid dissolved in a liquid?" The answers lead students towards methods such as sieving, magnetic separation, filtration or evaporation. This encourages reasoning about why a method works instead of memorising names.

(5) Digital Animation and Slow-Motion Learning:
Use simple animations or teacher-created videos to show processes that are difficult to observe clearly in real time, such as lighter husk moving farther during **winnowing**, particles settling during **sedimentation**, and water disappearing during **evaporation**. Students can pause the animation and predict what will happen next before viewing the result.

(6) Design Your Own Separation Machine:
Ask students to draw or construct a simple model of an imaginary machine that could separate a chosen mixture. For example, their machine could combine a sieve and magnet to separate materials based on **particle size and magnetic behaviour**. Students should label each stage and explain the scientific property used.

(7) "Separation Escape Room" Classroom Game:
Create stations containing clues such as "I separate bran from flour," "I remove iron from sawdust," and "I leave salt behind when water disappears." Students solve each clue to unlock the next station using **sieving, magnetic separation, evaporation**, and other chapter concepts. This gamifies revision while testing conceptual understanding.

(8) From Kitchen to Science – Video Investigation:
Students can observe or record safe separation processes at home, such as **straining tea, sieving flour, washing rice or churning curd**, and present them in class. They should identify the mixture, method of separation, property used and separated components.

(9) Magnetic Recycling Innovation Challenge:
Create a simulated recycling station with magnetic and non-magnetic classroom objects. Students use magnets to recover iron-containing objects and then design a poster or model explaining how magnetic separation can support recycling and reuse, extending the chapter's scrap-iron example.

(10) **"Which Method and Why?" QR Quiz Stations:**
Place QR codes around the classroom containing short real-life separation problems. Students move in teams, scan each situation, select the appropriate method and, importantly, give a one-sentence reason based on the relevant property of the components.

(11) **Student-Made Separation Concept Cards:**
Each student creates cards with four fields: **Mixture | Property Used | Separation Method | Result**. For example: *flour + bran → different particle sizes → sieving → flour separated from bran*. The cards can then be exchanged among groups for peer quizzes.

(12) **Separation Methods Innovation Fair:**
Conclude the chapter with a small class exhibition where teams demonstrate one method through a working model, experiment, poster or digital presentation. Stations can represent **winnowing, sieving, filtration, evaporation, churning and magnetic separation**, with students explaining the science to classmates as "young science demonstrators."

9.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. The process of separating grains from stalks by beating is called __________.
   Answer: Threshing

2. __________ is used to separate lighter husk from heavier grains with the help of air.
   Answer: Winnowing

3. Flour and bran can be separated by __________.
   Answer: Sieving

4. The conversion of a liquid into its vapour is called __________.
   Answer: Evaporation

5. The settling of a heavier insoluble component at the bottom of a liquid is called __________.
   Answer: Sedimentation

6. Carefully pouring off the upper liquid after sedimentation is called __________.
   Answer: Decantation

7. The solid left on a filter after filtration is called the __________.
   Answer: Residue

8. The liquid collected after passing through a filter is called the __________.
   Answer: Filtrate

9. Butter can be separated from curd by __________.
   Answer: Churning

10. Iron nails can be separated from sawdust using a __________.
    Answer: Magnet

11. Handpicking can separate components based on differences in size, colour and __________.
    Answer: Shape

12. Filter paper contains very fine __________.
    Answer: Pores

13. Common salt can be obtained from seawater with the help of __________.
    Answer: Evaporation

14. Substances attracted towards a magnet are called __________ substances.
    Answer: Magnetic

15. Modern threshers can perform threshing and __________ simultaneously.
    Answer: Winnowing

B. One-Mark Descriptive Questions:

1. **What is handpicking?**
   Answer: Handpicking is a method of separating easily distinguishable components of a mixture by picking them by hand.

2. **What is threshing?**
   Answer: Threshing is the process of separating grains from stalks by beating the harvested stalks.

3. **What is winnowing?**
   Answer: Winnowing is the separation of lighter and heavier components of a mixture using wind or blowing air.

4. **What is sieving?**
   Answer: Sieving separates solid components of different particle sizes using a sieve.

5. **What is evaporation?**
   Answer: Evaporation is the process in which a liquid changes into its vapour.

6. **What is sedimentation?**
   Answer: Sedimentation is the settling of a heavier insoluble component at the bottom of a liquid.

7. **What is decantation?**
   Answer: Decantation is the careful removal of the upper liquid after the heavier component has settled.

8. **What is filtration?**
   Answer: Filtration is a method of separating an insoluble solid from a liquid using a suitable filter.

9. **What is residue?**
   Answer: Residue is the solid material retained on the filter after filtration.

10. **What is filtrate?**
    Answer: Filtrate is the liquid that passes through the filter and is collected.

11. **Which method is used to separate butter from curd?**
    Answer: Churning is used to separate butter from curd.

12. **Give one example of a magnetic substance.**
    Answer: Iron is a magnetic substance.

13. **How can iron nails be separated from sawdust?**
    Answer: Iron nails can be separated from sawdust using a magnet.

14. **Which method is used to separate bran from flour?**
    Answer: Sieving is used to separate bran from flour.

15. **Why is separation of substances carried out?**
    Answer: Separation is carried out to remove unwanted components or obtain useful components from a mixture.

C. Two-Mark Descriptive Questions:

1. **What is handpicking? When is it useful?**
   Answer: Handpicking involves separating components manually. It is convenient when unwanted particles are few and easily distinguishable by size, colour or shape.
2. **Differentiate between threshing and winnowing.**
   Answer: Threshing separates grains from stalks by beating them. Winnowing separates lighter husk from heavier grains using moving air.
3. **How does a sieve separate flour from bran?**
   Answer: Fine flour passes through the holes of the sieve. Larger bran particles remain on the sieve.
4. **How is common salt obtained from seawater?**
   Answer: Seawater is kept in shallow pits exposed to sunlight and air so that the water evaporates. The solid salts left behind are further purified to obtain common salt.
5. **Differentiate between sedimentation and decantation.**
   Answer: Sedimentation allows heavier insoluble particles to settle at the bottom. Decantation carefully removes the upper liquid after settling.
6. **What are residue and filtrate?**
   Answer: The solid retained on a filter is called residue. The liquid passing through and collected below is called filtrate.
7. **Why is filter paper useful for filtration?**
   Answer: Filter paper has very fine pores. These pores retain suitable insoluble particles while allowing the liquid to pass through.
8. **Why does butter float after churning curd?**
   Answer: Churning separates butter from curd. The butter floats at the top because it is lighter than buttermilk.
9. **How is magnetic separation useful in recycling?**
   Answer: Magnets can separate scrap iron from other waste materials. The recovered iron can then be recycled and reused.
10. **Why might more than one method be needed to separate a mixture?**
    Answer: Different components may differ in different physical properties. Therefore, a sequence of separation methods may be required.

D. Three-Mark Descriptive Questions:

1. **Explain winnowing with an example.**
   Answer: Winnowing separates lighter and heavier components using wind or blowing air. In a mixture of grains and husk, the lighter husk is carried farther away. The heavier grains fall closer to the person performing winnowing.
2. **Explain the process of sieving.**
   Answer: Sieving separates solid components according to particle size. Smaller particles pass through the holes of the sieve. Larger particles remain on the sieve.

3. **Explain sedimentation and decantation using muddy water.**
   Answer: Muddy water is first kept undisturbed so that heavier mud particles settle at the bottom. This settling is called sedimentation. The upper water is then carefully poured away by decantation.

4. **Explain filtration using muddy water as an example.**
   Answer: Muddy water is passed through a suitable filter such as filter paper. Mud remains on the filter as residue. The clearer water passing through is collected as filtrate.

5. **How can salt be separated from salt water?**
   Answer: Salt water can be exposed to conditions that cause evaporation. The water changes into vapour and leaves the dissolved salt behind. Thus, evaporation can be used to recover salt from salt solution.

6. **Explain magnetic separation with an example.**
   Answer: Magnetic separation uses a magnet to separate magnetic materials from non-magnetic materials. Iron is attracted towards a magnet. Therefore, iron nails can be separated from sawdust using a magnet.

7. **Explain how threshing and winnowing help farmers.**
   Answer: Threshing separates grains from harvested stalks. Winnowing then separates lighter husk from heavier grains. Modern threshing machines can perform both processes simultaneously.

8. **Why is the choice of filter important during filtration?**
   Answer: Different filters have pores or spaces of different sizes. A suitable filter should retain the particles that need to be removed. Hence, the choice of filter depends on particle size.

E. Five-Mark Descriptive Questions:

1. **Explain any five methods used for separating mixtures in everyday life.**
   Answer:

   1. **Handpicking** separates easily visible components manually.
   2. **Winnowing** separates lighter husk from heavier grains using moving air.
   3. **Sieving** separates solid components according to particle size.
   4. **Filtration** separates an insoluble solid from a liquid.
   5. **Magnetic separation** separates magnetic substances such as iron from non-magnetic materials.

2. **Describe the steps used to obtain clearer water from muddy water.**
   Answer:

   1. Keep the muddy water undisturbed for some time.
   2. The heavier mud particles settle at the bottom by sedimentation.
   3. Carefully pour the upper water into another container by decantation.
   4. Pass the decanted water through a suitable filter to remove finer insoluble particles.
   5. The retained solid is residue and the liquid collected after filtration is filtrate.

3. **Explain how different physical properties help in selecting a separation method.**
   Answer:

    1. Differences in size, colour and shape can make handpicking possible.
    2. Differences in particle size are used during sieving.
    3. Differences in relative heaviness allow grains and husk to be separated by winnowing.
    4. Magnetic behaviour allows iron to be separated using a magnet.
    5. Thus, the properties of the components help determine the suitable separation method.

4. **A mixture contains iron nails, stones, sand and salt water. Explain how you would separate its components.**
   Answer:

    1. Use a magnet to remove the iron nails by magnetic separation.
    2. Remove the easily visible large stones by handpicking.
    3. Filter the remaining mixture to separate insoluble sand from the salt solution.
    4. Subject the salt solution to evaporation so that the water is removed.
    5. The salt remains behind, showing how several methods can be combined to separate a complex mixture.

5. **Explain the importance of separation methods in everyday life with suitable examples.**
   Answer:

    1. Separation helps remove unwanted components, such as stones from food grains.
    2. Sieving helps separate fine flour from bran and other larger particles.
    3. Filtration helps separate insoluble solids such as tea leaves from a liquid.
    4. Churning allows useful butter to be separated from curd.
    5. Magnetic separation helps recover scrap iron from mixed waste for recycling and reuse.

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6th Standard Science Book Chapter 10

Chapter 10: Living Creatures: Exploring their Characteristics

10.1 Summary of the Chapter:

Summary:

(1) **Living and Non-living Things:** Things around us can be classified as living or non-living. Living beings possess certain essential characteristics that distinguish them from non-living objects.

(2) **Characteristics of Living Beings:** All living beings show **movement, need nutrition, grow, respire, excrete, respond to stimuli, reproduce, and eventually die**. These characteristics help us identify whether something is living.

(3) **Movement and Growth:** Animals generally move from one place to another, while plants show movement in other ways. For example, *Drosera* traps insects by moving its hair-like structures, and climbers wind around nearby supports. Plants and animals also increase in size as they grow.

(4) **Respiration and Excretion:** All living beings respire. Plants exchange air through tiny pores called **stomata** on their leaves. Living beings also remove waste products through **excretion**; animals excrete substances such as sweat and urine, while plants may remove excess water and minerals as droplets.

(5) **Response to Stimuli and Reproduction:** A **stimulus** is anything or any event that causes a living being to respond. For example, the touch-me-not plant folds its leaves when touched. Living beings also reproduce to produce new individuals of their own kind, ensuring the continuity of life.

(6) **Seed Germination:** Germination is the process by which a seed develops into a sprout and begins growing into a new plant. Seeds generally require the **right amount of water and air** for germination; most seeds do not require light during germination, although sunlight becomes important for further seedling growth.

(7) **Growth and Movement in Plants:** Experiments with seedlings show that **roots grow downward while shoots grow upward**. When light comes from only one direction, the shoot grows towards the light, showing that plants can respond to environmental stimuli.

(8) **Life Cycle of a Plant:** A plant begins as a **seed**, germinates into a young plant, grows and produces flowers, and then develops fruits containing seeds. These seeds can produce the next generation of plants, completing the plant's life cycle.

(9) **Life Cycle of a Mosquito:** A mosquito passes through four main stages: **Egg → Larva → Pupa → Adult Mosquito**. Larvae and pupae live in water and come to the surface to obtain air for respiration, which explains why preventing stagnant water helps control mosquito breeding.

(10) **Life Cycle of a Frog:** A frog undergoes major changes during its life cycle: **Spawn/Egg → Embryo → Tadpole → Tadpole with Legs → Froglet → Adult Frog**. Tadpoles initially live in water and have tails; as they develop, they grow legs, lose their tails, and become adult frogs capable of living both in water and on land.

In essence: The chapter explains how we identify living organisms through their common characteristics and explores **germination, plant growth and movement, and the life cycles of plants, mosquitoes, and frogs**. It highlights that living organisms undergo changes throughout life and that protecting living beings and their habitats helps preserve the living world.

10.2 Important Formulas:

Important Formulas / Quantitative Relationships – Chapter 10:
This chapter is mainly **conceptual and activity-based**, so the chapter does **not prescribe standard mathematical formulas**. However, several activities involve counting, time, growth, germination and life-cycle data, so the following simple quantitative relationships are useful for solving numerical or application-based questions. For example, the chapter asks students to count breaths per minute under different activities and record observations.

No.	Quantitative relationship	Formula	Use
1	**Breathing Rate**	Breathing Rate = Number of breaths ÷ Time (min)	To calculate breaths per minute
2	**Number of Breaths**	Number of Breaths = Breathing Rate × Time	To find total breaths during a given period
3	**Change in Breathing Rate**	Change = Final Rate − Initial Rate	To compare breathing before and after exercise
4	**Percentage Increase in Breathing Rate**	$\% \text{ Increase} = \frac{\text{Final Rate} - \text{Initial Rate}}{\text{Initial Rate}} \times 100$	To determine how much breathing rate increases after physical activity
5	**Increase in Plant Height**	Growth = Final Height − Initial Height	To calculate plant growth over a period
6	**Average Growth Rate**	$\text{Growth Rate} = \frac{\text{Change in Height}}{\text{Time}}$	To calculate growth in cm/day or cm/week
7	**Percentage Growth**	$\% \text{ Growth} = \frac{\text{Final Size} - \text{Initial Size}}{\text{Initial Size}} \times 100$	To compare growth of plants or seedlings
8	**Germination Percentage**	$\text{Germination } \% = \frac{\text{No. of Seeds Germinated}}{\text{Total No. of Seeds Sown}} \times 100$	To compare seed germination under different conditions
9	**Non-germinated Seeds**	Non-germinated Seeds = Total Seeds Sown − Germinated Seeds	To find how many seeds failed to germinate
10	**Time Taken for Germination**	Time Taken = Date of Germination − Date of Sowing	To calculate the germination period
11	**Duration of a Life-cycle Stage**	Duration = End Time/Day − Start Time/Day	To calculate the duration of stages in plant or animal life cycles
12	**Average / Mean Observation**	$\text{Average} = \frac{\text{Sum of Observations}}{\text{Number of Observations}}$	To find average growth, breathing rate, germination time, etc.

The **germination-related calculations** are especially suitable for this chapter because Activity 10.2 asks students to sow equal numbers of bean seeds under different conditions and observe them over time. The chapter establishes that an appropriate amount of **water and air** is required for bean-seed germination.
Life-cycle time calculations:
The chapter also provides useful numerical information for constructing quantitative questions. For the **frog life cycle**, the diagram gives approximately: spawn—Day 1; embryo—Day 3–4; tadpole with tail—Day 7–10; tadpole with legs—8–10 weeks; froglet—12 weeks; and adult frog—14 weeks.

Thus, a useful general relationship is:

$$\boxed{\text{Time Interval} = \text{Later Time} - \text{Earlier Time}}$$

For example, if a froglet stage is reached at **12 weeks** and the adult stage at **14 weeks**:

$$14 - 12 = \boxed{2 \text{ weeks}}$$

Similarly, the chapter states that an adult mosquito may survive for about **10–15 days**, which can be used for simple duration, range and comparison problems.

Most Important Formulas for Grade 6

For a Grade 6 question bank, I would particularly recommend emphasizing these **five**:

Breathing Rate

$$\boxed{\text{Breathing Rate} = \frac{\text{Number of Breaths}}{\text{Time in Minutes}}}$$

Growth

$$\boxed{\text{Growth} = \text{Final Height} - \text{Initial Height}}$$

Growth Rate

$$\boxed{\text{Growth Rate} = \frac{\text{Growth}}{\text{Time}}}$$

Germination Percentage

$$\boxed{\text{Germination }\% = \frac{\text{Seeds Germinated}}{\text{Seeds Sown}} \times 100}$$

Time Duration

$$\boxed{\text{Duration} = \text{End Time} - \text{Start Time}}$$

Note: The last several formulas are **useful derived relationships for creating quantitative problems**, rather than formulas explicitly stated in the textbook. They are appropriate for numerical/HOTS questions based on the chapter's experiments on breathing, seed germination, plant growth, and life cycles.

10.3 Fill-Up the Blank LOTS type questions with Answers: (35 Questions)

LOTS Type – Fill in the Blanks with Answers:

1. Things around us can be broadly classified as __________ and non-living.
   Answer: living
2. Living beings need __________ for their growth and development.
   Answer: food (nutrition)
3. The process of taking air in and giving air out is called __________.
   Answer: breathing
4. Breathing is a part of the process called __________.
   Answer: respiration
5. Tiny pores present on the surface of leaves are called __________.
   Answer: stomata
6. The removal of waste products from the body is called __________.
   Answer: excretion
7. Sweat contains water and __________ that are removed from our body as waste products.
   Answer: salts
8. Anything or any event that prompts a living being to respond is called a __________.
   Answer: stimulus
9. The touch-me-not plant folds its leaves when it is __________.
   Answer: touched

10. The process of producing new individuals of one's own kind is called __________.
    Answer: reproduction
11. Reproduction is necessary for the __________ of life.
    Answer: continuity
12. When a seed turns into a sprout, it is said to have __________.
    Answer: germinated
13. Seeds require the right amount of water and __________ for germination.
    Answer: air
14. The outer covering of a seed is called the __________.
    Answer: seed coat
15. Water softens the seed coat and helps the tiny __________ inside the seed to develop into a plant.
    Answer: embryo
16. Most seeds do not require __________ for germination.
    Answer: light
17. After germination, __________ is required for the further growth of a seedling.
    Answer: sunlight
18. The roots of plants generally grow __________.
    Answer: downwards
19. The shoots of plants generally grow __________.
    Answer: upwards
20. When sunlight comes from only one direction, the shoot grows towards the __________.
    Answer: light
21. Jagadish Chandra Bose developed an instrument called the __________ to record responses and growth in plants.
    Answer: crescograph
22. The entire process from a seed to a plant and then to the next generation of seeds is called the __________ of a plant.
    Answer: life cycle
23. A bean plant produces fruits called __________ that contain seeds.
    Answer: pods
24. Mosquitoes pass through __________ main stages in their life cycle.
    Answer: four
25. The correct sequence in the mosquito life cycle is egg → larva → __________ → adult.
    Answer: pupa
26. Mosquito larvae and pupae generally develop in __________ water.
    Answer: stagnant
27. Mosquito larvae and pupae come to the surface of water to obtain __________ for respiration.
    Answer: air
28. A jelly-like cluster of frog eggs is known as __________.
    Answer: spawn
29. The young stage of a frog that has a tail and initially no legs is called a __________.
    Answer: tadpole
30. A tadpole gradually develops into a little frog called a __________.
    Answer: froglet
31. Tadpoles use their __________ to help them swim in water.
    Answer: tails

32. As froglets develop into adult frogs, they gradually lose their __________.
    Answer: tails
33. Adult frogs can live both in water and on __________.
    Answer: land
34. *Drosera* is an example of an __________ plant.
    Answer: insectivorous
35. All living beings show movement, grow, respire, reproduce, excrete and respond to __________.
    Answer: stimuli

These LOTS questions focus mainly on **remembering and recalling definitions, terms, characteristics, processes, and life-cycle stages** directly covered in the chapter.

10.4 Fill-Up the Blank HOTS type questions with Answers: (35 Questions)

HOTS Type – Fill in the Blanks with Answers:

1. A car can move but is considered non-living because movement alone is __________ to classify something as living.
   Answer: insufficient
2. A plant does not move from one place to another, yet it is living because it shows growth, respiration, reproduction and response to __________.
   Answer: stimuli
3. If a touch-me-not plant folds its leaves when touched, it demonstrates the characteristic of response to a __________.
   Answer: stimulus
4. If a seed is kept completely dry even when air is available, it will not germinate because it lacks __________.
   Answer: water
5. A bean seed kept in moist soil in complete darkness can still germinate because __________ is not essential for the germination of bean seeds.
   Answer: light
6. Seeds submerged in excess water may fail to germinate because sufficient __________ may not be available to them.
   Answer: air
7. If two groups of bean seeds receive sufficient air but only one receives adequate water, germination is expected in the group receiving both air and __________.
   Answer: water
8. Water helps germination by softening the __________, allowing the embryo inside to develop.
   Answer: seed coat
9. A seed may appear inactive, but under suitable conditions it germinates and grows; therefore, it can be classified as __________.
   Answer: living
10. If an inverted seedling is observed after some time, its root will bend and grow __________.
    Answer: downwards
11. When an inverted seedling corrects the direction of its shoot, the shoot bends and grows __________.
    Answer: upwards

12. If a seedling receives light only through a small hole in a box, its shoot will grow __________ the source of light.
    Answer: towards
13. A plant kept upright with light available from all directions will generally have its shoot growing upwards and its root growing __________.
    Answer: downwards
14. A bean plant produces flowers followed by pods containing seeds; this demonstrates that the plant has reached the __________ stage of its life cycle.
    Answer: reproductive
15. Seeds obtained from a mature bean plant can develop into new plants, showing the __________ of the plant life cycle.
    Answer: continuity
16. If mosquito larvae are repeatedly seen coming to the surface of stagnant water, they are doing so mainly to obtain __________ for respiration.
    Answer: air
17. If mosquito larvae are found in an open container containing stagnant water, removing the stagnant water can help disrupt the mosquito __________.
    Answer: life cycle
18. If mosquito larvae change into pupae during daily observation, we can conclude that the larval stage comes __________ the pupal stage.
    Answer: before
19. If a pupa develops into an adult mosquito, the pupa represents the stage immediately __________ the adult stage.
    Answer: before
20. A mosquito showing egg, larva, pupa and adult forms demonstrates that its body undergoes significant __________ during its life cycle.
    Answer: changes
21. If a jelly-like mass containing frog eggs is found near the edge of a pond, it is called __________.
    Answer: spawn
22. A young frog-like organism still possessing a tail but beginning to develop legs is most likely in the __________ stage.
    Answer: tadpole
23. If an organism has developed from a tadpole, resembles a small frog and still retains some features of its earlier stage, it is called a __________.
    Answer: froglet
24. As a tadpole develops into an adult frog, its legs become stronger while its __________ gradually disappears.
    Answer: tail
25. A tadpole's tail is useful because it helps the animal to __________ in water.
    Answer: swim
26. An adult frog can survive in both aquatic and terrestrial environments; therefore, it can live in water as well as on __________.
    Answer: land
27. If a living organism has adequate food, air and water but permanently stops carrying out all activities of life, it is considered __________.
    Answer: dead
28. A climber winding itself around a nearby support demonstrates __________ in plants even though the plant does not move from place to place.
    Answer: movement

29. If *Drosera* bends its hair-like structures inward after an insect enters its leaf, this shows both movement and response to a __________.
    Answer: stimulus
30. A student concludes that sunlight is essential for the germination of every seed. The bean-seed experiment shows that this conclusion is __________.
    Answer: incorrect
31. If a seed germinates successfully in darkness but the seedling is later deprived of sunlight, its further __________ is likely to be affected.
    Answer: growth
32. A plant excreting excess water and minerals as droplets on its leaves demonstrates that __________ is a characteristic of plants as well as animals.
    Answer: excretion
33. A child's breathing rate increases after running compared with normal walking. This observation demonstrates that the rate of __________ can vary with physical activity.
    Answer: breathing
34. If the root of an inverted plant bends downward despite its initial upward position, the observation proves that the direction of root growth is not determined simply by the plant's initial __________.
    Answer: position
35. The transformation from spawn to tadpole, froglet and adult frog demonstrates that living organisms undergo characteristic __________ during their life cycles.
    Answer: changes

10.5 One-mark questions with Answers of LOTS Type: (40 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What are the two broad categories into which things around us can be classified?**
   Answer: Things around us can be classified into living beings and non-living things.
2. **Name any two characteristics of living beings.**
   Answer: Living beings grow and respire.
3. **Why do living beings need food?**
   Answer: Living beings need food for their growth and development.
4. **What is breathing?**
   Answer: Breathing is the process of taking air into the body and giving air out of the body.
5. **What is respiration?**
   Answer: Respiration is a life process of which breathing is a part.
6. **What are stomata?**
   Answer: Stomata are tiny pores on the surface of leaves that help plants take air in and out.
7. **What is excretion?**
   Answer: Excretion is the process of removing waste products from the body.
8. **Name one waste product formed during excretion in animals.**
   Answer: Urine is a waste product formed during excretion in animals.
9. **How do some plants remove excess water and minerals?**
   Answer: Some plants remove excess water and minerals in the form of small droplets on their leaves.
10. **What is a stimulus?**
    Answer: Anything or any event that prompts a living being to respond is called a stimulus.

11. **How does the touch-me-not plant respond to touch?**
    Answer: The touch-me-not plant responds to touch by folding its leaves.
12. **What is reproduction?**
    Answer: Reproduction is the process by which living beings produce new individuals of their own kind.
13. **Why is reproduction necessary?**
    Answer: Reproduction is necessary for the continuity of life.
14. **What is germination?**
    Answer: Germination is the process in which a seed develops into a sprout.
15. **What two conditions are essential for the germination of bean seeds?**
    Answer: The right amount of water and air are essential for the germination of bean seeds.
16. **What is the seed coat?**
    Answer: The seed coat is the outer covering of a seed.
17. **What is the role of water in seed germination?**
    Answer: Water softens the seed coat and helps the embryo inside the seed develop into a plant.
18. **Is sunlight essential for the germination of most seeds?**
    Answer: No, sunlight is not essential for the germination of most seeds.
19. **Why is sunlight needed after germination?**
    Answer: Sunlight is required for the further growth of the seedling.
20. **In which direction do the roots of a plant generally grow?**
    Answer: The roots of a plant generally grow downwards.
21. **In which direction do the shoots of a plant generally grow?**
    Answer: The shoots of a plant generally grow upwards.
22. **How does a plant shoot respond to sunlight coming from one direction?**
    Answer: The shoot grows towards the direction from which sunlight comes.
23. **Who invented the crescograph?**
    Answer: Jagadish Chandra Bose invented the crescograph.
24. **What is a crescograph used for?**
    Answer: A crescograph is used to record plant responses and measure how fast plants grow.
25. **What is the life cycle of a plant?**
    Answer: The life cycle of a plant is the entire process from a seed to a plant and then to the next generation of seeds.
26. **What does a bean fruit contain?**
    Answer: A bean fruit or pod contains seeds that can give rise to a new generation of bean plants.
27. **Name the four stages in the life cycle of a mosquito.**
    Answer: The four stages are egg, larva, pupa and adult mosquito.
28. **Where does an adult female mosquito lay its eggs?**
    Answer: An adult female mosquito lays its eggs directly on or near water.
29. **Why do mosquito larvae and pupae come to the surface of water?**
    Answer: Mosquito larvae and pupae come to the water surface to obtain air for respiration.
30. **How long may an adult mosquito survive?**
    Answer: An adult mosquito may survive for about 10 to 15 days.
31. **What is frog spawn?**
    Answer: Frog spawn is the jelly-like cluster of frog eggs found in or around water.

32. **What is a tadpole?**
    Answer: A tadpole is a young stage in the life cycle of a frog that initially has a tail and no legs.
33. **What is a froglet?**
    Answer: A froglet is a developing stage of a frog that resembles a small frog.
34. **What helps a tadpole to swim in water?**
    Answer: The tail helps a tadpole to swim in water.
35. **Where does an adult frog live?**
    Answer: An adult frog lives both in water and on land.
36. **What is *Drosera*?**
    Answer: *Drosera* is an insectivorous plant that traps insects using hair-like projections with sticky ends.
37. **How do climbers show movement?**
    Answer: Climbers show movement by winding themselves around objects placed close to them.
38. **When is a living being considered dead?**
    Answer: A living being is considered dead when it can no longer exhibit the characteristics of life despite the availability of necessary resources.
39. **What happens to the shoot when an inverted plant grows?**
    Answer: The shoot of an inverted plant bends and grows upwards.
40. **What happens to the root when an inverted plant grows?**
    Answer: The root of an inverted plant bends and grows downwards.

10.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **A car moves from one place to another. Why is it still considered non-living?**
   Answer: A car is non-living because movement alone is not sufficient to show all the essential characteristics of life.
2. **Why can a plant be considered living even though it cannot move from place to place?**
   Answer: A plant is living because it shows growth, respiration, reproduction, excretion, movement and response to stimuli.
3. **How does a climber prove that plants can show movement?**
   Answer: A climber shows movement by winding itself around an object placed close to it.
4. **What can you infer when the hairs of a *Drosera* leaf move inward after an insect lands on it?**
   Answer: We can infer that *Drosera* responds to a stimulus by showing movement.
5. **Why does a person usually breathe faster after running than after walking?**
   Answer: Running involves greater physical activity, so the breathing rate increases compared with walking.
6. **A touch-me-not plant folds its leaves when touched; which characteristic of living beings does this demonstrate?**
   Answer: It demonstrates the ability of living beings to respond to stimuli.
7. **Why is reproduction important even though an individual organism can survive without reproducing?**
   Answer: Reproduction is important because it ensures the continuity of its kind.

8. **A bean seed is kept in dry soil with sufficient air and sunlight; will it germinate? Why?**
   Answer: No, it will not germinate because water is necessary for seed germination.
9. **Why may seeds fail to germinate when they are completely submerged in excess water?**
   Answer: Seeds submerged in excess water may not receive enough air required for germination.
10. **A bean seed germinates in moist soil kept in darkness; what can you conclude from this observation?**
    Answer: We can conclude that light is not essential for the germination of bean seeds.
11. **Why does a germinating seed require water?**
    Answer: Water softens the seed coat and enables the embryo to develop into a plant.
12. **Why does a seedling require sunlight even though most seeds do not require it for germination?**
    Answer: A seedling requires sunlight for its further growth after germination.
13. **If an upright seedling is turned upside down, what will eventually happen to its root?**
    Answer: Its root will bend and grow downwards.
14. **What will happen to the shoot of an inverted seedling after some time?**
    Answer: The shoot will bend and grow upwards.
15. **A seedling receives sunlight from only one side; how will its shoot respond?**
    Answer: Its shoot will bend and grow towards the direction of sunlight.
16. **What does the downward growth of roots even in an inverted plant indicate?**
    Answer: It indicates that roots maintain their characteristic downward direction of growth regardless of the plant's initial position.
17. **Why can a dormant-looking seed still be regarded as living?**
    Answer: A seed can be regarded as living because it can germinate and grow when suitable conditions are provided.
18. **A bean plant forms pods containing seeds; which characteristic of living beings is demonstrated?**
    Answer: The formation of seeds demonstrates reproduction in the plant.
19. **Why is the formation of seeds important in the life cycle of a plant?**
    Answer: Seeds give rise to a new generation of plants and thereby continue the plant's life cycle.
20. **Why should stagnant water not be allowed to collect around houses?**
    Answer: Stagnant water should be prevented because it can provide a place for mosquitoes to breed.
21. **Why do mosquito larvae and pupae repeatedly come to the surface of water?**
    Answer: They come to the surface because they require air for respiration.
22. **What would happen to mosquito larvae if they were prevented from obtaining air at the water surface?**
    Answer: The larvae would die because they would be unable to obtain the air needed for respiration.
23. **If mosquito larvae are observed changing into pupae, what can you infer about their life-cycle sequence?**
    Answer: We can infer that the larval stage occurs before the pupal stage.
24. **If a pupa changes into a mosquito, which stage immediately precedes the adult stage?**
    Answer: The pupal stage immediately precedes the adult mosquito stage.

25. **Why does breaking the mosquito life cycle help control mosquito populations?**
Answer: Breaking the life cycle prevents immature stages from developing into adult mosquitoes capable of continuing the cycle.
26. **A jelly-like cluster is found near the edge of a pond during the rainy season; what might it be?**
Answer: It might be frog spawn, which is a cluster of frog eggs.
27. **Why is a tail useful to a tadpole?**
Answer: A tail is useful because it helps the tadpole swim in water.
28. **How does the development of strong legs help a froglet?**
Answer: Strong legs help the developing frog to jump and move effectively on land.
29. **Why can an adult frog live in a different way from an early tadpole?**
Answer: An adult frog has developed strong legs and can live both in water and on land, whereas an early tadpole is adapted mainly to water.
30. **What does the transformation of a tadpole into an adult frog demonstrate?**
Answer: It demonstrates that animals can undergo major changes in body form during their life cycle.
31. **A plant continues to receive water but eventually becomes yellow, dries and stops all life activities; what can you conclude?**
Answer: We can conclude that the plant has reached the end of its life cycle and is dead.
32. **How does the life cycle of a bean plant ensure continuity of its kind?**
Answer: The mature plant produces seeds that can germinate and develop into a new generation of bean plants.
33. **If an organism grows and moves but never responds to any stimulus, can these two features alone prove that it is living?**
Answer: No, an organism should be identified using the complete set of essential characteristics of living beings rather than only growth and movement.
34. **Why is observation over several days useful when studying germination or a life cycle?**
Answer: Observation over several days allows us to identify and record the sequence of changes occurring in a living organism.
35. **What common idea connects seed germination, plant growth, mosquito development and frog development?**
Answer: All of them demonstrate that living organisms undergo systematic changes during growth and their life cycles.

10.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type:

1. **What are the main characteristics of living beings?**
Answer:
    1. Living beings show movement, need food, grow and respire.
    2. They also excrete, reproduce, respond to stimuli and eventually die.
2. **How do plants show movement even though they do not move from place to place?**
Answer:
    1. Flowers show movement when they open, and climbers wind themselves around nearby objects.
    2. In *Drosera*, hair-like projections move inward to trap insects.

3. **Why do living beings need food? Give an example.**
   Answer:
    1. Living beings need food for their growth and development.
    2. Humans, animals and plants require nutrition to grow.
4. **What is breathing, and how is it related to respiration?**
   Answer:
    1. During breathing, air moves into the body when we inhale and moves out when we exhale.
    2. Breathing is a part of the process called respiration.
5. **What is excretion? How does it occur in animals?**
   Answer:
    1. Excretion is the removal of waste products from the body.
    2. In animals, waste products are removed through substances such as sweat and urine.
6. **What is a stimulus? Give one example of a plant responding to a stimulus.**
   Answer:
    1. Anything or any event that prompts a living being to respond is called a stimulus.
    2. The touch-me-not plant responds to touch by folding its leaves.
7. **What is reproduction, and why is it necessary?**
   Answer:
    1. Reproduction is the process of producing new individuals of one's own kind.
    2. It is necessary for the continuity of life.
8. **What is seed germination? Name two essential conditions for the germination of bean seeds.**
   Answer:
    1. When a seed develops into a sprout, it is said to have germinated.
    2. Bean seeds require the right amount of water and air for germination.
9. **Explain the role of water in seed germination.**
   Answer:
    1. Water enables seeds to carry out the processes necessary for growth.
    2. It softens the seed coat and helps the embryo inside develop into a plant.
10. **Why is air necessary for the germination of seeds?**
    Answer:
    1. Seeds require air to carry out the processes necessary for germination.
    2. They obtain air from the spaces present between soil particles.
11. **Is sunlight necessary for seed germination? Explain.**
    Answer:
    1. Light is not essential for the germination of bean seeds, and most seeds generally do not require light to germinate.
    2. However, after germination, sunlight is required for the further growth of the seedling.
12. **Describe the direction of growth of roots and shoots in an upright plant.**
    Answer:
    1. The root of an upright plant grows downwards.
    2. The shoot of an upright plant grows upwards.
13. **What happens to the root and shoot when a plant is kept inverted?**
    Answer:
    1. The root bends and grows downwards.
    2. The shoot bends and grows upwards.

14. **How does a plant respond when sunlight comes from only one direction?**
    Answer:
    1. The shoot grows in the direction of the incoming sunlight.
    2. The root continues to grow downwards.
15. **Write two contributions of Jagadish Chandra Bose to the study of plants.**
    Answer:
    1. Jagadish Chandra Bose developed the crescograph to record plant responses and measure their growth.
    2. He demonstrated that plants can sense and respond to stimuli such as light, heat, electricity and gravity.
16. **Briefly describe the life cycle of a bean plant.**
    Answer:
    1. A seed germinates, grows into a young plant and matures to produce flowers and fruits.
    2. The fruits contain seeds that can grow into a new generation of bean plants.
17. **What happens to a bean plant after it produces fruits and seeds?**
    Answer:
    1. After producing fruits containing seeds, the plant eventually becomes yellow and dry.
    2. When its growth and all life activities finally stop, the plant is considered dead.
18. **Name the four stages in the life cycle of a mosquito.**
    Answer:
    1. The first two stages are **egg and larva**.
    2. The next two stages are **pupa and adult mosquito**.
19. **Why do mosquito larvae and pupae repeatedly come to the surface of water?**
    Answer:
    1. Mosquito larvae and pupae live in water but require air for respiration.
    2. Therefore, they repeatedly move to the water surface to obtain air.
20. **Why should stagnant water be avoided in our surroundings?**
    Answer:
    1. Mosquitoes can breed in stagnant water, where their larvae and pupae develop.
    2. Preventing stagnant water helps prevent mosquito breeding.
21. **What is frog spawn, and where can it be found?**
    Answer:
    1. Frog spawn is a white jelly-like cluster of frog eggs.
    2. It can be found on the surface of water near the edge of a pond or attached to nearby plants.
22. **Name the main stages in the life cycle of a frog.**
    Answer:
    1. The life cycle begins with the egg/embryo stage followed by the tadpole stage.
    2. The tadpole develops into a froglet and finally into an adult frog.
23. **How does a tadpole change as it develops into a froglet?**
    Answer:
    1. A tadpole gradually develops legs while initially retaining its tail.
    2. It begins to resemble a small frog and becomes a froglet.
24. **What changes occur when a froglet becomes an adult frog?**
    Answer:
    1. The froglet gradually loses its tail and develops strong legs for jumping and landing.

2. It becomes an adult frog capable of living both in water and on land.

25. **How is the life cycle important for the continuity of living organisms?**
Answer:
    1. Living organisms grow, develop and reproduce during their life cycles.
    2. Reproduction produces a new generation and helps maintain the continuity of their kind.

10.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:

1. **A toy car can move, but it is considered non-living. Why?**
Answer:
    1. Movement alone cannot be used to decide whether something is living.
    2. A toy car does not perform the other essential life processes shown by living beings.
2. **A plant cannot walk from one place to another. How can you prove that it still shows movement?**
Answer:
    1. Climbers wind around nearby supports, and flowers show movement while opening.
    2. *Drosera* also moves its hair-like projections inward when an insect lands on it.
3. **A student breathes faster after running than after a normal walk. What can you infer?**
Answer:
    1. The breathing rate changes with the level of physical activity.
    2. More vigorous activity such as running results in a higher breathing rate than normal walking.
4. **A touch-me-not plant folds its leaves when touched. What two characteristics of living beings does this demonstrate?**
Answer:
    1. Folding of the leaves demonstrates movement in the plant.
    2. It also demonstrates the plant's ability to respond to a stimulus.
5. **A bean seed is supplied with air and sunlight but no water. Predict what will happen and give a reason.**
Answer:
    1. The bean seed will not germinate.
    2. Water is essential for germination because it softens the seed coat and helps the embryo develop.
6. **A bean seed is completely submerged in water for several days. Why may it fail to germinate?**
Answer:
    1. A completely submerged seed may not receive sufficient air.
    2. Both the right amount of water and air are necessary for bean-seed germination.
7. **A bean seed germinates in a dark place when sufficient water and air are available. What does this observation prove?**
Answer:
    1. It shows that light is not essential for the germination of bean seeds.
    2. However, sunlight is required for the further growth of the seedling after germination.

8. **Two groups of bean seeds are given equal amounts of water, but one group does not receive enough air. Which group is more likely to germinate successfully and why?**
   Answer:
   1. The group receiving sufficient water and air is more likely to germinate successfully.
   2. Bean seeds require both the right amount of water and air for germination.
9. **A student says, "Sunlight is essential for a seed to germinate." How would you correct the student?**
   Answer:
   1. Most seeds, including bean seeds, can germinate without light when suitable water and air are available.
   2. Sunlight becomes important for the further growth of the seedling after germination.
10. **A seedling is placed upside down. Predict how its root and shoot will grow after some time.**
    Answer:
    1. The root will bend and grow downwards.
    2. The shoot will bend and grow upwards.
11. **A plant receives sunlight only from a window on one side. What change would you expect in its shoot and root?**
    Answer:
    1. The shoot will grow towards the light coming through the window.
    2. The root will continue to grow downwards.
12. **How does the experiment with an inverted seedling show that plant growth is directional?**
    Answer:
    1. Even after inversion, the root changes direction and grows downwards.
    2. At the same time, the shoot changes direction and grows upwards.
13. **Why is the crescograph useful for studying plants even though plant growth may not be easily noticed with our eyes?**
    Answer:
    1. A crescograph can record plant responses and measure their growth.
    2. It therefore helps us study changes in plants that may occur too slowly to observe easily.
14. **A bean plant produces flowers but no fruits or seeds. Which important part of its life cycle would remain incomplete? Explain.**
    Answer:
    1. The production of the next generation would remain incomplete because seeds are formed in the fruits.
    2. These seeds are needed to germinate and develop into new bean plants.
15. **Why can the formation of seeds be considered an important link between two generations of plants?**
    Answer:
    1. Seeds are produced by the mature plant as part of its life cycle.
    2. These seeds can germinate and grow into the next generation of plants.
16. **Mosquito larvae are repeatedly seen moving to the surface of stagnant water. What does this behaviour indicate?**
    Answer:

1. Their movement to the surface indicates that they need air for respiration.
   2. Although they live in water, mosquito larvae obtain the required air at the water surface.

17. **Why can preventing stagnant water from collecting around houses reduce the number of mosquitoes?**
    Answer:
    1. Mosquitoes use stagnant water as a place where their immature stages develop.
       2. Removing such water interrupts the mosquito life cycle and prevents many larvae and pupae from developing into adults.
18. **If mosquito larvae are present today and pupae appear after some time, what can you infer about their life cycle?**
    Answer:
    1. The observation shows that the larval stage develops into the pupal stage.
    2. It confirms that larva occurs before pupa in the mosquito life cycle.
19. **A student observes eggs, larvae and adult mosquitoes but misses one stage. Which stage is missing and where does it occur in the sequence?**
    Answer:
    1. The missing stage is the **pupa**.
    2. It occurs between the larval and adult stages: egg → larva → pupa → adult.
20. **A jelly-like mass is found near the edge of a pond. How can knowledge of the frog life cycle help identify it?**
    Answer:
    1. The jelly-like mass may be frog spawn containing frog eggs.
    2. These eggs represent the beginning stage of the frog life cycle.
21. **A water-dwelling animal has a long tail and later develops legs. Which stage of the frog life cycle is it likely to represent, and why?**
    Answer:
    1. It is likely to be a tadpole because tadpoles initially have tails and later develop legs.
    2. This change occurs as the tadpole progresses towards the froglet stage.
22. **How does the change from tadpole to froglet help the animal adapt to a different habitat?**
    Answer:
    1. The tadpole develops legs as it changes into a froglet.
    2. These changes prepare it for movement beyond its earlier water-based stage.
23. **Why is the disappearance of the tail and development of strong legs important in the frog life cycle?**
    Answer:
    1. The tail is useful for swimming during the tadpole stage, while strong legs help the frog jump and land.
    2. These changes enable the adult frog to live both in water and on land.
24. **Compare one similarity between the life cycles of a bean plant and a frog.**
    Answer:
    1. Both begin from an early stage and undergo a series of changes before reaching adulthood or maturity.
    2. Both eventually reproduce, helping to continue the next generation.
25. **Why is protecting the habitats of plants and animals important for completing their life cycles?**
    Answer:

1. Living organisms depend on suitable surroundings to grow, develop and reproduce through different stages of life.
2. Protecting their habitats helps them complete these stages and continue their generations.

10.9. Three-mark questions with Answers of LOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:

1. What are the main characteristics of living beings?

Answer:

1. Living beings need food, grow and show movement.
2. They respire, excrete and respond to stimuli.
3. They reproduce and eventually die.

2. Explain movement in plants with examples.

Answer:

1. Plants do not move from place to place, but their parts can show movement.
2. Climbers wind themselves around nearby supports as they grow.
3. In *Drosera*, hair-like projections move inward to trap insects.

3. Explain respiration in living beings.

Answer:

1. All living beings respire as part of their life processes.
2. In humans, air is taken into the body during inhalation and released during exhalation.
3. Plants also exchange air through tiny pores called stomata present on their leaves.

4. What is excretion? Explain how it occurs in living beings.

Answer:

1. Excretion is the process of removing waste products from the body.
2. Animals remove waste products through substances such as urine and sweat.
3. Plants can also remove excess water and minerals in the form of droplets on their leaves.

5. What is a stimulus? Explain response to stimuli with an example.

Answer:

1. Anything or any event that causes a living being to respond is called a stimulus.
2. Living beings can sense changes in their surroundings and respond to them.
3. For example, the touch-me-not plant folds its leaves when touched.

6. What is reproduction, and why is it important for living beings?

Answer:

1. Reproduction is the process by which living beings produce new individuals of their own kind.
2. New individuals grow and become capable of producing another generation.
3. Thus, reproduction helps in maintaining the continuity of life.

7. What is seed germination? State the conditions necessary for the germination of bean seeds.

Answer:

1. Germination is the process in which a seed develops into a sprout.
2. Bean seeds require the right amount of water for successful germination.
3. They also require sufficient air for germination.

8. Explain the role of water and air in seed germination.

Answer:

1. Water softens the seed coat and helps the embryo inside the seed develop.
2. Air is required by the seed to carry out the processes necessary for germination.

3. Therefore, both the right amount of water and sufficient air are necessary for bean-seed germination.

9. Explain the role of light during germination and subsequent growth of a seedling.
Answer:
1. Light is not essential for the germination of bean seeds.
2. Most seeds can germinate without light when suitable water and air are available.
3. After germination, sunlight is required for the further growth of the seedling.

10. Describe the direction of growth of the root and shoot of a plant.
Answer:
1. In an upright plant, the root generally grows downwards.
2. The shoot generally grows upwards.
3. When light comes from one direction, the shoot grows towards the light while the root continues to grow downwards.

11. What happens when a growing plant is placed in an inverted position?
Answer:
1. The root of the inverted plant bends and begins to grow downwards.
2. The shoot bends and begins to grow upwards.
3. Thus, roots and shoots maintain their characteristic directions of growth even when the plant is inverted.

12. Write a short note on Jagadish Chandra Bose and the crescograph.
Answer:
1. Jagadish Chandra Bose studied growth and responses in plants.
2. He developed an instrument called the crescograph to record plant responses and measure their growth.
3. His work demonstrated that plants can sense and respond to stimuli such as light, heat, electricity and gravity.

13. Describe the main stages in the life cycle of a bean plant.
Answer:
1. A bean seed germinates and develops into a young plant.
2. The plant grows and produces flowers, followed by fruits or pods containing seeds.
3. These seeds can germinate and develop into the next generation of bean plants.

14. What happens to a bean plant towards the end of its life cycle?
Answer:
1. The mature bean plant produces flowers, fruits and seeds.
2. After completing these stages, the plant gradually becomes yellow and dry.
3. When all its life activities cease, the plant is considered dead.

15. Describe the life cycle of a mosquito.
Answer:
1. The mosquito life cycle begins when a female mosquito lays eggs on or near water.
2. The eggs develop through the larval and pupal stages.
3. The pupa finally develops into an adult mosquito, completing the sequence **egg → larva → pupa → adult**.

16. Describe the larval and pupal stages of a mosquito.
Answer:
1. Mosquito larvae and pupae develop in water, especially where water remains stagnant.
2. Both larvae and pupae require air for respiration.
3. Therefore, they repeatedly come to the surface of the water to obtain air.

17. Describe the main stages in the life cycle of a frog.
Answer:
1. The frog life cycle begins with spawn containing eggs, which develop into embryos.

2. The embryos develop into tadpoles, and the tadpoles later develop legs.
3. The tadpole becomes a froglet and finally develops into an adult frog.

18. Describe the changes that occur when a tadpole develops into an adult frog.
Answer:
1. A tadpole initially has a tail that helps it swim in water.
2. As it develops, legs appear and it gradually changes into a froglet.
3. The tail gradually disappears and the froglet develops into an adult frog capable of living in water and on land.

19. What is frog spawn? How does it develop further?
Answer:
1. Frog spawn is a jelly-like cluster of frog eggs found in or near water.
2. The eggs develop into embryos and then into tadpoles.
3. Tadpoles later develop into froglets and finally into adult frogs.

20. Explain why life cycles are important in living organisms.
Answer:
1. Living organisms undergo different stages of growth and development during their lives.
2. Mature organisms reproduce and give rise to new individuals of their own kind.
3. Thus, the life cycle enables one generation to be followed by the next generation.

10.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:
1. A moving car and a growing plant both show movement. Why is only the plant considered living?
Answer:
1. Movement alone cannot be used to decide whether an object is living or non-living.
2. A plant also grows, respires, reproduces, excretes and responds to stimuli.
3. A car does not perform these essential life processes and is therefore non-living.

2. A student says that plants do not move because they remain fixed in one place. How would you prove the statement wrong?
Answer:
1. Plants show movement even though they do not move from one place to another.
2. Climbers wind around nearby supports, while *Drosera* moves its hair-like structures inward to trap insects.
3. Therefore, movement of plant parts proves that plants can show movement.

3. A student records more breaths per minute after running than after walking. What conclusions can be drawn?
Answer:
1. The student's breathing rate changes according to the level of physical activity.
2. Running results in a higher breathing rate than normal walking.
3. This observation shows that breathing is an active life process that can vary with activity.

4. A touch-me-not plant folds its leaves immediately after being touched. What does this observation tell you about plants?
Answer:
1. Touch acts as a stimulus to the touch-me-not plant.
2. Folding of its leaves is the plant's response to that stimulus.
3. This demonstrates that plants, like other living beings, can sense and respond to changes in their surroundings.

5. Three bean seeds are kept separately: one without water, one completely submerged in water, and one with sufficient water and air. Predict their germination.
Answer:
1. The seed without water will not germinate because water is necessary for germination.
2. The completely submerged seed may not germinate properly because it may not receive sufficient air.
3. The seed receiving the right amount of water and sufficient air is most likely to germinate successfully.

6. A bean seed germinates in darkness, but the seedling later needs sunlight. Explain this observation.
Answer:
1. Light is not essential for the germination of bean seeds.
2. A bean seed can germinate when the right amount of water and air are available even without light.
3. After germination, sunlight becomes necessary for the further growth of the seedling.

7. Why is excess water as unsuitable as insufficient water for seed germination?
Answer:
1. Insufficient water prevents the seed coat from softening and the embryo from developing properly.
2. Excess water can reduce the availability of air to the seed.
3. Hence, successful germination requires the right amount of water along with sufficient air.

8. A germinating seedling is accidentally placed upside down. Predict what will happen to its root and shoot.
Answer:
1. The root will change its direction and bend downwards.
2. The shoot will bend and grow upwards despite the inverted position.
3. This demonstrates that roots and shoots have characteristic directions of growth.

9. A plant is kept inside a box with light entering through an opening on only one side. Predict its growth.
Answer:
1. The shoot will gradually bend and grow towards the opening from which light enters.
2. The root will continue to grow downwards.
3. This observation demonstrates that plant growth can occur in response to environmental stimuli such as light.

10. Why was the crescograph important for understanding plants as living organisms?
Answer:
1. Plant growth and responses may be too slow or small to observe easily with our eyes.
2. Jagadish Chandra Bose developed the crescograph to record plant responses and measure their growth.
3. It helped demonstrate that plants can respond to stimuli such as light, heat, electricity and gravity.

11. A bean plant grows well and produces flowers but fails to produce seeds. How would this affect its life cycle?
Answer:
1. The plant would have completed growth and flowering but not successful formation of the next generation of seeds.
2. Seeds are required to germinate and develop into new bean plants.

3. Therefore, failure to produce seeds would interrupt the continuation of its life cycle into the next generation.

12. Why can a seed be considered living even when it does not visibly grow or move?
Answer:
1. A seed may remain without obvious visible growth under unsuitable conditions.
2. When suitable water and air are provided, it can germinate and develop into a seedling.
3. Its ability to begin growth under favourable conditions supports its classification as living.

13. Mosquito larvae are observed repeatedly coming to the surface of stagnant water. Explain this behaviour and its significance.
Answer:
1. Mosquito larvae require air for respiration even though they live in water.
2. They repeatedly come to the water surface to obtain air.
3. Therefore, preventing their access to air can interfere with their survival and development.

14. Why can removing stagnant water around houses help control mosquitoes?
Answer:
1. Mosquitoes lay eggs on or near water, and their larvae and pupae develop in water.
2. Removing stagnant water reduces suitable places for these stages of the mosquito life cycle.
3. Thus, it can interrupt development from eggs to adult mosquitoes.

15. A student observes mosquito larvae but no adult mosquitoes in a water container. Can the student conclude that adults will never appear? Explain.
Answer:
1. No, larvae are only one stage in the mosquito life cycle.
2. Under suitable conditions, larvae develop into pupae and then into adult mosquitoes.
3. Therefore, continued observation may reveal the later stages of the life cycle.

16. A tadpole and an adult frog look very different. How can you establish that they are stages of the same animal?
Answer:
1. Continuous observation shows that the tadpole gradually develops legs and changes into a froglet.
2. The froglet then loses its tail and develops into an adult frog.
3. The sequence of these changes establishes that they are different stages of the frog's life cycle.

17. How do the changes in a tadpole help it become suited for the adult frog's way of life?
Answer:
1. The tadpole initially has a tail that helps it swim in water.
2. As it develops, legs appear and become strong enough for jumping and landing.
3. Its tail gradually disappears as it becomes an adult frog capable of living both in water and on land.

18. Compare the life cycles of a bean plant and a frog based on the idea of continuity of life.
Answer:
1. A bean seed develops into a mature plant that produces new seeds.
2. Frog spawn develops through tadpole and froglet stages into an adult frog that can continue the next generation.

3. In both cases, growth, development and reproduction help maintain continuity from one generation to another.

19. Why is observing an organism over a long period more useful than observing it only once when studying its life cycle?

Answer:

1. A single observation shows only one stage of an organism's life.
2. Repeated observations reveal changes such as germination, growth, development and reproduction.
3. Arranging these observations in sequence helps us understand the complete life cycle.

20. How can protecting ponds and other natural habitats help frogs complete their life cycle?

Answer:

1. Frog eggs and tadpoles depend on aquatic habitats during the early stages of development.
2. Tadpoles undergo several changes before becoming froglets and adult frogs.
3. Protecting their habitats therefore supports the different stages required for frogs to complete their life cycle.

10.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:

1. Explain the important characteristics of living beings.

Answer:

1. Living beings need food or nutrition for their growth and development.
2. They grow and show different kinds of movement during their lives.
3. All living beings respire and remove waste products through excretion.
4. They respond to different stimuli or changes in their surroundings.
5. Living beings reproduce to ensure continuity of their kind and eventually die.

2. Explain seed germination and the conditions necessary for the germination of bean seeds.

Answer:

1. Germination is the process by which a seed develops into a sprout.
2. Bean seeds require the right amount of water for successful germination.
3. Water softens the seed coat and helps the embryo inside the seed develop.
4. Seeds also require sufficient air to carry out the processes necessary for germination.
5. Light is generally not essential for germination, although sunlight is required for the further growth of the seedling.

3. Describe the experiment used to study the conditions necessary for seed germination.

Answer:

1. Four identical pots are taken, and four bean seeds are placed in each pot.
2. The pots are provided with different combinations of water, air and light conditions.
3. The seeds are observed regularly for about 7–10 days to check whether they germinate.
4. The observations show that bean seeds need the right amount of water and sufficient air for germination.
5. They also show that light is not essential for bean-seed germination, though sunlight is needed for the seedling's further growth.

4. Explain growth and movement in plants with suitable examples.

Answer:

1. Plants show growth and movement even though they generally remain fixed at one place.

2. Flowers show movement when they open, while climbers wind around nearby supports.
3. *Drosera* shows movement when its hair-like projections move inward to trap an insect.
4. In a growing plant, roots generally grow downwards while shoots grow upwards.
5. When light comes from one direction, the shoot grows towards the light while the root continues to grow downwards.

5. Describe the life cycle of a bean plant.

Answer:

1. The life cycle of a bean plant begins with a seed that germinates under suitable conditions.
2. The germinated seed develops into a young plant with roots, stem and leaves.
3. The young plant continues to grow and eventually produces flowers.
4. The flowers develop into fruits or pods containing new seeds.
5. These seeds can germinate to produce the next generation of bean plants, while the parent plant eventually completes its life cycle and dies.

6. Describe the life cycle of a mosquito.

Answer:

1. The life cycle of a mosquito begins when an adult female lays eggs on or near water.
2. The eggs hatch and develop into larvae that live in water.
3. The larvae grow and change into pupae.
4. The pupae later develop into adult mosquitoes.
5. Thus, the mosquito life cycle follows the sequence **egg** → **larva** → **pupa** → **adult mosquito**.

7. Explain the importance of water and air during the larval and pupal stages of mosquitoes.

Answer:

1. Mosquito larvae and pupae develop in water, including stagnant water.
2. Both larvae and pupae require air for respiration.
3. They repeatedly come to the surface of the water to obtain air.
4. A layer of kerosene on the water surface can block their access to air.
5. When they cannot obtain the required air, the larvae and pupae die.

8. Describe the different stages in the life cycle of a frog.

Answer:

1. The frog life cycle begins with spawn containing eggs, which develop into embryos.
2. The embryos develop into tadpoles that have tails and live in water.
3. As tadpoles grow, they develop legs while still retaining their tails.
4. They then become froglets, during which the tail gradually disappears and the legs become stronger.
5. Finally, the froglet develops into an adult frog that can live both in water and on land.

9. Explain how a tadpole changes into an adult frog.

Answer:

1. A young tadpole has a tail that helps it swim in water.
2. As it grows, the tadpole begins to develop legs.
3. It gradually changes into a froglet with more developed legs and a reduced tail.
4. The tail continues to disappear while the legs become strong enough for jumping and landing.
5. Finally, it becomes an adult frog capable of living both in water and on land.

10. Explain how living beings respond to stimuli, with examples from plants.

Answer:

1. A stimulus is anything or any event that prompts a living being to respond.
2. Living beings can sense changes in their surroundings and react to them.

3. The touch-me-not plant folds its leaves when it is touched.
4. *Drosera* moves its hair-like projections inward when an insect enters its leaf.
5. Such responses show that plants, although fixed in one place, possess an important characteristic of living beings.

10.12 Five-mark questions with Answers of HOTS Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type

1. A student says, "Anything that moves is a living thing." Analyse this statement and justify whether it is correct.

Answer:
1. The statement is incorrect because movement alone cannot determine whether something is living.
2. Non-living objects such as vehicles can also move when an external force or energy is applied.
3. Living beings show several characteristics such as growth, respiration, excretion and response to stimuli.
4. They also reproduce to ensure the continuity of their kind and eventually die.
5. Therefore, a combination of life characteristics, rather than movement alone, should be considered while identifying living beings.

2. Four groups of bean seeds are kept under different conditions—without water, completely submerged in water, with adequate water and air in darkness, and with adequate water, air and light. Predict and explain the results.

Answer:
1. Seeds without water will not germinate because water is necessary for germination.
2. Completely submerged seeds may not germinate properly because they may not receive sufficient air.
3. Seeds receiving adequate water and air in darkness can germinate because light is not essential for bean-seed germination.
4. Seeds receiving adequate water, air and light can also germinate because the essential requirements are available.
5. Thus, the experiment demonstrates that the right amount of water and sufficient air are essential for bean-seed germination, while light is generally not essential for germination itself.

3. A student observes that a bean seed germinates in darkness but the seedling does not grow well when it remains without sunlight. Explain the observation.

Answer:
1. Light is not essential for the initial germination of most seeds, including bean seeds.
2. The seed can germinate in darkness if the right amount of water and sufficient air are available.
3. Germination results in the formation of a young seedling from the seed.
4. After germination, sunlight is required for the further growth of the seedling.
5. Therefore, the seed may germinate in darkness, but continued absence of sunlight affects its subsequent growth.

4. A potted seedling is placed upside down, and sunlight is allowed to enter from only one side. Predict the changes you would observe and explain what they demonstrate.

Answer:
1. The root of the inverted seedling will bend and grow downwards.
2. The shoot will change its direction and grow upwards.
3. When light comes from one side, the shoot will bend towards the incoming light.

4. The root will continue its downward growth despite the direction of the light.
5. These observations demonstrate that different parts of a plant show characteristic growth directions and that shoots respond to light.

5. A touch-me-not plant folds its leaves when touched, while a climber winds around a nearby support. What do these observations tell us about plants?

Answer:

1. The touch-me-not plant responds to touch by folding its leaves.
2. This demonstrates that plants can sense and respond to stimuli in their surroundings.
3. A climber shows movement by winding itself around a nearby support.
4. These examples prove that plants can show movement even though they do not locomote from one place to another.
5. Therefore, response to stimuli and movement provide evidence that plants possess characteristics of living beings.

6. A bean plant grows normally and produces flowers, but its fruits and seeds are removed before they mature. How could this affect the continuity of its life cycle?

Answer:

1. A mature bean plant normally produces flowers that develop into fruits containing seeds.
2. These seeds are important because they can germinate and form new bean plants.
3. Removing the fruits and seeds would prevent those seeds from completing their development.
4. Consequently, they would not be available to germinate and produce the next generation.
5. This shows why seed production is essential for the continuation of the bean plant's life cycle.

7. Mosquito larvae and pupae are found in stagnant water near a house. Explain how knowledge of their life cycle can help control their population.

Answer:

1. Mosquitoes pass through the stages egg, larva, pupa and adult during their life cycle.
2. The larval and pupal stages develop in water and require air for respiration.
3. Therefore, stagnant water provides a suitable place for these immature stages to develop.
4. Removing stagnant water can interrupt the aquatic stages before they develop into adults.
5. Hence, understanding the mosquito life cycle helps identify the stages at which mosquito development can be interrupted.

8. A student finds a tadpole in a pond and claims that it is a completely different animal from a frog. How would you use the frog life cycle to correct the student?

Answer:

1. A tadpole is an early developmental stage in the life cycle of a frog.
2. As the tadpole grows, it develops legs while initially retaining its tail.
3. It gradually changes into a froglet, during which further changes in its body occur.
4. The tail gradually disappears and the legs become stronger as the froglet develops.
5. Finally, it becomes an adult frog, proving that the tadpole and adult frog are stages of the same animal's life cycle.

9. Compare the life cycles of a bean plant and a frog and identify the common principle demonstrated by both.

Answer:

1. A bean plant begins as a seed, germinates, grows, produces flowers and fruits, and forms new seeds.

2. A frog begins as spawn and develops through embryo, tadpole and froglet stages before becoming an adult.
3. Both organisms undergo a series of changes during their growth and development.
4. Both eventually reach stages that allow the life cycle to continue into another generation.
5. Thus, both life cycles demonstrate growth, development and continuity from one generation to the next.

10. Why is long-term observation necessary to understand the complete life cycle of a living organism? Explain using the bean plant or frog as an example.

Answer:

1. Different stages of a life cycle occur over different periods and cannot all be observed at one moment.
2. A bean plant, for example, changes from a germinating seed to a young plant and later produces flowers, fruits and seeds.
3. Similarly, frog spawn develops into a tadpole, froglet and finally an adult frog over several weeks.
4. Recording observations at regular intervals helps arrange these changes in their correct sequence.
5. Therefore, long-term observation helps us understand how an organism grows, develops and completes its life cycle.

10.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. Riya wants to find out the conditions necessary for bean seeds to germinate. How can she conduct an experiment at home?

Answer:

1. Riya can take identical containers with bean seeds and expose them to different conditions of water, air and light.
2. She can keep one set without water, another with excess water, and another with the right amount of water and sufficient air.
3. She should observe the seeds regularly for about 7–10 days and record which ones germinate.
4. Seeds receiving the right amount of water and sufficient air should germinate, while unsuitable water or air conditions can prevent germination.
5. She can conclude that suitable water and air are essential for bean-seed germination, whereas light is not essential for germination itself.

2. Your classroom plant is kept near a window, and after a few days its shoot bends towards the window. Apply your knowledge of plant movement to explain the observation.

Answer:

1. The plant receives more light from the direction of the window.
2. A growing shoot responds to light by growing towards its source.
3. Therefore, the shoot gradually bends towards the window.
4. The root, however, continues to grow downwards rather than towards the light.
5. This observation can be used to demonstrate directional growth and response to light in plants.

3. You accidentally place a young potted seedling upside down. Predict what you would observe after a few days and explain why.

Answer:

1. Initially, the root and shoot would be in directions opposite to their usual positions.
2. After some time, the root would bend and begin growing downwards.
3. The shoot would also bend and begin growing upwards.
4. Thus, the plant would adjust the direction of growth of its root and shoot despite being inverted.
5. The observation can be used to demonstrate that plant parts show characteristic directions of growth.

4. After heavy rain, you notice stagnant water in discarded containers around your house and mosquito larvae in them. What should you infer and what action would be useful?

Answer:

1. The presence of larvae indicates that mosquitoes are undergoing part of their life cycle in the stagnant water.
2. Mosquito eggs develop into larvae and then pupae before becoming adults.
3. The larvae and pupae live in water and repeatedly come to the surface to obtain air.
4. Removing stagnant water would eliminate a place where these immature stages can continue developing.
5. Thus, knowledge of the mosquito life cycle can be applied to interrupt mosquito development around the home.

5. During a visit to a pond, you observe jelly-like frog eggs, tadpoles and small frogs with tails. Explain how you would arrange these observations to show the frog life cycle.

Answer:

1. The jelly-like cluster of eggs, called spawn, represents the beginning of the observed life cycle.
2. The eggs develop into embryos and then into tadpoles with tails.
3. The tadpoles later develop legs while continuing to have tails.
4. They then become froglets, in which the tail gradually disappears and the legs become stronger.
5. Finally, the froglet develops into an adult frog, giving the sequence **spawn/egg → embryo → tadpole → froglet → adult frog**.

6. A student keeps bean seeds in a dark cupboard with sufficient moisture and air. The seeds germinate, but the seedlings are left there for further growth. What should the student do?

Answer:

1. The germination shows that bean seeds do not require light for the initial process of germination.
2. The available water and air provided the essential conditions for the seeds to germinate.
3. However, the newly formed seedlings require sunlight for their further growth.
4. The student should therefore move the seedlings to a place where they can receive adequate sunlight.
5. This activity demonstrates that the conditions required for germination and subsequent seedling growth are not exactly the same.

7. During physical education class, you want to investigate whether running affects breathing rate. How would you carry out the activity?

Answer:

1. First, count and record the number of breaths taken in one minute under normal conditions or after a normal walk.
2. Then perform an activity such as running for the period suggested in the chapter.
3. Immediately afterwards, count the number of breaths taken in one minute again.
4. Compare the breathing rates recorded after the different levels of physical activity.

5. A higher breathing rate after running would show that breathing rate changes with the level of physical activity.

8. Your friend says that a touch-me-not plant is non-living because it cannot walk. How would you use observations to correct this idea?

Answer:

1. Touching the plant's leaves causes them to fold, showing a visible response to touch.
2. Here, touch acts as a stimulus and folding of the leaves is the response.
3. Plants also show other forms of movement, such as climbers winding around nearby supports.
4. They perform other life processes such as growth, respiration, excretion and reproduction.
5. Therefore, inability to walk from one place to another cannot be used to classify a plant as non-living.

9. A student wants to maintain a record of the complete life cycle of a bean plant. What observations should be made?

Answer:

1. The student should first record the date on which the bean seed is sown and when germination occurs.
2. The growth of the young plant and appearance of new leaves should be observed regularly.
3. The date on which the first flower appears should be recorded.
4. The formation of fruits or pods and the development of seeds should also be noted.
5. Continued observation until the plant becomes yellow, dries and completes its life activities will provide a record of its life cycle.

10. A pond in your neighbourhood is being filled with waste, and fewer frogs are being observed there. Using the chapter, explain why protecting such habitats is important.

Answer:

1. Frogs depend on water during important early stages of their life cycle.
2. Frog spawn develops into embryos and then into aquatic tadpoles.
3. Tadpoles undergo further changes before becoming froglets and adult frogs.
4. Damage to their habitat can interfere with the surroundings needed for these life-cycle stages.
5. Therefore, protecting ponds and other habitats is important for allowing organisms such as frogs to grow, develop and complete their life cycles.

10.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions with Answers:

1. Which of the following is the best evidence that an object is living?

A. It can move from one place to another

B. It makes a sound

C. It performs several life processes such as growth, respiration and reproduction

D. It changes its position when pushed

Answer: C. It performs several life processes such as growth, respiration and reproduction

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2. A student observes that a climber winds around a nearby stick. Which characteristic of living beings is most directly demonstrated?

A. Excretion

B. Movement

C. Reproduction
D. Respiration
Answer: B. Movement

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3. Which observation about *Drosera* provides evidence that plants respond to their surroundings?
A. Its roots grow underground
B. Its leaves are green
C. Its hair-like projections move inward when an insect lands on it
D. It produces seeds
Answer: C. Its hair-like projections move inward when an insect lands on it

---

4. Four objects show the following features. Which one is most likely a living being?
A. Moves but does not grow or reproduce
B. Grows, respires, excretes and reproduces
C. Produces sound and heat but does not grow
D. Changes shape only when an external force is applied
Answer: B. Grows, respires, excretes and reproduces

---

5. Which sequence correctly represents a response to a stimulus?
A. Touch → folding of touch-me-not leaves
B. Germination → seed formation
C. Flower → seed coat
D. Root → respiration
Answer: A. Touch → folding of touch-me-not leaves

---

6. A student counts 18 breaths per minute after a normal walk and 30 breaths per minute after running. What is the increase in breathing rate?
A. 8 breaths/minute
B. 10 breaths/minute
C. 12 breaths/minute
D. 48 breaths/minute
Answer: C. 12 breaths/minute

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7. Which structure allows a plant leaf to exchange air with its surroundings?
A. Seed coat
B. Stomata
C. Flower
D. Root hair
Answer: B. Stomata

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8. Which process removes waste products from the body of a living organism?
A. Germination
B. Reproduction
C. Excretion
D. Growth
Answer: C. Excretion

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9. Which pair represents the essential conditions identified in the chapter for successful germination of bean seeds?

A. Water and air
B. Light and soil only
C. Light and heat only
D. Soil and darkness only
Answer: A. Water and air

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10. Four identical bean seeds are kept under different conditions. Which seed is most likely to germinate successfully?
A. Seed with air but no water
B. Seed completely submerged in water
C. Seed with the right amount of water and sufficient air
D. Dry seed exposed to bright sunlight
Answer: C. Seed with the right amount of water and sufficient air

---

11. Why can a bean seed germinate in darkness?
A. Bean seeds do not need air
B. Bean seeds do not need water
C. Light is not essential for their germination
D. Darkness replaces the need for water
Answer: C. Light is not essential for their germination

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12. What is the most likely reason that a completely waterlogged seed may fail to germinate?
A. It receives too much sunlight
B. It may not receive sufficient air
C. Its seed coat becomes too hard
D. It receives too much soil
Answer: B. It may not receive sufficient air

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13. What is the main role of water during seed germination according to the chapter?
A. It makes the seed produce flowers immediately
B. It softens the seed coat and helps the embryo develop
C. It prevents the root from growing
D. It replaces the need for air
Answer: B. It softens the seed coat and helps the embryo develop

---

14. Consider the following statements:
I. Light is essential for the germination of all seeds.
II. Sunlight is required for the further growth of a seedling after germination.
Which option is correct?
A. Only I is correct
B. Only II is correct
C. Both I and II are correct
D. Neither I nor II is correct
Answer: B. Only II is correct

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15. A seedling is turned upside down. What is most likely to happen?
A. Root grows upward and shoot downward
B. Both root and shoot grow downward

C. Root bends downward and shoot bends upward
D. Both stop growing permanently
Answer: C. Root bends downward and shoot bends upward

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16. A plant is placed where light reaches it from only one side. Which observation is expected?
A. Root grows towards light and shoot downward
B. Shoot grows towards light while root grows downward
C. Both root and shoot grow towards light
D. Neither root nor shoot changes its growth direction
Answer: B. Shoot grows towards light while root grows downward

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17. Which instrument is associated with Jagadish Chandra Bose's studies of plant growth and responses?
A. Microscope
B. Barometer
C. Crescograph
D. Thermometer
Answer: C. Crescograph

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18. Which sequence best represents the life cycle of a bean plant?
A. Seed → fruit → root → flower → leaf
B. Seed → young plant → mature plant → flowers/fruits → seeds
C. Flower → seed → fruit → root → death
D. Seed → flower → germination → young plant
Answer: B. Seed → young plant → mature plant → flowers/fruits → seeds

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19. Which event is most important for connecting one generation of a bean plant with the next?
A. Downward growth of roots
B. Opening of leaves
C. Formation of new seeds
D. Drying of old leaves
Answer: C. Formation of new seeds

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20. Which is the correct sequence in the mosquito life cycle?
A. Egg → pupa → larva → adult
B. Larva → egg → adult → pupa
C. Egg → larva → pupa → adult
D. Egg → adult → larva → pupa
Answer: C. Egg → larva → pupa → adult

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21. Mosquito larvae repeatedly come to the surface of water mainly because they:
A. need sunlight for germination
B. need air for respiration
C. search for soil
D. develop into eggs at the surface
Answer: B. need air for respiration

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22. If stagnant water containing mosquito larvae is removed, which result is most likely?

A. More larvae will develop
B. Mosquito breeding will be encouraged
C. Development of aquatic stages of mosquitoes will be interrupted
D. Adult mosquitoes will turn into pupae
Answer: C. Development of aquatic stages of mosquitoes will be interrupted

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23. Which mosquito stage occurs immediately before the adult?
A. Egg
B. Larva
C. Pupa
D. Embryo
Answer: C. Pupa

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24. An adult mosquito may survive for approximately:
A. 1–2 days
B. 3–5 days
C. 10–15 days
D. 8–10 weeks
Answer: C. 10–15 days

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25. Which sequence correctly represents the major developmental stages of a frog?
A. Spawn → tadpole → froglet → adult frog
B. Spawn → froglet → tadpole → adult frog
C. Tadpole → spawn → adult frog → froglet
D. Adult frog → tadpole → spawn → froglet
Answer: A. Spawn → tadpole → froglet → adult frog

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26. A student finds a jelly-like cluster near the edge of a pond. It is most likely:
A. mosquito pupa
B. bean seed coat
C. frog spawn
D. plant waste
Answer: C. frog spawn

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27. Which change occurs as a tadpole develops towards an adult frog?
A. Its legs disappear and tail becomes longer
B. It develops legs and its tail gradually disappears
C. It develops wings
D. It changes into a pupa
Answer: B. It develops legs and its tail gradually disappears

---

28. According to the chapter's timeline, which stage is expected around 12 weeks in frog development?
A. Spawn
B. Embryo
C. Froglet
D. Adult frog
Answer: C. Froglet

---

29. A frog reaches its adult stage at approximately:

A. Day 3–4
B. Day 7–10
C. 8–10 weeks
D. 14 weeks
Answer: D. 14 weeks

---

30. Which of the following correctly matches the organism with a developmental stage?
A. Mosquito — froglet
B. Frog — pupa
C. Mosquito — larva
D. Bean plant — tadpole
Answer: C. Mosquito — larva

---

31. Which pair of organisms discussed in the chapter undergoes clearly observable changes through several stages of a life cycle?
A. Mosquito and frog
B. Car and frog
C. Stone and mosquito
D. Seed coat and car
Answer: A. Mosquito and frog

---

32. Study the statements:
P: All living beings show several characteristics of life.
Q: Movement alone is sufficient to classify anything as living.
Which option is correct?
A. Both P and Q are correct
B. P is correct, but Q is incorrect
C. P is incorrect, but Q is correct
D. Both P and Q are incorrect
Answer: B. P is correct, but Q is incorrect

---

33. A bean plant produces 20 seeds, of which 15 germinate. What percentage of seeds germinated?
A. 25%
B. 50%
C. 75%
D. 80%
Answer: C. 75%
(15 ÷ 20) × 100 = 75%

---

34. A froglet is observed at 12 weeks and an adult frog at 14 weeks. Approximately how much time separates these observations?
A. 2 days
B. 2 weeks
C. 8 weeks
D. 14 weeks
Answer: B. 2 weeks

---

35. Which conclusion best connects the plant, mosquito and frog examples discussed in the chapter?

A. All living organisms have identical life cycles
B. Living organisms remain unchanged throughout life
C. Living organisms undergo characteristic changes during their life cycles
D. Only animals undergo developmental changes
Answer: C. Living organisms undergo characteristic changes during their life cycles

Answer Key:
1-C, 2-B, 3-C, 4-B, 5-A, 6-C, 7-B, 8-C, 9-A, 10-C, 11-C, 12-B, 13-B, 14-B, 15-C, 16-B, 17-C, 18-B, 19-C, 20-C, 21-B, 22-C, 23-C, 24-C, 25-A, 26-C, 27-B, 28-C, 29-D, 30-C, 31-A, 32-B, 33-C, 34-B, 35-C.

10.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching–Learning:
The following best practices are closely aligned with the chapter's focus on **characteristics of living beings, seed germination, plant responses, and the life cycles of plants, mosquitoes and frogs**.

(1) Learning through Real-Life Observation
Encourage students to observe living and non-living things in the classroom, school garden or surroundings and classify them based on characteristics such as growth, movement, respiration and response to stimuli. Students can maintain a simple observation table with "Object – Observation – Living/Non-living – Reason."

(2) Hands-on Seed Germination Experiment
Let students perform the chapter's bean-seed activity using different conditions of water, air and light. They should make predictions, observe the seeds for 7–10 days, record changes and arrive at conclusions from their own observations rather than simply memorising the requirements for germination.

(3) Maintain a Plant Growth Diary
Each student or group can grow a bean plant and maintain a diary recording germination, appearance of leaves, increase in height, flowering, fruit formation and seed development. This provides a meaningful way to understand the complete plant life cycle through long-term observation.

(4) Prediction–Observation–Explanation Strategy
Before conducting an activity, ask students to **predict** what will happen; then let them **observe** the actual result and finally **explain** why it happened. For example, students can predict how the root and shoot of an inverted seedling will grow and then compare their predictions with actual observations.

(5) Activity-Based Learning on Response to Stimuli
Use safe classroom or garden observations such as a touch-me-not plant, climbers or plants receiving light from one direction. Students can identify the stimulus, observe the response and explain how these examples demonstrate characteristics of living plants.

(6) Life-Cycle Sequencing Activities
Provide picture or word cards representing stages of the **bean plant, mosquito and frog life cycles** and ask students to arrange them in the correct order. Students should then explain the changes occurring from one stage to the next.

(7) Collaborative Group Investigation
Divide students into small groups and assign themes such as "Characteristics of Living Beings," "Seed Germination," "Plant Movement," "Mosquito Life Cycle," and

"Frog Life Cycle." Each group can prepare a chart, model or short presentation and teach its findings to the class.

(8) Connect Science with Health and the Environment
Use the mosquito life cycle to discuss why stagnant water around homes and schools should be avoided. Students can conduct a supervised "Mosquito Breeding Spot Survey" of the school campus and identify containers or locations where water may collect.

(9) Use Concept Maps for Consolidation
At the end of the chapter, students can construct a concept map beginning with **"Living Creatures"** and branching into **nutrition, growth, movement, respiration, excretion, response to stimuli, reproduction and life cycles**. This helps students connect individual concepts instead of learning them as isolated facts.

(10) Integrate Assessment with Classroom Activities
Use observation-based oral questions, worksheets, exit slips and short HOTS questions throughout the lesson rather than depending only on a final written test. For example, ask: *"A seed has sufficient water and light but no air—will it germinate? Give a reason,"* or *"Why is a moving car not classified as living?"* This checks whether students can apply the concepts they have learned.

10.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for Grade 6:
The following innovative activities can make the chapter more **experiential, inquiry-oriented, collaborative and engaging**, while remaining closely connected to the concepts and activities presented in the chapter.

(1) "Living or Non-Living?" Mystery Investigation:
Create mystery stations containing objects or pictures such as a seed, dry leaf, toy car, stone, potted plant and insect. Instead of simply classifying them, students act as "young scientists" and use evidence such as growth, respiration, reproduction and response to stimuli to justify their decisions. This encourages evidence-based reasoning rather than memorisation.

(2) Digital Time-Lapse Seed Germination Project:
Students can photograph germinating bean seeds at the same time every day for 7–10 days and combine the photographs into a simple time-lapse presentation. They can label stages such as seed, emergence of root, emergence of shoot and young seedling, making gradual biological changes visually observable.

(3) "Plant Maze" Challenge:
Place a growing seedling inside a cardboard box with light entering through a strategically positioned opening and ask students to predict the direction in which the shoot will grow. Students can photograph or sketch the plant each day and use the final result to explain how shoots respond to light.

(4) Life-Cycle Stop-Motion Animation:
Student groups can use paper cut-outs, clay models or drawings to create a simple stop-motion animation of the **bean plant, mosquito or frog life cycle**. Narration can explain the changes occurring at each stage, combining science with art, technology and communication skills.

(5) QR-Code Interactive Life-Cycle Gallery:
Create classroom posters showing different stages of plant, mosquito and frog life cycles and attach teacher-created QR codes linking to student explanations,

photographs or short animations. Students move through the gallery, scan each code and complete a sequencing or comparison worksheet.

(6) Student Scientist – Breathing Data Lab:
Students can count their breaths per minute after activities such as normal walking, running or dancing, as suggested in the chapter. The class data can be entered into a spreadsheet and represented using simple bar graphs so that students connect biological observations with mathematics and data interpretation.

(7) Virtual "Crescograph" Investigation:
Introduce Jagadish Chandra Bose's crescograph and ask students to imagine themselves as inventors designing a modern device for observing very slow plant growth. They can sketch their "Smart Crescograph" and explain what it would measure and record, connecting the chapter with creativity and scientific instrumentation.

(8) Mosquito Detective – Campus Challenge:
Turn mosquito-life-cycle learning into a supervised environmental investigation. Student teams can survey the school campus for places where stagnant water could collect, mark them on a simple campus map and suggest preventive actions based on their understanding of the mosquito life cycle.

(9) Frog Life-Cycle Timeline Game:
Give students cards containing the chapter's stages and approximate timings—spawn, embryo, tadpole, tadpole with legs, froglet and adult frog. Teams compete to arrange the stages and timings correctly and then explain one important developmental change at each stage.

(10) "Be the Organism" Role-Play:
Students can physically enact life cycles: one group becomes a germinating bean plant, another represents **egg** → **larva** → **pupa** → **mosquito**, and another performs **spawn** → **tadpole** → **froglet** → **adult frog**. Each student explains the change represented by their stage, turning life-cycle sequencing into kinesthetic learning.

(11) Science Photo Journal – "Living World Around Me":
Students can photograph or sketch examples around their home or school that demonstrate growth, movement, reproduction or response to stimuli. They can create a digital or paper portfolio titled **"Evidence That It Is Living"**, writing one scientific explanation beneath each observation.

(12) Life-Cycle Comparison Wheel:
Students can construct rotating paper wheels for the bean plant, mosquito and frog life cycles. By rotating the wheels, they reveal successive stages and compare how plants and animals change during their lives, reinforcing the chapter's concluding idea that living organisms undergo characteristic changes during their life cycles.

10.17: Practicing Questions/Question Bank:

A. Fill in the Blanks:

1. The process by which a seed develops into a sprout is called __________.
   Answer: Germination

2. Tiny pores present on the leaves of plants are called __________.
   Answer: Stomata

3. The removal of waste products from the body is called __________.
   Answer: Excretion

4. Anything or any event that causes a living being to respond is called a __________.
   Answer: Stimulus

5. Bean seeds require the right amount of __________ and sufficient air for germination.
   Answer: Water

6. The roots of a plant generally grow __________.
   Answer: Downwards

7. When light comes from one direction, the shoot grows __________ the light.
   Answer: Towards

8. The instrument developed by Jagadish Chandra Bose to study plant growth and responses is called the __________.
   Answer: Crescograph

9. The four stages of a mosquito life cycle are egg, larva, __________ and adult.
   Answer: Pupa

10. A jelly-like cluster of frog eggs is called __________.
    Answer: Spawn

11. A young frog with a tail is called a __________.
    Answer: Tadpole

12. A tadpole gradually develops into a __________ before becoming an adult frog.
    Answer: Froglet

13. Mosquito larvae and pupae come to the surface of water to obtain __________.
    Answer: Air

14. Living beings produce new individuals of their own kind through __________.
    Answer: Reproduction

15. The touch-me-not plant folds its leaves in response to __________.
    Answer: Touch

B. One-Mark Descriptive Questions:

1. **What is germination?**
   Answer: Germination is the process by which a seed develops into a sprout.

2. **What are stomata?**
   Answer: Stomata are tiny pores on leaves through which plants exchange air.

3. **What is excretion?**
   Answer: Excretion is the process of removing waste products from the body.

4. **What is a stimulus?**
   Answer: Anything or any event that prompts a living being to respond is called a stimulus.

5. **Name two conditions necessary for bean-seed germination.**
   Answer: The right amount of water and sufficient air are necessary for bean-seed germination.

6. **How does a touch-me-not plant respond to touch?**
   Answer: A touch-me-not plant responds to touch by folding its leaves.

7. **What is a crescograph?**
   Answer: A crescograph is an instrument developed by Jagadish Chandra Bose to record plant responses and measure growth.

8. **Name the four stages of the mosquito life cycle.**
   Answer: The stages are egg, larva, pupa and adult mosquito.

9. **Why do mosquito larvae come to the surface of water?**
   Answer: Mosquito larvae come to the surface to obtain air for respiration.

10. **What is frog spawn?**
    Answer: Frog spawn is a jelly-like cluster of frog eggs.

11. **What is a froglet?**
    Answer: A froglet is a developmental stage between the tadpole and adult frog.

12. **In which direction does a plant shoot generally grow?**
    Answer: A plant shoot generally grows upwards.

13. **What happens to a shoot when light comes from only one direction?**
    Answer: The shoot grows towards the source of light.

14. **Why is reproduction important?**
    Answer: Reproduction ensures the continuity of living organisms.

15. **Name any two characteristics of living beings.**
    Answer: Growth and respiration are two characteristics of living beings.

C. Two-Mark Descriptive Questions:

1. **What is reproduction? Why is it important?**
   Answer: Reproduction is the process by which living beings produce new individuals of their own kind. It ensures the continuity of life.

2. **How do plants show movement? Give two examples.**
   Answer: Climbers show movement by winding around nearby supports. *Drosera* shows movement by moving its hair-like structures inward to trap insects.

3. **Explain the role of water in seed germination.**
   Answer: Water softens the seed coat. It also helps the embryo inside the seed develop into a plant.

4. **Is light essential for bean-seed germination? Explain.**
   Answer: Light is not essential for the germination of bean seeds. However, sunlight is required for the further growth of the seedling.

5. **What happens when a growing seedling is placed upside down?**
   Answer: Its root bends and grows downwards. Its shoot bends and grows upwards.

6. **Why do mosquito larvae and pupae come to the water surface?**
   Answer: Both require air for respiration. Therefore, they repeatedly come to the surface of water to obtain air.

7. **Name the main stages of the frog life cycle.**
   Answer: Frog spawn develops into tadpoles and then froglets. Froglets finally develop into adult frogs.

8. **How does a tadpole change as it develops?**
   Answer: A tadpole gradually develops legs while retaining its tail initially. It later becomes a froglet as its body changes further.

9. **How does the touch-me-not plant demonstrate response to stimuli?**
   Answer: Touch acts as a stimulus to the plant. Its leaves fold in response to the touch.

10. **Why should stagnant water not be allowed to collect around our homes?**
    Answer: Mosquito larvae and pupae develop in water. Removing stagnant water helps interrupt mosquito development.

D. Three-Mark Descriptive Questions:

1. **Explain any three characteristics of living beings.**
   Answer:
   1. Living beings require food for growth and development.
   2. They respire and remove waste products through excretion.
   3. They respond to stimuli and reproduce to continue their kind.

2. **Explain the conditions necessary for bean-seed germination.**
   Answer:
   1. Bean seeds require the right amount of water.
   2. They also require sufficient air for germination.
   3. Light is not essential for germination, although sunlight is needed for further seedling growth.

3. **Describe the directional growth of roots and shoots.**
   Answer:
   1. Roots generally grow downwards.
   2. Shoots generally grow upwards.
   3. When light comes from one side, the shoot grows towards the light while the root continues downwards.

4. **Describe the life cycle of a mosquito.**
   Answer:
   1. An adult female mosquito lays eggs on or near water.
   2. The eggs develop into larvae and then pupae.
   3. Pupae finally develop into adult mosquitoes.

5. **Describe three important changes in the life cycle of a frog.**
   Answer:

1. Frog spawn develops into embryos and then tadpoles.
2. Tadpoles develop legs and gradually become froglets.
3. The tail disappears as the froglet develops into an adult frog.

6. **Why is a plant considered living even though it cannot walk?**
   Answer:
   1. Plants grow and show movement of their parts.
   2. They respire, excrete and respond to stimuli.
   3. They also reproduce and complete a definite life cycle.
7. **Explain how the life cycle of a bean plant continues from one generation to another.**
   Answer:
   1. A seed germinates and grows into a young plant.
   2. The mature plant produces flowers and fruits containing seeds.
   3. These seeds can germinate to form the next generation of plants.
8. **How can you experimentally show that breathing rate changes with physical activity?**
   Answer:
   1. Count the number of breaths per minute under normal activity.
   2. Repeat the measurement after an activity such as running.
   3. Compare the readings to observe the change in breathing rate.

E. Five-Mark Descriptive Questions:

1. **Explain the major characteristics that distinguish living beings from non-living things.**
   Answer:
   1. Living beings require food or nutrition for growth and development.
   2. They grow and show different forms of movement.
   3. They respire and remove waste products through excretion.
   4. They sense and respond to stimuli in their surroundings.
   5. They reproduce to continue their kind and eventually die.
2. **Describe an experiment to investigate the conditions required for the germination of bean seeds.**
   Answer:
   1. Take identical pots and place the same number of bean seeds in each.
   2. Provide the pots with different conditions of water, air and light.
   3. Observe the seeds regularly for about 7–10 days and record germination.
   4. Seeds receiving the right amount of water and sufficient air germinate successfully.

   5. The observations also show that light is not essential for bean-seed germination, though sunlight is needed for subsequent seedling growth.

3. **Describe the complete life cycle of a bean plant.**
   Answer:

   1. A bean seed germinates under suitable conditions.
   2. It develops into a young plant with roots, stem and leaves.
   3. The plant grows and eventually produces flowers.
   4. Flowers develop into fruits or pods containing new seeds.
   5. The new seeds can germinate to produce the next generation, while the parent plant eventually completes its life cycle.

4. **Explain the mosquito life cycle and how knowledge of it can help reduce mosquito breeding.**
   Answer:

   1. The mosquito life cycle consists of egg, larva, pupa and adult stages.
   2. The female mosquito lays eggs on or near water.
   3. Larvae and pupae develop in water and require air for respiration.
   4. Removing stagnant water can interrupt these aquatic stages of development.
   5. Therefore, understanding the mosquito life cycle helps us identify ways to reduce mosquito breeding.

5. **Explain the life cycle of a frog and the major changes that occur during development.**
   Answer:

   1. The life cycle begins with jelly-like frog spawn containing eggs.
   2. The eggs develop into embryos and then into tadpoles with tails.
   3. Tadpoles gradually develop legs as they grow.
   4. They become froglets, during which the tail gradually disappears and the legs become stronger.
   5. Finally, the froglet develops into an adult frog capable of living both in water and on land.

6. **Explain how plants show growth, movement and response to stimuli.**
   Answer:

   1. Plants grow continuously during different stages of their life cycle.
   2. Climbers show movement by winding around nearby supports.
   3. *Drosera* shows movement by moving its hair-like projections inward when an insect enters its leaf.
   4. Shoots respond to light by growing towards its source.
   5. These observations demonstrate that plants show movement and respond to environmental stimuli despite remaining rooted in one place.

6th Standard Science Book Chapter 11

Chapter 11: Nature's Treasures

11.1 Summary of the Chapter:

Chapter 11: Nature's Treasures — Summary:

(1) **Nature provides essential resources** such as air, water, sunlight, forests, soil, rocks, minerals and fossil fuels. These resources support the survival and well-being of all living beings.

(2) **Air is essential for life.** The oxygen present in air is required by humans and most other living beings for survival. Air is mainly composed of about **78% nitrogen, 21% oxygen and 1% other gases**.

(3) **Moving air is called wind.** Wind can occur as a gentle breeze or blow strongly during storms. Wind energy can be used through windmills to generate electricity, run flour mills and pull water from wells.

(4) **Water is essential and precious.** It is required for drinking, cooking, bathing, washing, agriculture and industries. Although water covers about two-thirds of the Earth's surface, most of it is salty ocean water, and only a small amount of freshwater is easily accessible.

(5) **Water must be conserved and protected from pollution.** Turning off unused taps, fixing leakages, recycling water and practising **rainwater harvesting** are important methods of saving water.

(6) **The Sun is the main source of energy on Earth.** It provides heat and light and helps plants prepare food. Solar energy can also be used through solar panels, solar cookers and solar water heaters.

(7) **Forests are large areas with dense plant growth** and provide food and shelter to many animals, birds and insects. Forests should be protected because restoring a lost forest takes many years.

(8) **Soil is an important natural resource** that supports plant growth and biodiversity. It is formed by the breaking down of rocks through the action of the Sun, water and living organisms over thousands of years.

(9) **Rocks and minerals are valuable natural resources.** Rocks are used for buildings, roads, dams, roofing and tools, while minerals provide useful metals such as aluminium, gold, copper and iron.

(10) **Fossil fuels include coal, petroleum and natural gas.** They are formed from the remains of microorganisms and plants buried deep inside the Earth over millions of years. Burning fossil fuels causes air pollution.

(11) **Natural resources are classified as renewable and non-renewable.** Air, water and forests are renewable because they can be replenished naturally, while minerals, soil, rocks, coal, petroleum and natural gas are non-renewable because they cannot be replenished within a reasonable period.

(12) **Natural resources must be used judiciously and responsibly.** Conserving resources, preventing pollution and avoiding wastage help meet our present needs while protecting resources and the environment for future generations.

11.2 Important Formulas:

Important Formulas / Quantitative Relationships — Chapter 11: *Nature's Treasures:*

This chapter is **mainly conceptual and does not introduce many formal scientific formulas**. The main quantitative concept explicitly introduced is **percentage**, especially in relation to the composition of air.

1. **Percentage**

$$\text{Percentage} = \frac{\text{Part}}{\text{Whole}} \times 100$$

The chapter defines percentage as the **number of parts in 100**.

2. **Finding a Part from a Percentage**

$$\text{Part} = \frac{\text{Percentage}}{100} \times \text{Total Quantity}$$

Example: If there are 200 units of air, oxygen units would be:

$$\frac{21}{100} \times 200 = 42$$

3. **Finding the Total Quantity**

$$\text{Total Quantity} = \frac{\text{Part} \times 100}{\text{Percentage}}$$

4. **Composition of Air**

For numerical questions, remember:

$$\text{Nitrogen} = 78\%$$
$$\text{Oxygen} = 21\%$$
$$\text{Argon} + \text{Carbon dioxide} + \text{other gases} = 1\%$$

Therefore:

$$78\% + 21\% + 1\% = 100\%$$

These values are directly shown in Fig. 11.1 of the chapter.

5. **Fraction represented by a Percentage**

$$\text{Fraction} = \frac{\text{Percentage}}{100}$$

Thus:

$$78\% = \frac{78}{100},\ 21\% = \frac{21}{100},\ 1\% = \frac{1}{100}$$

6. **Water Coverage of the Earth**

The chapter states that water covers approximately **two-thirds of the Earth's surface**.
Hence:

$$\text{Fraction covered by water} \approx \frac{2}{3}$$

Approximate percentage:

$$\frac{2}{3} \times 100 \approx 66.7\%$$

7. **Fraction of Land Surface**

From the chapter's approximate two-thirds water coverage:

$$\text{Land fraction} \approx 1 - \frac{2}{3} = \frac{1}{3}$$

or approximately:

$$\frac{1}{3} \times 100 \approx 33.3\%$$

8. **Water Saved**

For simple application-based problems on water conservation:

$$\text{Water Saved} = \text{Water Used Before} - \text{Water Used After}$$

The chapter discusses reducing wastage through closing taps, repairing leakages, recycling water and water harvesting.

9. **Percentage of Water Saved**

A useful quantitative extension for problems based on the chapter is:

$$\text{Percentage of Water Saved} = \frac{\text{Water Saved}}{\text{Original Water Use}} \times 100$$

10. **Fuel Consumption**

For application-based questions connected with fossil-fuel conservation:

$$\text{Fuel Consumed} = \text{Initial Fuel} - \text{Remaining Fuel}$$

The chapter stresses conserving fossil fuels because they are limited and take millions of years to form.

11. **Resource Remaining**

For simple numerical problems:

$$\text{Resource Remaining} = \text{Initial Quantity} - \text{Quantity Used}$$

12. **Total Resource Consumption**

If the same quantity is consumed each day:

$$\text{Total Consumption} = \text{Consumption per Day} \times \text{Number of Days}$$

Most Important for Grade 6:

For this particular chapter, students should mainly remember **percentage calculations and the numerical facts 78% nitrogen, 21% oxygen, 1% other gases, and approximately** 2/3**of Earth's surface covered by water**. The other formulas above are useful extensions for creating **application-based and HOTS quantitative problems**, rather than formulas explicitly taught in the chapter.

11.3 Fill-Up the Blank LOTS type questions with Answers: (32 Questions)

Fill in the Blanks – LOTS Type:

1. Resources provided by nature are called __________ **resources**.
   Answer: Natural
2. The air we breathe contains __________, which is essential for our survival.
   Answer: Oxygen
3. Air contains about __________**% nitrogen**.
   Answer: 78%
4. Air contains about __________**% oxygen**.
   Answer: 21%
5. Argon, carbon dioxide and other gases together make up about __________**%** of air.
   Answer: 1%
6. Moving air is called __________.
   Answer: Wind
7. Windmills use the energy of __________ to generate electricity.
   Answer: Wind
8. Water covers about __________ of the Earth's surface.
   Answer: Two-thirds
9. Most of the water on Earth is found in __________ **and seas**.
   Answer: Oceans
10. Water present in oceans and seas is __________ **or salty**.
    Answer: Saline
11. Collecting and storing rainwater for later use is called __________ **harvesting**.
    Answer: Rainwater
12. Stepwells are commonly known as __________ in Rajasthan.
    Answer: Bawadi
13. Stepwells are commonly known as __________ in Gujarat.
    Answer: Vav

14. The __________ is the main source of energy on Earth.
    Answer: Sun
15. Solar panels capture the Sun's energy and produce __________.
    Answer: Electricity
16. Large areas with dense growth of various types of plants are called __________.
    Answer: Forests
17. __________ **Mahotsav** is a forest festival celebrated during the month of July.
    Answer: Van
18. The __________ **movement** was an effort by people to protect trees from being cut.
    Answer: Chipko
19. __________ are natural agents that help in turning and loosening the soil.
    Answer: Earthworms
20. Soil is formed by the disintegration of __________ over a long period of time.
    Answer: Rocks
21. Rocks are made up of __________.
    Answer: Minerals
22. Aluminium, gold, copper and iron are extracted from __________.
    Answer: Minerals
23. Petrol, diesel and kerosene are obtained from __________.
    Answer: Petroleum
24. Petroleum, natural gas and coal are commonly called __________ **fuels**.
    Answer: Fossil
25. Fossil fuels take __________ **of years** to form.
    Answer: Millions
26. __________ **Natural Gas (CNG)** is used as a fuel for vehicles.
    Answer: Compressed
27. __________ is mainly used for the production of electricity.
    Answer: Coal
28. Resources that are renewed or replenished naturally within a reasonable period are called __________ **resources**.
    Answer: Renewable
29. Air, water and forests are examples of __________ **natural resources**.
    Answer: Renewable
30. Coal, petroleum and natural gas are examples of __________ **resources**.
    Answer: Non-renewable
31. Resources created by human beings to meet their needs are called __________ **resources**.
    Answer: Human-made
32. We should use natural resources __________ so that they are available for the future.
    Answer: Judiciously

11.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

Fill in the Blanks with Answers – HOTS Type:

1. If the amount of oxygen in the air becomes insufficient, living beings will find it difficult to __________.
   Answer: survive
2. When a paper pinwheel (*firki*) starts rotating as we run with it, it shows the presence of __________ **air**.
   Answer: moving

3. A village planning to generate electricity using continuously moving air can install __________.
   Answer: windmills
4. Since most of the water on Earth is saline, humans mainly depend on the limited supply of __________ for their daily needs.
   Answer: freshwater
5. A leaking tap should be repaired immediately because it helps to __________ **water**.
   Answer: conserve
6. If a family collects rainwater from its rooftop and stores it for later use, it is practising __________.
   Answer: rainwater harvesting
7. Throwing household and industrial waste into a river makes its water unfit for __________.
   Answer: consumption
8. If a region experiences frequent water scarcity, constructing structures such as stepwells can help in __________ **water**.
   Answer: harvesting
9. When wet clothes are kept outside on a sunny day, the __________ provides the energy that helps them dry.
   Answer: Sun
10. A house that wants to produce electricity directly from sunlight can install __________ **panels**.
    Answer: solar
11. A cow gets energy by eating grass, but the ultimate source of this energy is the __________.
    Answer: Sun
12. If forests are cut down on a large scale, many wild animals may lose their food and __________.
    Answer: shelter
13. Since it takes many years to restore a lost forest, forests should be used __________.
    Answer: responsibly
14. If people hug trees to prevent them from being cut, their action resembles the famous __________ **movement**.
    Answer: Chipko
15. If the roots of trees are removed from a forest area, the soil can be more easily __________ **away** by water.
    Answer: washed
16. Fallen leaves enrich the forest soil because they __________ and add nutrients to it.
    Answer: decay
17. A gardener who wants to loosen the soil naturally would benefit from the presence of __________.
    Answer: earthworms
18. Two soil samples collected from different places may have different colours because they contain different __________.
    Answer: materials
19. Since rocks take thousands to millions of years to form, they should be used __________.
    Answer: responsibly

20. If fossil fuels continue to be consumed rapidly, they may eventually become __________ because they are available in limited quantities.
Answer: exhausted
21. Using public transport instead of individual vehicles can help conserve __________ **fuels**.
Answer: fossil
22. When petrol and diesel are burnt in vehicles, the smoke and carbon dioxide produced contribute to __________ **pollution**.
Answer: air
23. If a resource can be restored naturally within a reasonable period, it is classified as a __________ **resource**.
Answer: renewable
24. If a resource takes millions of years to form and gets exhausted after use, it is classified as __________.
Answer: non-renewable
25. Forests can be considered renewable only when they are used responsibly and given sufficient time to __________.
Answer: regenerate
26. Petroleum cannot be quickly replaced after use because it takes __________ **of years** to form.
Answer: millions
27. Replacing petrol or diesel vehicles with electric vehicles can help reduce the release of __________ from vehicles.
Answer: smoke
28. If humans consume natural resources faster than nature can restore them, the resources may become __________.
Answer: depleted
29. Using only the amount of natural resources that we actually need helps prevent their __________.
Answer: wastage
30. Conserving natural resources today helps ensure their availability for __________ **generations**.
Answer: future

11.5 One-mark questions with Answers of LOTS Type: (34 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What are natural resources?**
Answer: Resources that we get from nature are called natural resources.
2. **Name any four natural resources.**
Answer: Air, water, forests and soil are four natural resources.
3. **Why do living beings need oxygen?**
Answer: Living beings need oxygen to perform their body functions and survive.
4. **What is wind?**
Answer: Moving air is called wind.
5. **Name the major gas present in air.**
Answer: Nitrogen is the major gas present in air.
6. **What percentage of air is oxygen?**
Answer: Oxygen makes up about 21% of air.
7. **What percentage of air is nitrogen?**
Answer: Nitrogen makes up about 78% of air.

8. **Mention any two uses of windmills.**
Answer: Windmills are used to generate electricity and pull water from wells.
9. **Mention any two uses of water in daily life.**
Answer: Water is used for drinking and cooking.
10. **Where is most of the water on Earth found?**
Answer: Most of the water on Earth is found in oceans and seas.
11. **Why is seawater not suitable for domestic use?**
Answer: Seawater is not suitable for domestic use because it is saline or salty.
12. **What is rainwater harvesting?**
Answer: Collecting and storing rainwater in large quantities for later use is called rainwater harvesting.
13. **What are stepwells called in Rajasthan and Gujarat?**
Answer: Stepwells are called *Bawadi* in Rajasthan and *Vav* in Gujarat.
14. **What is the main source of energy on Earth?**
Answer: The Sun is the main source of energy on Earth.
15. **How do solar panels make use of solar energy?**
Answer: Solar panels capture the Sun's energy and produce electricity.
16. **What is a forest?**
Answer: A forest is a large area with dense growth of various types of plants.
17. **What do forests provide to wild animals?**
Answer: Forests provide food and shelter to wild animals.
18. **What is Van Mahotsav?**
Answer: Van Mahotsav is a week-long forest festival during which trees are planted and awareness about forests is raised.
19. **What was the main purpose of the Chipko movement?**
Answer: The main purpose of the Chipko movement was to protect trees from being felled.
20. **How do plant roots help to protect soil?**
Answer: Plant roots hold the soil and prevent it from being washed away.
21. **How is soil formed?**
Answer: Soil is formed by the disintegration of rocks through the actions of the Sun, water and living organisms over a long time.
22. **How do earthworms help the soil?**
Answer: Earthworms help in turning and loosening the soil.
23. **What are rocks made up of?**
Answer: Rocks are made up of minerals.
24. **Name any two important rocks mentioned in the chapter.**
Answer: Granite and sandstone are two important rocks mentioned in the chapter.
25. **Name any two metals extracted from minerals.**
Answer: Copper and iron are two metals extracted from minerals.
26. **What are fossil fuels?**
Answer: Petroleum, natural gas and coal are commonly called fossil fuels.
27. **Name three products obtained from petroleum.**
Answer: Petrol, diesel and kerosene are obtained from petroleum.
28. **What is CNG?**
Answer: CNG stands for Compressed Natural Gas and is used as a fuel for vehicles.
29. **What are renewable resources?**
Answer: Resources that are renewed, replenished or restored within a reasonable period are called renewable resources.

30. **Give two examples of renewable natural resources.**
    Answer: Air and water are examples of renewable natural resources.
31. **What are non-renewable resources?**
    Answer: Resources that are not replenished within a reasonable period are called non-renewable resources.
32. **Give two examples of non-renewable natural resources.**
    Answer: Coal and petroleum are examples of non-renewable natural resources.
33. **What are human-made resources?**
    Answer: Resources created by human beings to meet their needs are called human-made resources.
34. **Why should we conserve natural resources?**
    Answer: We should conserve natural resources to fulfil our present needs while saving them for the future.

11.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type

1. **Why can humans not survive for long without air?**
   Answer: Humans cannot survive for long without air because the body needs oxygen to perform its essential functions.
2. **How can you prove that air is present around us even though we cannot see it?**
   Answer: The movement of leaves, clothes or pages due to wind shows that air is present around us.
3. **Why is wind considered a useful natural resource?**
   Answer: Wind is useful because its energy can operate windmills to generate electricity, run flour mills and pull water from wells.
4. **Why should we not waste freshwater even though most of the Earth is covered with water?**
   Answer: We should not waste freshwater because most of Earth's water is saline and only a small fraction of freshwater is easily accessible.
5. **How can a student reduce water wastage while brushing teeth?**
   Answer: A student can reduce water wastage by turning off the tap while brushing.
6. **Why should leaking water taps be repaired quickly?**
   Answer: Leaking taps should be repaired quickly to prevent unnecessary wastage of precious freshwater.
7. **Why is polluted water unsuitable for living beings?**
   Answer: Polluted water is unsuitable because contamination makes it unfit for consumption by living beings.
8. **How can rainwater harvesting help an area facing water shortage?**
   Answer: Rainwater harvesting can reduce water shortage by collecting and storing rainwater for later use.
9. **Why is the Sun called the main source of energy on Earth?**
   Answer: The Sun is called the main source of energy because plants depend on sunlight to produce food and animals depend directly or indirectly on plants.
10. **How does a cow indirectly obtain energy from the Sun?**
    Answer: A cow indirectly obtains solar energy by eating grass that uses sunlight to grow.
11. **Why are solar panels useful for conserving other energy resources?**
    Answer: Solar panels are useful because they capture the Sun's energy and convert it into electricity.

12. **What may happen to wild animals if a large forest is destroyed?**
Answer: Wild animals may lose their natural sources of food and shelter if a large forest is destroyed.
13. **Why should forests be given sufficient time to regenerate?**
Answer: Forests should be given sufficient time to regenerate because growing a new forest or restoring a lost one takes many years.
14. **How did the Chipko movement help in conserving forests?**
Answer: The Chipko movement helped conserve forests when people hugged and encircled trees to prevent them from being felled.
15. **Why does soil in forests become rich in nutrients naturally?**
Answer: Forest soil becomes rich in nutrients because fallen leaves decay and add nutrients back to the soil.
16. **How do tree roots help in conserving soil?**
Answer: Tree roots conserve soil by holding it firmly and preventing it from being washed away.
17. **Why are earthworms considered beneficial to plants?**
Answer: Earthworms are beneficial because they naturally turn and loosen the soil, creating better conditions for plant roots.
18. **Why can soil samples collected from different places have different colours?**
Answer: Soil samples can have different colours because they may contain different materials.
19. **Why should rocks be conserved even though they appear abundant?**
Answer: Rocks should be conserved because they take thousands to millions of years to form.
20. **Why are minerals important in our everyday life?**
Answer: Minerals are important because they provide metals and materials used to manufacture many useful products.
21. **Why are fossil fuels called exhaustible resources?**
Answer: Fossil fuels are exhaustible because they are available in limited quantities and take millions of years to form.
22. **Why is CNG considered preferable to petrol or diesel in terms of pollution?**
Answer: CNG is preferable because the chapter identifies it as a cleaner fuel than petrol or diesel.
23. **How can walking or cycling to nearby places help conserve natural resources?**
Answer: Walking or cycling reduces the use of vehicles and thereby helps conserve fossil fuels.
24. **Why does excessive use of fossil fuels contribute to air pollution?**
Answer: Excessive use of fossil fuels causes air pollution because their burning produces smoke and carbon dioxide.
25. **Why is air classified as a renewable resource?**
Answer: Air is classified as renewable because it is replenished through natural processes within a reasonable period.
26. **Why is petroleum classified as a non-renewable resource?**
Answer: Petroleum is non-renewable because it takes millions of years to form and cannot be replenished within a reasonable period.
27. **How can electric vehicles help improve air quality in cities?**
Answer: Electric vehicles can help improve air quality because they do not release smoke from fossil-fuel combustion.

28. **Why should renewable resources also be used judiciously?**
    Answer: Renewable resources should be used judiciously so that natural processes have sufficient time to renew or restore them.
29. **What could happen if humans continuously use natural resources without conserving them?**
    Answer: Continuous wasteful use can reduce the availability of natural resources for future needs.
30. **How does responsible use of natural resources benefit future generations?**
    Answer: Responsible use conserves resources for future needs while reducing harm to the environment.

11.7 Two-mark questions with Answers of LOTS Type: (27 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type

1. What are natural resources? Give two examples.

Answer:
1. Resources that we get from nature are called **natural resources**.
2. **Air and water** are examples of natural resources.

2. Why is oxygen important for living beings?

Answer:
1. Our body needs **oxygen** to perform its functions.
2. Most living beings need oxygen for their **survival**.

3. What is the composition of air?

Answer:
1. Air contains about **78% nitrogen and 21% oxygen**.
2. The remaining **1% consists of argon, carbon dioxide and other gases**.

4. What is wind? Mention one use of wind energy.

Answer:
1. **Moving air is called wind**.
2. Wind energy can be used by windmills to **generate electricity**.

5. Mention any four uses of water.

Answer:
1. Water is used for **drinking, cooking, bathing and washing**.
2. It is also used for **growing crops and industrial purposes**.

6. Where is freshwater found on Earth?

Answer:
1. Freshwater is found in **ice sheets, snow, rivers and lakes**.
2. Freshwater is also present **underground**.

7. Mention two ways to reduce the wastage of water.

Answer:
1. We should **turn off taps when they are not in use**.
2. We should **repair water leakages** to prevent wastage.

8. What is rainwater harvesting? Why is it useful?

Answer:
1. **Rainwater harvesting** is the collection and storage of rainwater in large quantities for later use.
2. It is useful because it helps in **conserving water**.

9. What are stepwells? Name their local names in Rajasthan and Gujarat.

Answer:
1. Stepwells are traditional structures built for **water harvesting**.

2. They are called **Bawadi in Rajasthan** and **Vav in Gujarat**.

10. Mention two uses of energy from the Sun.

Answer:

1. The Sun's heat is used for **drying clothes and food materials**.
2. Solar energy can be used for **generating electricity, cooking and heating water**.

11. Why is the Sun called the main source of energy on Earth?

Answer:

1. Plants obtain energy from the **Sun to prepare food**.
2. Animals depend directly or indirectly on plants, so ultimately living beings depend on the **Sun for energy**.

12. What are forests? How are they useful to wild animals?

Answer:

1. Forests are **large areas with dense growth of various types of plants**.
2. They provide **food and shelter** to many wild animals, birds and insects.

13. What is Van Mahotsav? What is its aim?

Answer:

1. **Van Mahotsav** is a week-long forest festival celebrated across India during July.
2. Its aim is to plant trees, create awareness about forests and **increase green cover**.

14. What was the Chipko movement?

Answer:

1. The **Chipko movement** began in the early 1970s in Uttarakhand to prevent the cutting of trees.
2. Local women participated by **encircling and hugging trees** to protect them from being felled.

15. How do trees help in maintaining fertile soil?

Answer:

1. The roots of trees **hold the soil and prevent it from being washed away**.
2. Fallen leaves decay and **enrich the soil with nutrients**.

16. How is soil formed?

Answer:

1. Soil is formed by the **disintegration or breaking apart of rocks**.
2. This happens through the action of the **Sun, water and living organisms over thousands of years**.

17. What is the role of earthworms in soil?

Answer:

1. Earthworms are natural agents that help in **turning and loosening the soil**.
2. Loosened soil provides **air and space for plant roots to grow easily**.

18. Mention four uses of rocks.

Answer:

1. Rocks are used in constructing **houses, buildings, roads and dams**.
2. Rocks such as slate and laterite are used for **roofing and as building materials**.

19. What are minerals? Mention two of their uses.

Answer:

1. **Rocks are made up of minerals**, from which metals such as aluminium, gold, copper and iron are extracted.
2. Minerals are used to manufacture **airplanes, cars, jewellery, cosmetics and electronic equipment**.

20. What are fossil fuels? Give three examples.

Answer:

1. Fuels formed from the buried remains of microorganisms and plants over millions of years are called **fossil fuels**.
2. **Petroleum, natural gas and coal** are examples of fossil fuels.

21. Mention two uses of natural gas and coal.

Answer:

1. Natural gas is used for **cooking, generating electricity and as CNG fuel for vehicles**.
2. Coal is mainly used for the **production of electricity**.

22. Why should fossil fuels be conserved?

Answer:

1. Fossil fuels are available in **limited quantities** and take millions of years to form.
2. Burning fossil fuels produces **smoke and carbon dioxide**, which cause air pollution.

23. What are renewable resources? Give two examples.

Answer:

1. Resources that get renewed, replenished or restored within a reasonable period are called **renewable resources**.
2. **Air and water** are examples of renewable natural resources.

24. What are non-renewable resources? Give two examples.

Answer:

1. Resources that are not replenished within a reasonable period are called **non-renewable resources**.
2. **Coal and petroleum** are examples of non-renewable natural resources.

25. Distinguish between natural resources and human-made resources.

Answer:

1. **Natural resources** are obtained from nature, such as air, water and forests.
2. **Human-made resources** are created by humans, such as electric bulbs, furniture, solar panels and bicycles.

26. Mention two ways to conserve fossil fuels in transportation.

Answer:

1. We can **walk or cycle to nearby places** instead of using fuel-powered vehicles.
2. We can use **public transport** to reduce fossil-fuel consumption.

27. Why should natural resources be used responsibly?

Answer:

1. Natural resources should be conserved and used **without unnecessary wastage**.
2. Responsible use helps meet our present needs while **saving resources for the future without harming the environment**.

11.8. Two-mark questions with Answers of HOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:

1. Why should we conserve water even though about two-thirds of the Earth is covered with water?

Answer:

1. Most of the water on Earth is saline and cannot be used directly for our daily needs.
2. Only a small fraction of freshwater is easily accessible, so it must be conserved carefully.

2. A tap in your school is leaking continuously. What would you do and why?

Answer:

1. I would immediately close it properly or inform an adult to get the leakage repaired.
2. This would prevent unnecessary wastage and help conserve water.

3. How can rainwater harvesting help a village facing water scarcity?

Answer:

1. Rainwater harvesting allows the village to collect and store rainwater during the rainy season.
2. The stored water can be used later when water availability is low.

4. Why would a windy region be suitable for installing windmills?
Answer:

1. Windmills use the energy of moving air to perform useful work.
2. Therefore, a windy region can use windmills for activities such as generating electricity.

5. Why is the Sun considered the ultimate source of energy for a cow eating grass?
Answer:

1. Grass uses sunlight to prepare its food and store energy.
2. When the cow eats grass, it indirectly obtains energy that originally came from the Sun.

6. A family wants to reduce its dependence on conventional electricity during sunny days. What can it use?
Answer:

1. The family can install solar panels to capture energy from sunlight.
2. Solar panels can convert the Sun's energy into electricity for useful purposes.

7. What may happen to wild animals if a large part of a forest is cut down?
Answer:

1. Wild animals may lose the food and shelter provided by the forest.
2. Therefore, cutting forests can make it difficult for many animals to survive in their natural habitat.

8. Why is planting a few trees not an immediate replacement for a fully grown forest?
Answer:

1. A forest contains dense plant growth that provides habitat, food and shelter to many organisms.
2. A new forest takes many years to grow and regenerate after an old forest is lost.

9. How does the Chipko movement demonstrate the importance of people's participation in conservation?
Answer:

1. People protected trees by encircling and hugging them to prevent them from being felled.
2. Their collective action showed that local communities can actively participate in protecting forests.

10. What might happen to soil if a large number of trees are removed from an area?
Answer:

1. Without tree roots to hold it, the soil may be washed away more easily.
2. The soil may also receive fewer nutrients from the decay of fallen leaves.

11. Why are earthworms useful to a farmer or gardener?
Answer:

1. Earthworms naturally turn and loosen the soil.
2. Loosened soil creates better conditions for the growth of plant roots.

12. Two soil samples collected from different places have different colours. What could you infer?
Answer:

1. The two soil samples may contain different kinds or amounts of materials.
2. Therefore, the appearance and properties of soil can vary from one place to another.

13. Why should rocks be used carefully even though we see them in large quantities?
Answer:

1. Rocks take thousands to millions of years to form naturally.

2. Therefore, they cannot be quickly replaced if they are used excessively.

14. Why would the excessive extraction of minerals be a matter of concern?

Answer:

1. Minerals are natural resources obtained from rocks and are used for many useful products.
2. Since minerals are non-renewable resources, excessive extraction can reduce their availability.

15. Why cannot we depend on fossil fuels forever?

Answer:

1. Fossil fuels are available in limited quantities and take millions of years to form.
2. They cannot be replenished within a reasonable period after being consumed.

16. How does excessive use of petrol and diesel affect the environment?

Answer:

1. Burning these fossil fuels releases smoke and carbon dioxide into the air.
2. Their excessive use therefore contributes to air pollution.

17. Your school is only a short distance from your home. How can you help conserve fossil fuels while travelling to school?

Answer:

1. I can walk or cycle to school instead of using a fuel-powered vehicle.
2. This reduces the consumption of fossil fuels used for transportation.

18. Why is travelling by public transport better for conserving fossil fuels?

Answer:

1. Public transport allows many people to travel together in the same vehicle.
2. Using it can reduce the overall consumption of fossil fuels compared with using many individual vehicles.

19. Why are coal and petroleum classified as non-renewable resources?

Answer:

1. Coal and petroleum take a very long time to form naturally.
2. They cannot be replenished within a reasonable period after they are used.

20. Why can forests be considered renewable resources even though trees take years to grow?

Answer:

1. Forests can regenerate naturally or be restored when they are protected and managed responsibly.
2. However, sufficient time must be allowed for forests to regenerate after their use.

21. What would happen if humans used renewable resources faster than they could be replenished?

Answer:

1. The quantity of these resources available for use would decrease.
2. Therefore, even renewable resources need to be used judiciously and given time to replenish.

22. How can using solar energy help in conserving natural resources?

Answer:

1. Solar energy can be used for generating electricity, cooking and heating water.
2. Greater use of solar energy can reduce our dependence on limited fossil-fuel resources.

23. Why is an electric vehicle useful for reducing pollution from vehicles?

Answer:

1. Electric vehicles do not burn petrol or diesel while being driven.
2. Therefore, they avoid smoke produced by burning these fossil fuels in vehicles.

24. A student says, "Renewable resources can never become scarce, so we can use them freely." Why is this reasoning incorrect?
Answer:
1. Renewable resources need time and suitable natural conditions to be replenished or restored.
2. Hence, they should also be conserved and used responsibly rather than wasted.

25. Why is the responsible use of natural resources important for future generations?
Answer:
1. Excessive and careless use can reduce the amount of resources available in the future.
2. Judicious use helps meet present needs while conserving resources and protecting the environment for future generations.

11.9. Three-mark questions with Answers of LOTS Type: (10 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:
1. What are natural resources? Give examples.
Answer:
1. Resources that we obtain from **nature** are called natural resources.
2. **Air, water, energy from the Sun, forests and soil** are examples of natural resources.
3. **Rocks, minerals and fossil fuels** are also important natural resources.

2. Describe the composition of air.
Answer:
1. Air is a mixture of different gases and contains about **78% nitrogen**.
2. It contains about **21% oxygen**, which is essential for the survival of living beings.
3. The remaining **1% consists of argon, carbon dioxide and other gases**.

3. What is wind? Mention its important uses.
Answer:
1. **Moving air is called wind**.
2. Windmills use wind energy to **generate electricity and run flour mills**.
3. Windmills can also be used to **pull water from wells**.

4. Describe the distribution and availability of water on Earth.
Answer:
1. Water covers about **two-thirds of the Earth's surface**.
2. Most of this water is present in **oceans and seas and is saline**.
3. Freshwater is found in **ice and snow, rivers, lakes and underground**, but only a small fraction is easily accessible.

5. Mention three ways by which we can conserve water.
Answer:
1. We should **turn off taps** when water is not being used.
2. We should **repair leaking taps and pipes** to prevent wastage.
3. We should **reuse water wherever possible and practise water harvesting**.

6. What is rainwater harvesting? Explain its importance.
Answer:
1. **Rainwater harvesting** is the collection and storage of rainwater in large quantities for later use.
2. It helps in **conserving rainwater** instead of allowing it to flow away.
3. Traditional structures such as **Bawadi in Rajasthan and Vav in Gujarat** have been used for water harvesting.

7. Explain the importance of the Sun as a source of energy.
Answer:

1. The **Sun is the main source of energy on Earth**.
2. Plants use sunlight to prepare food, while animals obtain this energy directly or indirectly through plants.
3. Solar energy is also used for **generating electricity, cooking food and heating water**.

8. What are forests? State their importance.

Answer:

1. Forests are large areas with **dense growth of various types of plants**.
2. They provide **food and shelter** to many wild animals, birds and other organisms.
3. Forests are valuable natural resources and should be **protected and allowed sufficient time to regenerate**.

9. Write a short note on Van Mahotsav.

Answer:

1. **Van Mahotsav** is a week-long forest festival celebrated across India during **July**.
2. During this festival, people participate in **planting trees**.
3. It creates awareness about forests and encourages people to **increase and protect green cover**.

10. Write three points about the Chipko movement.

Answer:

1. The **Chipko movement** began in the early 1970s in present-day Uttarakhand.
2. Local people, especially women, **encircled and hugged trees** to prevent them from being cut.
3. The movement became an important example of people's efforts to **protect forests**.

11. Explain how forests help in protecting and enriching soil.

Answer:

1. The **roots of trees hold the soil** and help prevent it from being washed away.
2. Fallen leaves **decay and add nutrients** to the soil.
3. Thus, vegetation plays an important role in **protecting and enriching forest soil**.

12. Explain how soil is formed.

Answer:

1. Soil is formed by the **disintegration or breaking down of rocks**.
2. The Sun, water and living organisms contribute to the gradual breakdown of rocks.
3. The process of soil formation takes **thousands of years**.

13. What are rocks and minerals? Mention their uses.

Answer:

1. Rocks are natural materials that take **thousands to millions of years to form**, and rocks are made up of minerals.
2. Metals such as **aluminium, gold, copper and iron** are extracted from minerals.
3. These materials are used in making **buildings, vehicles, jewellery, cosmetics and electronic equipment**.

14. What are fossil fuels? How are they formed?

Answer:

1. **Petroleum, natural gas and coal** are commonly called fossil fuels.
2. They are formed from the **buried remains of microorganisms and plants**.
3. Their formation takes place under the Earth over **millions of years**.

15. Mention three important uses of fossil fuels.

Answer:

1. Petroleum provides fuels such as **petrol, diesel and kerosene**.
2. Natural gas is used for **cooking, generating electricity and as CNG in vehicles**.
3. Coal is mainly used for the **production of electricity**.

16. Why should fossil fuels be used carefully?

Answer:
1. Fossil fuels are available in **limited quantities**.
2. They take **millions of years to form**, so they cannot be quickly replaced.
3. Burning fossil fuels produces **smoke and carbon dioxide**, which contribute to air pollution.

17. What are renewable resources? Explain with examples.
Answer:
1. Resources that are **renewed, replenished or restored by natural processes within a reasonable period** are called renewable resources.
2. **Air and water** are examples of renewable natural resources.
3. **Forests** can also be renewed when they are protected and given sufficient time to regenerate.

18. What are non-renewable resources? Give examples.
Answer:
1. Resources that are **not replenished within a reasonable period** are called non-renewable resources.
2. **Minerals, soil and rocks** are included among non-renewable resources in the chapter.
3. **Coal, petroleum and natural gas** are also non-renewable natural resources.

19. Differentiate between natural resources and human-made resources.
Answer:
1. **Natural resources** are obtained directly from nature, such as air, water, forests and soil.
2. **Human-made resources** are created by human beings to meet their needs.
3. Human-made resources include useful objects and materials produced by humans using available resources.

20. Why is the judicious use of natural resources necessary?
Answer:
1. Natural resources are essential for meeting our **daily needs and survival**.
2. They should be used carefully without unnecessary wastage or damage to the environment.
3. Judicious use helps conserve resources for **present as well as future generations**.

11.10. Three-mark questions with Answers of HOTS Type: (20 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:
1. Earth has a large amount of water, yet many places face water scarcity. Explain why.
Answer:
1. About two-thirds of the Earth is covered with water, but most of it is **saline water** in oceans and seas.
2. Only a small fraction of freshwater is easily accessible for human use.
3. Therefore, freshwater must be conserved and used carefully to reduce water scarcity.

2. Your school notices that a large quantity of water is being wasted every day. Suggest three measures to conserve it.
Answer:
1. Students should **turn off taps** immediately after use.
2. Leaking taps and pipes should be **repaired promptly** to prevent continuous wastage.
3. Water should be **reused wherever possible**, and rainwater harvesting can be practised.

3. A village receives good rainfall but experiences water shortage during summer. How can rainwater harvesting help?
Answer:

1. Rainwater can be **collected during the rainy season** instead of allowing it to flow away.
2. The collected rainwater can be **stored for later use** when water becomes scarce.
3. Traditional water-harvesting structures such as **Bawadi and Vav** show how water can be conserved effectively.

4. A coastal area receives strong winds for most of the year. How can this natural resource be used beneficially?

Answer:

1. The energy of moving air can be captured using **windmills**.
2. Windmills can use wind energy to **generate electricity or operate flour mills**.
3. They can also be used to **pull water from wells**, making wind a useful natural resource.

5. Explain how the food eaten by an animal can ultimately be linked to energy from the Sun.

Answer:

1. Plants use **energy from sunlight** to prepare their food.
2. Herbivorous animals obtain this stored energy when they eat plants.
3. Thus, animals depend directly or indirectly on the **Sun as their ultimate source of energy**.

6. A family lives in an area that receives plenty of sunlight. Suggest how they can use this natural resource effectively.

Answer:

1. They can install **solar panels** to produce electricity from sunlight.
2. They can use a **solar cooker** to cook food using solar energy.
3. They can also use a **solar water heater** to heat water.

7. What consequences may occur if a large forest is cleared completely?

Answer:

1. Many animals, birds and other organisms may lose their **food and shelter**.
2. Without tree roots, soil may not be held firmly and can be **washed away more easily**.
3. Restoring the lost forest would take **many years**, so forests need careful protection.

8. Why can planting new trees not immediately compensate for cutting down a mature forest?

Answer:

1. A mature forest provides established **food and shelter for many living organisms**.
2. Newly planted trees need considerable time to grow and develop into a forest.
3. Since forest regeneration takes **many years**, preventing unnecessary cutting is important.

9. What lessons about conservation can students learn from the Chipko movement?

Answer:

1. The Chipko movement shows that ordinary people can actively participate in **protecting natural resources**.
2. People, especially women, protected trees by **encircling and hugging them** to prevent their felling.
3. It demonstrates how collective community action can contribute to **forest conservation**.

10. Predict what may happen to the soil if all the trees in a hilly area are removed.

Answer:

1. Tree roots would no longer be available to **hold the soil firmly**.
2. Rainwater could therefore wash away the loose soil more easily.
3. The soil may also receive fewer nutrients because there would be fewer **fallen leaves to decay and enrich it**.

11. A gardener finds many earthworms in the garden soil. Why should the gardener consider this useful?
Answer:
1. Earthworms act as natural agents that **turn the soil**.
2. Their activity also helps in **loosening the soil**.
3. Therefore, their presence can help maintain soil conditions suitable for plant growth.

12. Two students collect soil from two different locations and notice differences in colour and texture. What can they conclude?
Answer:
1. Soil from different locations can contain **different materials**.
2. Differences in the materials present can result in variations in the appearance of soil samples.
3. Therefore, soil does not necessarily have identical characteristics at every location.

13. Why should rocks and minerals be conserved despite their widespread use?
Answer:
1. Rocks take **thousands to millions of years** to form naturally.
2. Rocks contain minerals from which useful metals such as iron, copper, aluminium and gold are obtained.
3. Since rocks and minerals are classified as **non-renewable resources**, they should be used judiciously.

14. Suppose fossil fuels are consumed continuously at a very high rate. What problems may arise?
Answer:
1. Fossil-fuel reserves may decrease because they are available in **limited quantities**.
2. They cannot be replaced quickly because their formation takes **millions of years**.
3. Increased burning of fossil fuels would also produce more **smoke and carbon dioxide**, contributing to air pollution.

15. How can students help reduce the consumption of fossil fuels in their daily travel?
Answer:
1. Students can **walk** to nearby places whenever possible.
2. They can use a **bicycle** instead of a fuel-powered vehicle for short distances.
3. They can use **public transport** to help reduce fossil-fuel consumption.

16. A student says, "Petroleum will form again naturally, so we do not need to conserve it." Explain why the statement is misleading.
Answer:
1. Petroleum does form naturally, but its formation takes **millions of years**.
2. It cannot be replenished within a reasonable period compared with the rate at which humans use it.
3. Hence, petroleum is classified as a **non-renewable resource** and needs to be conserved.

17. Why should renewable resources also be used carefully?
Answer:
1. Renewable resources can be replenished or restored by **natural processes within a reasonable period**.
2. However, resources such as forests require sufficient time to **regenerate after use**.
3. Therefore, renewable resources should also be used responsibly rather than wasted.

18. Compare solar energy and fossil fuels from the viewpoint of conservation.
Answer:
1. Solar energy comes continuously from the **Sun**, the main source of energy on Earth.
2. Fossil fuels such as coal and petroleum are **limited and take millions of years to form**.

3. Using solar energy where possible can therefore reduce our dependence on limited fossil-fuel resources.

19. Why can replacing some fuel-powered vehicles with electric vehicles help the environment?

Answer:

1. Burning petrol and diesel produces **smoke and carbon dioxide**, which contribute to air pollution.
2. Electric vehicles do not burn these fossil fuels while being driven.
3. Therefore, their use can reduce pollution caused directly by the burning of petrol or diesel in vehicles.

20. How can the present generation ensure that natural resources remain available for future generations?

Answer:

1. Natural resources should be used **judiciously and without unnecessary wastage**.
2. Renewable resources should be given sufficient opportunity to **replenish or regenerate**.
3. Responsible use can meet present needs while conserving resources and protecting the environment for the **future**.

11.11 Five-mark questions with Answers of LOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:

1. Explain the importance and uses of air as a natural resource.

Answer:

1. **Air** is an important natural resource required for the survival of living beings.
2. Air contains about **78% nitrogen, 21% oxygen and 1% other gases**.
3. Oxygen present in air is essential for the survival of most living beings.
4. Moving air is called **wind**, and its energy can be used through windmills.
5. Windmills are used to **generate electricity, run flour mills and pull water from wells**.

2. Describe the availability of water on Earth and explain why water conservation is necessary.

Answer:

1. Water covers about **two-thirds of the Earth's surface**.
2. Most of Earth's water is found in oceans and seas and is **saline or salty**.
3. Freshwater occurs in **ice and snow, rivers, lakes and underground sources**.
4. Only a small fraction of freshwater is easily accessible for our use.
5. Therefore, we should conserve water by **preventing wastage, repairing leaks, reusing water and practising water harvesting**.

3. Explain rainwater harvesting and traditional methods of water conservation.

Answer:

1. **Rainwater harvesting** involves collecting and storing rainwater in large quantities for later use.
2. It helps conserve rainwater instead of allowing this valuable resource to go to waste.
3. People in India have traditionally used different structures to **harvest and store water**.
4. **Stepwells** are one such traditional water-harvesting structure.
5. Stepwells are known as **Bawadi in Rajasthan and Vav in Gujarat**.

4. Explain the importance of energy from the Sun.

Answer:

1. The **Sun is the main source of energy on Earth**.
2. Plants use sunlight to **prepare their food**.

3. Animals obtain this energy directly or indirectly by depending on plants for food.
4. **Solar panels** capture energy from the Sun and produce electricity.
5. Solar energy is also used in **solar cookers and solar water heaters**.

5. Describe the importance of forests and the need for their conservation.
Answer:
1. Forests are areas with **dense growth of various types of plants**.
2. They provide **food and shelter** to many wild animals, birds and other living organisms.
3. Forest cover decreases when trees are cut down for different human needs.
4. Growing a new forest or restoring a lost forest takes **many years**.
5. Therefore, forests should be **preserved and used responsibly**, giving them sufficient time to regenerate.

6. Write a detailed note on Van Mahotsav and the Chipko movement.
Answer:
1. **Van Mahotsav** is a week-long forest festival celebrated across India during July.
2. During Van Mahotsav, people **plant trees and create awareness about forests**.
3. The **Chipko movement** began in the early 1970s in present-day Uttarakhand.
4. Local people, particularly women, **encircled and hugged trees** to prevent them from being felled.
5. Both Van Mahotsav and the Chipko movement highlight the importance of **protecting and conserving forests**.

7. Explain soil formation and the role of plants and organisms in maintaining soil.
Answer:
1. Soil is formed by the **disintegration of rocks** over a very long period.
2. The action of the **Sun, water and living organisms** gradually breaks rocks into smaller particles.
3. Tree roots **hold the soil** and help prevent it from being washed away.
4. Fallen leaves decay and **add nutrients to the soil**.
5. Organisms such as **earthworms help in turning and loosening the soil**.

8. Explain the importance and uses of rocks and minerals.
Answer:
1. Rocks are important natural resources that take **thousands to millions of years to form**.
2. Rocks are used in the construction of **houses, buildings, roads and dams**.
3. Rocks are made up of different **minerals**.
4. Metals such as **aluminium, gold, copper and iron** are extracted from minerals.
5. These materials are used in making **vehicles, jewellery, cosmetics, electronic equipment and many other useful products**.

9. What are fossil fuels? Explain their formation, uses and limitations.
Answer:
1. **Petroleum, natural gas and coal** are commonly called fossil fuels.
2. They are formed from the buried remains of **microorganisms and plants over millions of years**.
3. Petroleum provides useful fuels such as **petrol, diesel and kerosene**.
4. Natural gas is used for cooking and electricity generation, while coal is mainly used for **producing electricity**.
5. Fossil fuels are limited, and their burning produces **smoke and carbon dioxide that cause air pollution**.

10. Differentiate between renewable and non-renewable natural resources.
Answer:

1. **Renewable resources** are resources that can be renewed, replenished or restored within a reasonable period.
2. **Air, water and forests** are examples of renewable natural resources.
3. **Non-renewable resources** cannot be replenished within a reasonable period.
4. **Minerals, soil, rocks, coal, petroleum and natural gas** are examples of non-renewable resources given in the chapter.
5. Both types of resources should be **used judiciously and conserved** for future needs.

11. Explain why fossil fuels need to be conserved and mention ways to reduce their use.
Answer:
1. Fossil fuels are **limited natural resources** and may get exhausted with continuous use.
2. They take **millions of years to form**, so they cannot be replaced quickly.
3. Burning fossil fuels produces **smoke and carbon dioxide**, contributing to air pollution.
4. We can reduce their use by **walking or cycling to nearby places and using public transport**.
5. Using other sources of energy wherever possible can further reduce our dependence on fossil fuels.

12. Explain why natural resources should be used judiciously.
Answer:
1. Natural resources such as **air, water, forests, soil, rocks, minerals and fossil fuels** are essential for our lives.
2. Some resources can be renewed, while others take a very long time to form.
3. Careless or excessive use can reduce the availability of these valuable resources.
4. We should avoid wastage and use natural resources **responsibly without harming the environment**.
5. Judicious use helps satisfy our present needs while preserving resources for **future generations**.

11.12 Five-mark questions with Answers of HOTS Type: (12 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:
1. A village has enough rainfall during the monsoon but faces severe water shortage in summer. Suggest a suitable conservation plan.
Answer:
1. The villagers should collect and store rainwater through **rainwater harvesting** during the monsoon.
2. Traditional water-harvesting structures such as **stepwells** can be used to conserve water.
3. Leaking taps and pipes should be repaired to prevent unnecessary **water wastage**.
4. Water should be **reused or recycled wherever possible** for suitable purposes.
5. These practices will help conserve the limited amount of accessible freshwater for periods of scarcity.

2. A large number of trees are cut down from a forest near a village. Analyse the possible effects on the forest ecosystem and soil.
Answer:
1. Wild animals may lose the **food and shelter** provided by the forest.
2. The reduction in vegetation may disturb the habitat of many living organisms.
3. Without tree roots to hold it, the soil may be **washed away more easily**.
4. Fewer fallen leaves will be available to decay and **add nutrients to the soil**.
5. The damage cannot be quickly reversed because a forest takes **many years to regenerate**.

3. "The Sun supports life on Earth both directly and indirectly." Justify the statement.

Answer:

1. The **Sun is the main source of energy on Earth**.
2. Plants directly use sunlight to **prepare their food**.
3. Animals obtain energy indirectly from the Sun by consuming plants or other animals that depend on plants.
4. Humans also use sunlight through **solar panels, solar cookers and solar water heaters**.
5. Thus, the Sun supports living organisms and also provides a useful source of energy for human activities.

4. Suppose fossil fuels become unavailable in the future. Explain why this is possible and how we can reduce their consumption now.

Answer:

1. Fossil fuels such as **coal, petroleum and natural gas** are available in limited quantities.
2. They take **millions of years to form**, so they cannot be replenished within a reasonable period.
3. We can reduce their consumption by **walking or cycling** for short distances.
4. Using **public transport** can also help reduce the amount of fossil fuel consumed for transportation.
5. Using alternatives such as **solar energy** wherever suitable can further reduce dependence on fossil fuels.

5. A student says, "Renewable resources never need conservation because nature will always replace them." Analyse this statement.

Answer:

1. Renewable resources can be **renewed, replenished or restored within a reasonable period**.
2. However, this does not mean that they can be used carelessly or wasted.
3. For example, forests are renewable, but a destroyed forest may take **many years to regenerate**.
4. Excessive use without sufficient time for recovery can reduce the availability of renewable resources.
5. Therefore, renewable resources should also be **used responsibly and conserved**.

6. Why is it important to conserve rocks and minerals even though they appear to be widely available?

Answer:

1. Rocks are important natural resources used in **buildings, roads, dams and other constructions**.
2. Rocks contain **minerals** from which useful metals such as iron, copper, aluminium and gold are obtained.
3. These minerals are required for making vehicles, jewellery, electronic equipment and many other products.
4. Rocks take **thousands to millions of years to form**, so they cannot be replaced quickly.
5. Hence, rocks and minerals are non-renewable resources and should be **used judiciously**.

7. Your school wants to become more responsible in its use of natural resources. Suggest five actions students can follow.

Answer:

1. Students should **close water taps properly** and report leaking taps immediately.
2. The school can collect rainwater by adopting **rainwater-harvesting practices**.
3. Students can **walk or cycle** to nearby places whenever possible to reduce fossil-fuel consumption.

4. They can participate in **tree-planting and forest-awareness activities** inspired by Van Mahotsav.
5. Students should avoid unnecessary wastage and develop the habit of using all natural resources **judiciously**.

8. Compare the environmental consequences of using fossil fuels with the advantages of using solar energy.

Answer:

1. Fossil fuels are **limited resources** that take millions of years to form.
2. Burning them produces **smoke and carbon dioxide**, contributing to air pollution.
3. Solar energy comes from the **Sun**, which is the main source of energy on Earth.
4. Solar energy can be used for **generating electricity, cooking food and heating water**.
5. Therefore, using solar energy where suitable can reduce dependence on limited and polluting fossil fuels.

9. A hilly region is losing trees rapidly. Predict how this could affect the soil and suggest ways to address the problem.

Answer:

1. Tree roots normally **hold the soil** and help prevent it from being washed away.
2. Cutting trees can therefore make the soil more vulnerable to being carried away by water.
3. The soil may also become less enriched because fewer fallen leaves will **decay and add nutrients**.
4. Tree cutting should be reduced and the remaining forest should be **protected responsibly**.
5. Tree-planting activities such as those encouraged during **Van Mahotsav** can support the restoration of green cover over time.

10. "Our present lifestyle depends on natural resources, but our future depends on how wisely we use them." Explain.

Answer:

1. We depend on **air, water, sunlight, forests, soil, rocks, minerals and fossil fuels** for many daily needs.
2. Some of these resources are renewable, while others cannot be replenished within a reasonable period.
3. Excessive or careless use can reduce the availability of resources and may also harm the environment.
4. We should therefore conserve resources and use them only as **judiciously as necessary**.
5. Responsible use helps meet present needs while ensuring that natural resources remain available for **future generations**.

11.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. Your school receives plenty of rain during the monsoon, but sometimes faces water shortage in summer. Prepare a five-point water-conservation plan for your school.

Answer:

1. The school should install a **rainwater-harvesting system** to collect rainwater during the monsoon.
2. The collected rainwater should be **stored for later use** whenever suitable.
3. Students should ensure that **taps are closed properly** after use.
4. Leaking taps and pipes should be **repaired immediately** to prevent wastage.

5. Water should be **reused or recycled wherever possible** to reduce the demand for fresh water.

2. A family wants to reduce its dependence on fossil fuels and make better use of natural resources. Suggest five practical actions.

Answer:

1. Family members can **walk or cycle** when travelling short distances.
2. They can use **public transport** instead of individual fuel-powered vehicles whenever possible.
3. They can use **solar panels** to obtain electricity from sunlight.
4. They can use a **solar cooker or solar water heater** to make use of solar energy.
5. These practices reduce unnecessary dependence on **limited fossil-fuel resources**.

3. A village near a forest is experiencing rapid cutting of trees. As a student environmental volunteer, suggest five actions to help conserve the forest.

Answer:

1. Villagers should be made aware that forests provide **food and shelter to many living organisms**.
2. Unnecessary cutting of trees should be discouraged because forests take **many years to regenerate**.
3. Students and villagers can participate in **tree-planting programmes** such as Van Mahotsav.
4. The community can learn from the **Chipko movement**, which demonstrated people's participation in protecting trees.
5. Forest resources should be used **responsibly**, allowing sufficient time for their regeneration.

4. A farmer removes most of the trees surrounding a field and later notices that soil is being washed away during heavy rain. Explain the problem and suggest suitable measures.

Answer:

1. Tree roots normally **hold the soil firmly** and help prevent it from being washed away.
2. Removing trees reduces this natural protection and leaves the soil more exposed.
3. Trees also contribute fallen leaves that **decay and enrich the soil with nutrients**.
4. The farmer should protect the remaining vegetation and **grow more trees** around suitable areas.
5. Restoring vegetation will help protect the soil, although trees and forests require **time to regenerate**.

5. Your town has increasing air pollution because many people use petrol and diesel vehicles. Suggest five measures based on the ideas in the chapter.

Answer:

1. People should **walk** when travelling to nearby places.
2. They should use **bicycles** for short-distance travel whenever possible.
3. More people should travel by **public transport** to reduce individual vehicle use.
4. Greater use of **electric vehicles** can reduce smoke released directly from petrol- and diesel-powered vehicles.
5. These measures can reduce fossil-fuel consumption because burning fossil fuels produces **smoke and carbon dioxide that contribute to air pollution**.

6. Your family is building a house in a sunny and windy region. How can natural resources be used wisely in the house and its surroundings?

Answer:

1. **Solar panels** can be installed to generate electricity from sunlight.
2. A **solar water heater** can use the Sun's energy to heat water.

3. A **solar cooker** can be used for cooking food when conditions are suitable.
4. Wind energy can be utilised through **windmills** where local wind conditions permit.
5. Using sunlight and wind for useful purposes can reduce dependence on other energy resources.

7. A community is using rocks and minerals rapidly for construction and manufacturing. Suggest how these resources should be managed.

Answer:

1. People should understand that rocks take **thousands to millions of years to form**.
2. Rocks should be used carefully for construction rather than being **unnecessarily wasted**.
3. Minerals should also be used judiciously because useful metals such as **iron, copper, aluminium and gold** are obtained from them.
4. The community should remember that rocks and minerals are classified as **non-renewable resources** in the chapter.
5. Therefore, their use should be planned carefully so that these valuable resources are conserved.

8. Your class is asked to organise a "Save Natural Resources" campaign. What five messages would you include?

Answer:

1. **Save water** by closing taps, repairing leaks and avoiding unnecessary wastage.
2. **Protect forests** and participate in tree-planting activities.
3. **Walk, cycle or use public transport** to reduce fossil-fuel consumption.
4. Make suitable use of **solar energy** for electricity, cooking and heating water.
5. Use all natural resources **judiciously** so that they remain available for future generations.

9. A village has abundant sunlight, strong winds and limited fossil-fuel supplies. Propose an energy plan using the resources available there.

Answer:

1. The village can install **solar panels** to generate electricity using sunlight.
2. **Solar cookers** can be used for cooking when sufficient sunlight is available.
3. **Solar water heaters** can be used instead of consuming fuel for heating water.
4. Windmills can utilise strong winds for **generating electricity and other useful work**.
5. Using these naturally available energy resources can reduce the village's dependence on **limited fossil fuels**.

10. Imagine you are responsible for making your home more "resource-friendly." What five practices would you introduce?

Answer:

1. I would ensure that water is not wasted by **closing taps properly and repairing leaks**.
2. I would encourage **rainwater harvesting** to collect water for later use.
3. I would use **solar energy** for suitable household purposes such as heating water.
4. I would prefer **walking, cycling or public transport** wherever practical to reduce fossil-fuel use.
5. I would encourage everyone at home to use natural resources **judiciously without harming the environment**, keeping future needs in mind.

11.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

1. Which option correctly represents the approximate composition of air?

A. Nitrogen 21%, Oxygen 78%, Other gases 1%
B. Nitrogen 78%, Oxygen 21%, Other gases 1%
C. Nitrogen 70%, Oxygen 20%, Other gases 10%
D. Nitrogen 50%, Oxygen 49%, Other gases 1%
Answer: B. Nitrogen 78%, Oxygen 21%, Other gases 1%
2. A windmill is installed in a village. Which combination of activities can it perform according to the chapter?
A. Generate electricity, run flour mills and pull water from wells
B. Purify seawater, produce coal and make soil
C. Produce oxygen, generate rainfall and form minerals
D. Make petroleum, store sunlight and produce rocks
Answer: A. Generate electricity, run flour mills and pull water from wells
3. Which statement best explains why water must be conserved despite covering about two-thirds of Earth?
A. All water on Earth is frozen.
B. Most water is saline and only a small fraction of freshwater is easily accessible.
C. Freshwater cannot be found underground.
D. Humans can use only rainwater.
Answer: B. Most water is saline and only a small fraction of freshwater is easily accessible.
4. Which of the following practices would conserve the greatest amount of freshwater?
A. Keeping taps running while brushing
B. Ignoring leaking pipelines
C. Repairing leaks and harvesting rainwater
D. Using freshwater unnecessarily for every purpose
Answer: C. Repairing leaks and harvesting rainwater
5. Consider the following:
I. Bawadi
II. Vav
III. Windmill
IV. Stepwell
Which are associated with traditional water harvesting?
A. I and III only
B. II and III only
C. I, II and IV only
D. I, II, III and IV
Answer: C. I, II and IV only
6. Which sequence correctly shows the indirect transfer of energy from the Sun to a cow?
A. Sun → Cow → Grass
B. Grass → Sun → Cow
C. Sun → Grass → Cow
D. Cow → Grass → Sun
Answer: C. Sun → Grass → Cow
7. Which device does NOT directly use solar energy?
A. Solar panel
B. Solar cooker
C. Solar water heater
D. Windmill
Answer: D. Windmill

8. Why is the Sun considered the main source of energy on Earth?
A. It produces all minerals directly.
B. Plants use sunlight to make food, and animals depend directly or indirectly on plants.
C. It produces petroleum every day.
D. It converts seawater directly into drinking water.
Answer: B. Plants use sunlight to make food, and animals depend directly or indirectly on plants.
9. Which is the most likely immediate effect of large-scale forest cutting?
A. Increase in wildlife habitat
B. Increase in shelter for animals
C. Loss of food and shelter for many organisms
D. Faster formation of rocks
Answer: C. Loss of food and shelter for many organisms
10. Which pair is correctly matched?
A. Van Mahotsav — fossil-fuel conservation
B. Chipko movement — protection of trees
C. Bawadi — wind-energy generation
D. Solar panel — water harvesting
Answer: B. Chipko movement — protection of trees
11. What was the key action associated with the Chipko movement?
A. Building dams across rivers
B. Hugging and encircling trees to prevent their cutting
C. Digging mines for minerals
D. Installing solar panels in forests
Answer: B. Hugging and encircling trees to prevent their cutting
12. If trees are removed from a slope, which change is most likely?
A. Soil will be held more firmly.
B. Soil may be washed away more easily.
C. Rocks will immediately become soil.
D. More nutrients will be added by fallen leaves.
Answer: B. Soil may be washed away more easily.
13. Fallen leaves are beneficial to forest soil mainly because they:
A. turn into rocks immediately.
B. prevent sunlight from reaching Earth.
C. decay and add nutrients to the soil.
D. produce petroleum quickly.
Answer: C. Decay and add nutrients to the soil.
14. Which statement about soil formation is correct?
A. Soil is formed instantly after rainfall.
B. Soil is formed only by animals.
C. Soil forms through the disintegration of rocks over thousands of years.
D. Soil is produced only from fallen leaves.
Answer: C. Soil forms through the disintegration of rocks over thousands of years.
15. A gardener finds many earthworms in the soil. Which conclusion is most appropriate?
A. Earthworms prevent soil from loosening.
B. Earthworms help turn and loosen the soil.
C. Earthworms convert soil into petroleum.
D. Earthworms stop plant roots from growing.
Answer: B. Earthworms help turn and loosen the soil.

16. Which statement best describes the relationship between rocks and minerals?
A. Minerals are made only from soil.
B. Rocks are made up of minerals.
C. Rocks and minerals are renewable within a few days.
D. Minerals are made from fossil fuels.
Answer: B. Rocks are made up of minerals.
17. Which group contains only metals mentioned in the chapter as being extracted from minerals?
A. Aluminium, gold, copper and iron
B. Nitrogen, oxygen, iron and argon
C. Copper, oxygen, carbon dioxide and gold
D. Aluminium, nitrogen, iron and oxygen
Answer: A. Aluminium, gold, copper and iron
18. Which statement provides the strongest reason for using rocks judiciously?
A. Rocks dissolve completely in rainwater.
B. Rocks take thousands to millions of years to form.
C. Rocks cannot be used for construction.
D. Rocks contain only one mineral.
Answer: B. Rocks take thousands to millions of years to form.
19. Which group consists entirely of fossil fuels?
A. Coal, petroleum and natural gas
B. Coal, sunlight and water
C. Petroleum, wind and soil
D. Natural gas, forests and sunlight
Answer: A. Coal, petroleum and natural gas
20. Fossil fuels are formed mainly from:
A. fresh rocks exposed to sunlight.
B. rainwater stored underground.
C. buried remains of microorganisms and plants over millions of years.
D. air trapped inside mountains.
Answer: C. Buried remains of microorganisms and plants over millions of years.
21. Which of the following is correctly matched?
A. Petroleum — petrol, diesel and kerosene
B. Coal — solar electricity
C. Natural gas — formation of soil
D. Wind — production of minerals
Answer: A. Petroleum — petrol, diesel and kerosene
22. Why does excessive burning of fossil fuels cause environmental concern?
A. It produces only oxygen.
B. It produces smoke and carbon dioxide that contribute to air pollution.
C. It increases the formation of fossil fuels.
D. It immediately produces new forests.
Answer: B. It produces smoke and carbon dioxide that contribute to air pollution.
23. Which combination contains only renewable natural resources according to the chapter?
A. Air, water and forests
B. Coal, petroleum and natural gas
C. Rocks, minerals and coal
D. Soil, petroleum and minerals
Answer: A. Air, water and forests

24. Which combination contains only non-renewable resources according to the chapter?
A. Air, water and forests
B. Coal, petroleum and natural gas
C. Wind, water and forests
D. Sunlight, air and water
Answer: B. Coal, petroleum and natural gas
25. Which criterion is most useful for classifying a resource as renewable or non-renewable?
A. Its colour
B. Its price
C. Whether it can be replenished within a reasonable period
D. Whether it is found near a city
Answer: C. Whether it can be replenished within a reasonable period
26. A student classifies forests as renewable but petroleum as non-renewable. What is the best reason?
A. Forests are green while petroleum is dark.
B. Forests can regenerate within a reasonable period, while petroleum takes millions of years to form.
C. Petroleum is useful but forests are not.
D. Forests are human-made resources.
Answer: B. Forests can regenerate within a reasonable period, while petroleum takes millions of years to form.
27. Which action would conserve both fossil fuels and help reduce pollution from transportation?
A. Using a motor vehicle for every short trip
B. Keeping vehicle engines running unnecessarily
C. Walking or cycling for nearby journeys
D. Increasing the use of petrol
Answer: C. Walking or cycling for nearby journeys
28. Consider the following statements:
I. Fossil fuels are available in limited quantities.
II. Fossil fuels take millions of years to form.
III. Burning fossil fuels can cause air pollution.
Which statements are correct?
A. I only
B. I and II only
C. II and III only
D. I, II and III
Answer: D. I, II and III
29. Which sequence shows the most appropriate approach to conserving natural resources?
A. Use excessively → Waste → Replace immediately
B. Identify need → Use judiciously → Avoid wastage → Conserve for future
C. Extract continuously → Ignore pollution → Increase consumption
D. Cut forests → Waste water → Burn more fuel
Answer: B. Identify need → Use judiciously → Avoid wastage → Conserve for future
30. Which statement best expresses the central message of *Nature's Treasures*?
A. Natural resources should be used as quickly as possible.
B. Only non-renewable resources need protection.

C. Humans should use natural resources judiciously while protecting the environment and future needs.
D. Human-made resources can completely replace nature.
Answer: C. Humans should use natural resources judiciously while protecting the environment and future needs.

11.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
The following best practices are closely aligned with the chapter themes of **air, water, solar energy, forests, soil, rocks, minerals, fossil fuels, and conservation of natural resources**.

No.	Best Practice	Suggested Classroom Implementation
1	**Natural Resource Observation Walk**	Take students around the school campus and ask them to identify natural resources such as **air, sunlight, water, soil, plants and rocks**. Students can record their observations in a simple worksheet.
2	**Water Conservation Audit**	Ask students to observe how water is used in the school and identify leaking taps or unnecessary wastage. Encourage practices such as **closing taps properly, repairing leaks and reusing water wherever possible**.
3	**Rainwater Harvesting Model**	Let students prepare a simple model showing how rainwater falling on a rooftop can be **collected and stored for later use**. Connect the activity with traditional stepwells such as **Bawadi and Vav** discussed in the chapter.
4	**Learning through Simple Wind Activities**	Use a paper pinwheel or similar classroom activity to demonstrate **moving air or wind**. Discuss how windmills use wind energy to generate electricity and perform other useful work.
5	**Solar Energy Demonstration**	Show pictures/models of **solar panels, solar cookers and solar water heaters** and ask students to explain how each makes use of energy from the Sun.
6	**Tree Adoption Programme**	Each student or group can adopt a tree on the school campus, observe it periodically and participate in its care. Link the activity with **Van Mahotsav** and the importance of increasing and protecting green cover.
7	**Chipko Movement Role-Play**	Organise a short classroom role-play in which students demonstrate how local people protected trees by **encircling and hugging them**. Follow it with a discussion on community participation in forest conservation.
8	**Soil and Rock Observation Corner**	Ask students to collect safe samples of soil and rocks from different places and compare their **colour, appearance and other observable features**. This reinforces the chapter's discussion of soil, rocks and minerals.
9	**Renewable vs Non-Renewable Sorting Activity**	Prepare cards labelled **air, water, forests, minerals, rocks, coal, petroleum and natural gas**. Students classify them into renewable and non-renewable resources and explain their reasoning.

No.	Best Practice	Suggested Classroom Implementation
10	**Fossil-Fuel Conservation Challenge**	Ask students to maintain a one-week record of occasions when their family could **walk, cycle or use public transport** instead of using an individual fuel-powered vehicle. Discuss how such choices can reduce fossil-fuel consumption.
11	**"Save Nature's Treasures" Campaign**	Students can prepare posters, slogans and short presentations on **saving water, protecting forests, conserving fossil fuels and using resources judiciously**. Display the best work in the classroom or school corridor.
12	**Resource-Conservation Pledge**	Conclude the chapter by having each student choose three practical commitments, such as **saving water, avoiding resource wastage and protecting trees**. This reinforces the chapter's message of meeting present needs while conserving resources for the future.

Recommended Best-Practice Outcome:
Teaching this chapter should move beyond memorising the names of resources. Students should **observe → investigate → classify → practise conservation → reflect on their own behaviour**, helping them connect *Nature's Treasures* with responsible actions in everyday life.

11.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for Grade 6:
The chapter provides good opportunities for innovative, **activity-based, technology-supported and experiential learning** around air, water, solar energy, forests, soil, rocks, minerals, fossil fuels and resource conservation.

No.	Innovation	Innovative Teaching–Learning Activity
1	**Nature's Treasures Digital Hunt**	Students photograph or identify examples of **air/wind, water, sunlight, plants, soil and rocks** around the school and create a digital collage titled *Nature's Treasures Around Us*.
2	**Build-a-Rainwater-Harvesting Model**	Groups design a miniature rooftop rainwater-harvesting system using recycled materials. They explain how rainwater can be **collected and stored for later use** and compare their model with traditional stepwells such as Bawadi and Vav.
3	**Renewable Resource Smart Sorting Game**	Create physical or digital cards for **air, water, forests, rocks, minerals, coal, petroleum and natural gas**. Teams race to classify them as renewable or non-renewable and justify each choice.
4	**Solar Innovation Challenge**	Students design a simple model or poster for a **solar-powered home**, choosing where they would use solar panels, a solar cooker or a solar water heater. This connects directly with the chapter's applications of solar energy.
5	**Wind-to-Work STEM Challenge**	Students make simple paper pinwheels and investigate how moving air causes rotation. They then connect their observations to windmills used for **generating electricity, running flour mills and pulling water from wells**.

No.	Innovation	Innovative Teaching–Learning Activity
6	**Virtual Forest Conservation Story**	Students create a short digital story, comic strip or animation showing what happens when a forest is cut and how it can be protected. They can incorporate **Van Mahotsav and the Chipko movement** into their story.
7	**Soil Detective Laboratory**	Give groups different soil samples and let them compare **colour and visible materials** using hand lenses. Students record observations and connect them with the chapter's explanation that soil develops through the gradual disintegration of rocks.
8	**Resource Journey Mapping**	Students select an everyday item and prepare a visual map connecting it to natural resources. For example, they can explore how useful metals such as **iron, copper or aluminium come from minerals** and are eventually used in manufactured products.
9	**Fossil-Fuel Decision Game**	Give students situations such as "school is 500 metres away," "family is travelling across town," or "going to a nearby shop." Students choose among walking, cycling, public transport or other options and discuss which choices can help **reduce fossil-fuel consumption**.
10	**Nature Conservation QR Gallery**	Groups create posters on water, forests, solar energy, soil or fossil fuels and attach teacher-created QR codes linking to student audio explanations or presentations. The classroom becomes an interactive **Nature's Treasures Gallery**.
11	**"Resource Doctor" Problem-Solving Station**	Present real-life problems such as a leaking tap, unnecessary tree cutting, excessive fuel use or water wastage. Students act as "Resource Doctors" and prescribe **three practical conservation solutions** for each problem.
12	**My Eco-Score Challenge**	Students maintain a simple one-week record of actions such as **saving water, walking/cycling, avoiding wastage and caring for plants**. They reflect on which habits help them use natural resources more judiciously.

Suggested Innovative Learning Model:
A useful approach for Grade 6 is **Explore → Experiment → Create → Apply → Conserve**. Students first observe natural resources, perform simple investigations, create models or digital products, apply their understanding to real-life problems, and finally identify conservation actions they can practise themselves. This keeps *Nature's Treasures* experiential and closely connected to the chapter's central message of **judicious use of natural resources for present and future needs**.

11.17: Practicing Questions/Question Bank :

A. Fill in the Blanks:

1. Moving air is called __________.
   Answer: Wind

2. Air contains about __________**% nitrogen**.
   Answer: 78%

3. About __________% of air is oxygen.
   Answer: 21%

4. Water covers about __________ **of the Earth's surface**.
   Answer: Two-thirds

5. Collecting and storing rainwater for future use is called __________.
   Answer: Rainwater harvesting

6. The __________ is the main source of energy on Earth.
   Answer: Sun

7. A device that converts solar energy into electricity is called a __________.
   Answer: Solar panel

8. The __________ **movement** involved people hugging trees to protect them from being cut.
   Answer: Chipko

9. Rocks are made up of __________.
   Answer: Minerals

10. Petroleum, natural gas and coal are called __________ **fuels**.
    Answer: Fossil

11. Air and water are examples of __________ **resources**.
    Answer: Renewable

12. Coal and petroleum are examples of __________ **resources**.
    Answer: Non-renewable

B. One-Mark Descriptive Questions:

1. **What are natural resources?**
   Answer: Resources that we obtain from nature are called natural resources.

2. **What is wind?**
   Answer: Moving air is called wind.

3. **Name two uses of windmills.**
   Answer: Windmills are used to generate electricity and pull water from wells.

4. **Why is seawater not directly suitable for our daily needs?**
   Answer: Seawater is saline or salty.

5. **What is rainwater harvesting?**
   Answer: Rainwater harvesting is the collection and storage of rainwater for later use.

6. **Name two devices that use solar energy.**
   Answer: Solar cookers and solar water heaters use solar energy.

7. **What is Van Mahotsav?**
   Answer: Van Mahotsav is a week-long forest festival that promotes tree planting and awareness about forests.

8. **How do tree roots help soil?**
   Answer: Tree roots hold the soil and prevent it from being washed away.

9. **What are fossil fuels?**
   Answer: Petroleum, natural gas and coal are commonly called fossil fuels.

10. **Give two examples of renewable resources.**
    Answer: Air and water are renewable resources.

C. Two-Mark Descriptive Questions:

1. **Why should we conserve freshwater?**
   Answer:
   - Most of Earth's water is saline.
   - Only a small fraction of freshwater is easily accessible.

2. **Mention two ways to conserve water at home.**
   Answer:
   - Turn off taps when they are not in use.
   - Repair leaking taps and pipes.

3. **How is the Sun important to living organisms?**
   Answer:
   - Plants use sunlight to prepare their food.
   - Animals obtain this energy directly or indirectly by depending on plants.

4. **Mention two benefits of forests.**
   Answer:
   - Forests provide food to many living organisms.
   - They provide shelter and habitat to wildlife.

5. **How do fallen leaves and tree roots help the soil?**
   Answer:
   - Tree roots hold the soil and prevent it from being washed away.
   - Fallen leaves decay and add nutrients to the soil.

6. **Why should rocks be used judiciously?**
   Answer:
   - Rocks take thousands to millions of years to form.
   - They cannot be replenished within a reasonable period.

7. **Why are fossil fuels considered non-renewable?**
   Answer:
   - Fossil fuels take millions of years to form.
   - They cannot be replenished within a reasonable period after use.

8. **How can we reduce fossil-fuel consumption while travelling?**
   Answer:

- We can walk or cycle for nearby journeys.
- We can use public transport whenever possible.

D. Three-Mark Descriptive Questions:

1. **Describe the composition of air.**
   Answer:
   - Air contains about **78% nitrogen**.
   - It contains about **21% oxygen**.
   - The remaining **1% consists of argon, carbon dioxide and other gases**.
2. **Explain the distribution of water on Earth.**
   Answer:
   - Water covers about two-thirds of Earth's surface.
   - Most of it is saline water present in oceans and seas.
   - Freshwater is present in ice, snow, rivers, lakes and underground, but only a small fraction is easily accessible.
3. **Explain three uses of solar energy.**
   Answer:
   - Solar panels use it to generate electricity.
   - Solar cookers use it for cooking.
   - Solar water heaters use it for heating water.
4. **Explain how forests help in maintaining soil.**
   Answer:
   - Tree roots hold the soil firmly.
   - Roots help prevent soil from being washed away.
   - Fallen leaves decay and enrich the soil with nutrients.
5. **What are fossil fuels? Why should they be conserved?**
   Answer:
   - Coal, petroleum and natural gas are fossil fuels.
   - They take millions of years to form and are available in limited quantities.
   - Burning them produces smoke and carbon dioxide, contributing to air pollution.
6. **Differentiate between renewable and non-renewable resources.**
   Answer:
   - Renewable resources can be replenished or restored within a reasonable period.
   - Non-renewable resources cannot be replenished within a reasonable period.
   - Air and water are renewable, whereas coal and petroleum are non-renewable.

E. Five-Mark Descriptive Questions:

1. Explain the importance of water and suggest ways to conserve it.
Answer:

1. Water is required for drinking, cooking, washing and many other activities.
2. Although water covers about two-thirds of Earth, most of it is saline.
3. Only a small fraction of freshwater is easily accessible.
4. We should close taps, repair leaks and reuse water wherever possible.
5. Rainwater harvesting can collect and store rainwater for later use.

2. Explain the importance of forests and why they should be conserved.
Answer:

1. Forests contain dense growth of different kinds of plants.
2. They provide food and shelter to many wild animals and other organisms.
3. Tree roots help hold and protect the soil.
4. A destroyed forest takes many years to regenerate.
5. Therefore, forests should be protected and used responsibly.

3. Describe fossil fuels, their uses and the problems caused by their excessive use.
Answer:

1. Petroleum, natural gas and coal are fossil fuels.
2. They form from buried remains of organisms over millions of years.
3. Petroleum provides petrol, diesel and kerosene, while natural gas and coal are also used as energy sources.
4. Fossil fuels are available in limited quantities.
5. Their burning produces smoke and carbon dioxide, contributing to air pollution.

4. Explain renewable and non-renewable natural resources with examples.
Answer:

1. Renewable resources can be replenished or restored within a reasonable period.
2. Air, water and forests are examples of renewable resources given in the chapter.
3. Non-renewable resources cannot be replenished within a reasonable period.
4. Minerals, rocks, coal, petroleum and natural gas are examples of non-renewable resources.
5. Both types should be used judiciously to conserve nature's treasures.

5. Your school wants to start a "Save Nature's Treasures" programme. Suggest five actions students can practise.
Answer:

1. Students should close taps properly and report water leaks.

2. The school can practise rainwater harvesting.
3. Students can plant and protect trees and participate in forest-awareness programmes.
4. They can walk, cycle or use shared/public transport where suitable to reduce fossil-fuel use.
5. They should avoid unnecessary wastage and use all natural resources judiciously for present and future needs.

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6th Standard Science Book Chapter 12

Chapter 12: Beyond Earth

12.1 Summary of the Chapter:

Summary:

(1) **Stars and Constellations:** Stars are celestial objects that shine with their **own light**. Groups of stars appear to form recognizable patterns, and the regions of the sky containing these patterns are called **constellations**.

(2) **Constellations and Navigation:** In earlier times, people used star patterns to identify directions while travelling on land and sea. The sky is officially divided into **88 constellations**.

(3) **Important Star Patterns: Orion, Canis Major, Taurus, Big Dipper and Little Dipper** are important patterns discussed in the chapter. **Sirius**, located in Canis Major, is the brightest star in the night sky.

(4) **Pole Star:** The **Pole Star (Polaris)** is part of the Little Dipper and appears nearly stationary in the northern sky. Therefore, it is useful for locating the **North direction** in the Northern Hemisphere.

(5) **Night-Sky Watching:** Stars are best observed on **clear, cloudless nights from dark and open places**. Light pollution, smoke, dust, tall buildings and trees can reduce the visibility of stars.

(6) **The Sun:** The **Sun is a star** and is the closest star to Earth. It is an extremely hot spherical ball of gases that produces enormous amounts of **heat and light** and is the main source of energy for Earth.

(7) **Importance of the Sun:** The Sun makes life possible by providing heat and sunlight. It supports plant growth and influences **climate, seasons, weather, the water cycle and winds**. The Sun is about **150 million km** from Earth.

(8) **Planets and the Solar System:** A planet is a large, nearly spherical object that **revolves around the Sun**. The eight planets in order from the Sun are **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.

(9) **Characteristics of Planets:** The four inner planets—Mercury, Venus, Earth and Mars—are smaller and have rocky surfaces. The outer planets—**Jupiter, Saturn, Uranus and Neptune**—are much larger and are mostly made of gas and ice.

(10) **Natural Satellites and the Moon:** Objects that move around planets are called **satellites**. The Moon is Earth's natural satellite and takes about **27 days** to complete one revolution around Earth. Its surface has many **craters**, mostly formed by impacts of asteroids or space rocks.

(11) **Asteroids and Comets: Asteroids** are small, rocky, irregularly shaped objects, many of which lie in the asteroid belt between Mars and Jupiter. **Comets** consist of dust, gases, rocks and ice and develop long tails when they approach the Sun.

(12) **Milky Way and the Universe:** The **Sun, eight planets, their moons, asteroids and comets** together form our Solar System. Our Solar System belongs to the **Milky Way Galaxy (Ākāśha Gangā)**, which contains millions to billions of stars. Beyond the Milky Way are many other galaxies forming part of the vast **Universe**, and scientists continue searching for life on planets around other stars.

12.2 Important Formulas:

Important Formulae / Numerical Relationships

This Grade 6 chapter is mainly **conceptual** and does not introduce many formal mathematical formulae. However, the following relationships and conversions are useful for quantitative and application-based problems.

(1) Astronomical Unit (AU)
1 AU ≈ 150 million km = 150,000,000 km
One astronomical unit is approximately the distance between the **Earth and the Sun**.

(2) Distance in kilometres from AU
Distance (km) = Distance (AU) × 150,000,000 km
This can be used for simple problems involving astronomical distances.

(3) Distance in AU from kilometres
Distance (AU) = Distance (km) ÷ 150,000,000 km

(4) Distance of Proxima Centauri
Distance ≈ 269,000 AU
Therefore, Proxima Centauri is about **269,000 times farther from us than the Sun**.

(5) Earth's Rotation
1 complete rotation of Earth ≈ 24 hours = 1 day.
For simple problems:
Number of rotations = Total time in hours ÷ 24

(6) Earth's Revolution
1 complete revolution of Earth around the Sun ≈ 1 year.
Therefore:
Number of revolutions ≈ Number of years

(7) Moon's Revolution
1 revolution of the Moon around Earth ≈ 27 days.
Hence:
Number of Moon revolutions = Number of days ÷ 27

(8) Earth–Moon Distance
Distance between Earth and Moon ≈ 3,84,000 km.

(9) Moon–Earth Diameter Relationship
The Moon's diameter is approximately **one-fourth of Earth's diameter**.
Moon's diameter ≈ Earth's diameter ÷ 4
or
Earth's diameter ≈ 4 × Moon's diameter

(10) Sun–Earth Diameter Relationship
The chapter states that the Sun is about **100 times bigger than Earth in diameter**.
Sun's diameter ≈ 100 × Earth's diameter

(11) Locating the Pole Star using the Big Dipper
The Pole Star can be located at approximately **five times the distance between the two end stars of the Big Dipper's cup**, along the imaginary line towards the north.
Distance to Pole Star on sky diagram ≈ 5 × distance between the two pointer stars

(12) Useful Time Conversion Formulae
For numerical problems related to rotation and revolution:
1 day = 24 hours
1 year ≈ 365 days
Number of days = Number of years × 365

Important Values to Remember:

1 AU ≈ 150 million km; Earth–Moon distance ≈ 3,84,000 km; Earth's rotation ≈ 24 hours; Earth's revolution ≈ 1 year; Moon's revolution ≈ 27 days; Moon's diameter ≈ ¼ of Earth's diameter; Sun's diameter ≈ 100 × Earth's diameter; Proxima Centauri ≈ 269,000 AU.
These are the **main numerical relationships required for Grade 6 quantitative, HOTS and Olympiad-type questions** based on Chapter 12.

12.3 Fill-Up the Blank LOTS type questions with Answers: (30 Questions)

LOTS Fill in the Blanks with Answers:

1. Stars shine with their own __________.
   Answer: light
2. The regions of the sky containing groups of stars forming patterns are called __________.
   Answer: constellations
3. The International Astronomical Union has officially divided the entire sky into __________ constellations.
   Answer: 88
4. __________ is the brightest star in the night sky.
   Answer: Sirius
5. The Pole Star is also known as __________.
   Answer: Polaris
6. The Pole Star appears nearly stationary in the __________ direction.
   Answer: North
7. The Big Dipper lies in the constellation __________.
   Answer: Ursa Major
8. In India, the Big Dipper is known as __________.
   Answer: Saptaṛiṣhi
9. Excessive artificial light at night is called __________ pollution.
   Answer: light
10. The star closest to the Earth is the __________.
    Answer: Sun
11. The distance between the Sun and Earth is about __________ **million kilometres**.
    Answer: 150
12. The approximate distance between the Sun and Earth is called one __________ **unit**.
    Answer: astronomical (AU)
13. The Earth takes about __________ **hours** to complete one rotation about its axis.
    Answer: 24
14. The movement of an object around the Sun is called __________.
    Answer: revolution
15. There are __________ planets in our Solar System.
    Answer: eight
16. The planet commonly called the Morning Star or Evening Star is __________.
    Answer: Venus
17. Mars is commonly known as the __________ **Planet**.
    Answer: Red
18. The Earth is also called the __________ **Planet** because a large portion of its surface is covered with water.
    Answer: Blue
19. Objects that move around planets are commonly called __________.
    Answer: satellites

20. The Earth's natural satellite is the __________.
    Answer: Moon
21. The Moon takes about __________ **days** to complete one revolution around the Earth.
    Answer: 27
22. The Moon is about __________ **km** away from the Earth.
    Answer: 3,84,000
23. Circular bowl-like structures on the Moon's surface are called __________.
    Answer: craters
24. The region between Mars and Jupiter containing many asteroids is called the __________ **belt**.
    Answer: asteroid
25. Objects made of dust, gases, rocks and ice that may develop long tails near the Sun are called __________.
    Answer: comets
26. A famous comet that appears approximately every 76 years is __________ **Comet**.
    Answer: Halley's
27. The Sun, eight planets, their moons, asteroids and comets together form the __________.
    Answer: Solar System
28. Our home galaxy is called the __________ **Galaxy**.
    Answer: Milky Way
29. The Milky Way Galaxy is also known as __________ **Gangā**.
    Answer: Ākāśha
30. Our Solar System is a part of the __________ **Galaxy**.
    Answer: Milky Way

12.4 Fill-Up the Blank HOTS type questions with Answers: (30 Questions)

HOTS Type – Fill in the Blanks with Answers:

1. If a sailor in the Northern Hemisphere wants to find the North direction at night, the most useful star to locate is the __________.
   Answer: Pole Star (Polaris)
2. If the two pointer stars of the Big Dipper are 3 cm apart on a sky diagram, the Pole Star would be located approximately __________ **cm** away along the imaginary line.
   Answer: 15 cm
3. A student observes that very few stars are visible from a brightly illuminated city but many are visible from a dark village. The main reason is __________.
   Answer: light pollution
4. If you want to observe faint stars clearly, you should select an open place with minimum __________.
   Answer: light pollution
5. A celestial object shines with its own light and appears to twinkle. It is most likely a __________.
   Answer: star
6. An object seen brightly near the eastern horizon before sunrise could be __________, which is often called the Morning Star.
   Answer: Venus
7. If an object revolves around the Sun and is large and nearly spherical, it can be identified as a __________.
   Answer: planet

8. If Earth completes three revolutions around the Sun, approximately __________ **years** will have passed.
   Answer: 3 years
9. If Earth completes five rotations about its axis, approximately __________ **hours** will have passed.
   Answer: 120 hours
10. A planet appearing reddish when viewed from Earth is most likely __________.
    Answer: Mars
11. A planet that appears blue from space because much of its surface is covered with water is __________.
    Answer: Earth
12. Although Mercury is closer to the Sun, __________ is hotter because its atmosphere can trap heat.
    Answer: Venus
13. If the Earth's diameter is taken as four equal units, the Moon's diameter would be approximately __________ **unit**.
    Answer: 1
14. If the Moon completes two revolutions around Earth, approximately __________ **days** would have passed.
    Answer: 54 days
15. A small object orbiting a planet is generally called a __________.
    Answer: satellite
16. If a rocky, irregularly shaped object is found revolving around the Sun between Mars and Jupiter, it is most likely an __________.
    Answer: asteroid
17. A celestial object made of ice, dust, gases and rocks develops a long tail as it approaches the Sun. It is a __________.
    Answer: comet
18. A comet becomes difficult to see with the naked eye when it moves __________ **from the Sun**.
    Answer: away
19. If Halley's Comet was last seen in 1986 and appears approximately once every 76 years, its next expected appearance would be around __________.
    Answer: 2062
20. If the Sun suddenly stopped providing energy, processes essential for sustaining __________ **on Earth** would be severely affected.
    Answer: life
21. The Sun looks much larger than other stars mainly because it is much __________ **to Earth**.
    Answer: closer
22. Stars are present in the sky during daytime but are not normally visible because of the extreme __________ **of the Sun**.
    Answer: brightness
23. If an astronomer wants to observe objects too dim to be seen with the naked eye, an appropriate instrument is a __________.
    Answer: telescope
24. If a student observes an extended faint band of light across a dark, moonless sky, the student is most likely observing the __________ **Galaxy**.
    Answer: Milky Way

25. Since our Solar System is located within the Milky Way, the Milky Way is our home __________.
    Answer: galaxy
26. Planets discovered revolving around stars other than the Sun are known as __________.
    Answer: exoplanets
27. Scientists searching for life outside our Solar System mainly investigate __________ revolving around other stars.
    Answer: exoplanets
28. If an object does not produce its own light but is visible because it reflects sunlight, it could be a __________.
    Answer: planet
29. If the Sun–Earth distance is approximately one astronomical unit, a distance 10 times greater would be __________ **AU**.
    Answer: 10 AU
30. Since the Sun, planets, moons, asteroids and comets form one system, this collection of celestial objects is called the __________.
    Answer: Solar System

These questions are **HOTS-oriented** because students must **apply, calculate, infer, identify, compare or reason from the concepts** rather than merely recall a direct statement.

12.5 One-mark questions with Answers of LOTS Type: (35 Questions)

One-Mark Descriptive Questions with Answers – LOTS Type:

1. **What is a star?**
   Answer: A star is a celestial object that shines with its own light.
2. **What is a constellation?**
   Answer: A constellation is a defined region of the sky that often includes a recognizable pattern of stars.
3. **How many constellations are officially recognized?**
   Answer: There are **88 officially recognized constellations**.
4. **Name the brightest star in the night sky.**
   Answer: Sirius is the brightest star in the night sky.
5. **What is the Pole Star also called?**
   Answer: The Pole Star is also called **Polaris**.
6. **Why is the Pole Star useful for finding direction?**
   Answer: The Pole Star appears nearly stationary in the North direction and therefore helps us locate North.
7. **What is the Big Dipper called in India?**
   Answer: The Big Dipper is known as **Saptaṛiṣhi** in India.
8. **What is light pollution?**
   Answer: The presence of excessive artificial light at night is called **light pollution**.
9. **Which is the closest star to us?**
   Answer: The **Sun** is the closest star to us.
10. **What is the Sun?**
    Answer: The Sun is an extremely hot spherical ball of gases and is the star closest to us.
11. **What is an astronomical unit (AU)?**
    Answer: An astronomical unit is approximately the distance between the **Sun and the Earth**.

12. **What is the approximate distance between the Sun and Earth?**
    Answer: The distance between the Sun and Earth is about **150 million kilometres**.
13. **What is revolution?**
    Answer: The movement of an object around the Sun is called **revolution**.
14. **How long does the Earth take to complete one rotation?**
    Answer: The Earth takes about **24 hours** to complete one rotation.
15. **What is a planet?**
    Answer: A planet is a large, nearly spherical object that revolves around the Sun.
16. **How long does the Earth take to complete one revolution around the Sun?**
    Answer: The Earth takes nearly **one year** to complete one revolution around the Sun.
17. **Name the eight planets of the Solar System in order from the Sun.**
    Answer: The eight planets are **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.
18. **Which planet is commonly called the Morning Star or Evening Star?**
    Answer: Venus is commonly called the Morning Star or Evening Star.
19. **Which planet is called the Red Planet?**
    Answer: Mars is called the Red Planet because its soil appears reddish.
20. **Why is Earth called the Blue Planet?**
    Answer: Earth is called the Blue Planet because a large portion of its surface is covered with water.
21. **What is a natural satellite?**
    Answer: A natural satellite is a natural object that moves around a planet.
22. **What is Earth's natural satellite?**
    Answer: The **Moon** is Earth's natural satellite.
23. **How long does the Moon take to revolve around Earth?**
    Answer: The Moon takes about **27 days** to complete one revolution around Earth.
24. **What are craters?**
    Answer: Craters are circular, bowl-like structures found on the Moon's surface.
25. **What is the approximate distance between Earth and the Moon?**
    Answer: The Moon is about **3,84,000 km** away from Earth.
26. **What are asteroids?**
    Answer: Asteroids are small, rocky and irregularly shaped objects in the Solar System.
27. **Where is the asteroid belt located?**
    Answer: The asteroid belt is located between the paths of **Mars and Jupiter**.
28. **What are comets made of?**
    Answer: Comets are made up of **dust, gases, rocks and ice**.
29. **Name a famous comet mentioned in the chapter.**
    Answer: Halley's Comet is a famous comet that appears approximately every 76 years.
30. **What is the Solar System?**
    Answer: The Sun, eight planets, their moons, asteroids, comets and other smaller objects together form the **Solar System**.
31. **What is the Milky Way Galaxy?**
    Answer: The Milky Way is our home galaxy containing millions to billions of stars.
32. **What is the Indian name for the Milky Way Galaxy?**
    Answer: The Milky Way Galaxy is also called **Ākāśha Gangā**.
33. **Which galaxy contains our Solar System?**
    Answer: Our Solar System is part of the **Milky Way Galaxy**.

34. **What are exoplanets?**
    Answer: Exoplanets are planets discovered revolving around stars other than the Sun.
35. **What instrument helps us observe dim celestial objects?**
    Answer: A **telescope** helps us observe dim celestial objects that cannot be seen clearly with the naked eye.

12.6 One-mark questions with Answers of HOTS Type: (30 Questions)

One-Mark Descriptive Questions with Answers – HOTS Type:

1. **Why can more stars be seen from a village than from a brightly lit city?**
   Answer: More stars can be seen from a village because it generally has less **light pollution** than a brightly lit city.
2. **Why is the Pole Star useful to a traveller at night?**
   Answer: The Pole Star helps a traveller locate **North** because it appears nearly stationary in the northern sky.
3. **A student cannot see the Pole Star from the Southern Hemisphere; why?**
   Answer: The Pole Star cannot be seen from the Southern Hemisphere because not all stars are visible from every place on Earth.
4. **Why should you wait for about half an hour after reaching a dark place for sky watching?**
   Answer: Waiting allows the eyes to adjust to darkness so that celestial objects can be seen more clearly.
5. **If two pointer stars of the Big Dipper are 2 cm apart on a diagram, approximately how far along the imaginary line should you look for the Pole Star?**
   Answer: You should look approximately **10 cm** along the imaginary line because the Pole Star lies about five times the distance between the pointer stars.
6. **Why does the Sun appear much larger than other stars?**
   Answer: The Sun appears much larger because it is **much closer to Earth** than the other stars.
7. **Why are other stars not normally visible during the daytime?**
   Answer: Other stars are not normally visible during the day because the extreme brightness of the Sun makes them difficult to see.
8. **If Earth completes two rotations, how much time has approximately passed?**
   Answer: Approximately **48 hours** have passed because Earth takes about 24 hours for one rotation.
9. **If Earth completes three revolutions around the Sun, approximately how many years have passed?**
   Answer: Approximately **three years** have passed because Earth takes nearly one year for each revolution.
10. **How can you infer that Venus is a planet and not a star even though it appears very bright?**
    Answer: Venus is a planet because it revolves around the Sun and does not shine with its own light like a star.
11. **Why is Venus hotter than Mercury even though Mercury is closer to the Sun?**
    Answer: Venus is hotter because its atmosphere traps heat and significantly increases its temperature.
12. **A bright object is seen near the eastern horizon just before sunrise; which planet could it be?**
    Answer: The bright object could be **Venus**, which can be observed in the east before sunrise.

13. **How can you distinguish a star from a planet by observing it in the night sky?**
    Answer: A star generally appears to **twinkle much more** than a planet.
14. **Why would you use a telescope to observe a very dim celestial object?**
    Answer: A telescope makes celestial objects appear brighter and larger and helps us see objects invisible to the naked eye.
15. **If the Moon completes two revolutions around Earth, approximately how many days have passed?**
    Answer: Approximately **54 days** have passed because the Moon takes about 27 days for one revolution.
16. **If Earth's diameter is four times the Moon's diameter, what fraction of Earth's diameter is the Moon's diameter?**
    Answer: The Moon's diameter is approximately **one-fourth (¼)** of Earth's diameter.
17. **Why do craters remain on the Moon's surface for a very long time?**
    Answer: Craters remain for a long time because the Moon has hardly any atmosphere and lacks water and life that could alter its surface.
18. **An irregular rocky object is observed revolving around the Sun between Mars and Jupiter; what is it likely to be?**
    Answer: The object is likely to be an **asteroid** because many asteroids revolve around the Sun between Mars and Jupiter.
19. **Why does a comet develop a tail when it approaches the Sun?**
    Answer: A comet develops a tail because its frozen material begins to evaporate as it approaches the Sun.
20. **Why does a comet become difficult to see as it moves away from the Sun?**
    Answer: A comet becomes difficult to see because it appears dimmer as it moves away from the Sun.
21. **Halley's Comet was last seen in 1986 and appears every 76 years; around which year should it appear again?**
    Answer: Halley's Comet should appear again around **2062** (1986 + 76).
22. **Why can the Milky Way be seen more clearly from a dark location than from a city?**
    Answer: The Milky Way can be seen more clearly from a dark location because there is much less artificial light interfering with its faint light.
23. **If the Solar System is part of the Milky Way, what does this tell us about the relative size of the two systems?**
    Answer: It tells us that the **Milky Way Galaxy is vastly larger than the Solar System** and contains many stars.
24. **Why do planets and moons shine even though they do not produce their own light?**
    Answer: Planets and moons appear to shine because they **reflect sunlight from their surfaces**.
25. **If scientists want to search for life outside our Solar System, which celestial objects are particularly important to study?**
    Answer: Scientists particularly study **exoplanets**, which are planets revolving around other stars.
26. **Why would a moonless night be better for observing faint stars?**
    Answer: A moonless night is better because the absence of bright moonlight makes faint celestial objects easier to see.
27. **If a planet is farther from the Sun, what general change in its temperature would you expect?**

Answer: In general, a planet farther from the Sun would be expected to be **colder**, although its atmosphere can affect its temperature.

28. **Why is Earth called the Blue Planet when viewed from space?**
Answer: Earth appears blue from space because a large portion of its surface is covered with **water**.
29. **If you identify Orion in the night sky, how can it help you locate Sirius?**
Answer: An imaginary line through Orion's three middle stars towards the east leads towards **Sirius**.
30. **Why are dark-sky reserves useful for astronomy?**
Answer: Dark-sky reserves control light pollution and therefore provide darker skies for observing and studying celestial objects.

12.7 Two-mark questions with Answers of LOTS Type: (25 Questions)

Two-Mark Descriptive Questions with Answers – LOTS Type:

1. What are stars and constellations?

Answer:
1. Stars are celestial objects that shine with their **own light**.
2. Constellations are defined regions of the sky that often include groups of stars appearing to form recognizable patterns.

2. How were star patterns useful to people in earlier times?

Answer:
1. People recognized star patterns to identify different stars in the night sky.
2. Sailors and travellers used these patterns to **find directions** on land and at sea.

3. Write two facts about the Pole Star.

Answer:
1. The Pole Star, or **Polaris**, is part of the Little Dipper.
2. It appears nearly stationary in the North direction and helps locate **North** in the Northern Hemisphere.

4. What are the Big Dipper and Little Dipper?

Answer:
1. The Big Dipper is a star pattern that lies in the constellation **Ursa Major**.
2. The Little Dipper lies in **Ursa Minor** and includes the Pole Star.

5. What is light pollution? How does it affect night-sky watching?

Answer:
1. Excessive artificial light during nighttime is called **light pollution**.
2. It reduces our ability to see and study stars and other objects in the night sky.

6. Mention two preparations necessary for night-sky watching.

Answer:
1. Select a **dark, open area** away from lights, tall buildings and trees.
2. Use a sky map or app to choose a suitable date and time for observing celestial objects.

7. How can the Pole Star be located using the Big Dipper?

Answer:
1. Locate the two stars at the end of the Big Dipper's cup and imagine a straight line passing through them towards the north.
2. At about **five times the distance** between these two stars, the line leads to the Pole Star.

8. Write two characteristics of the Sun.

Answer:

1. The Sun is the **closest star to us** and is an extremely hot spherical ball of gases.
2. It gives out a huge amount of energy and produces **heat and light**.

9. State two ways in which the Sun is important for life on Earth.

Answer:

1. The Sun provides heat that keeps Earth at a temperature suitable for **life**.
2. Sunlight helps plants grow, and the Sun also influences weather, climate and the water cycle.

10. What are rotation and revolution of the Earth?

Answer:

1. Earth takes about **24 hours** to complete one rotation about its axis.
2. Earth takes nearly **one year** to complete one revolution around the Sun.

11. What is a planet? Name the eight planets of the Solar System.

Answer:

1. A planet is a large, nearly spherical object that **revolves around the Sun**.
2. The eight planets are **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.

12. State two characteristics of the inner planets.

Answer:

1. The inner planets are **Mercury, Venus, Earth and Mars**, and they are relatively smaller in size.
2. They have **solid surfaces with rocks** on them.

13. State two characteristics of the outer planets.

Answer:

1. **Jupiter, Saturn, Uranus and Neptune** are much larger than Earth.
2. They are mostly made of **gas and ice** and have large ring-like structures around them.

14. Why are Mars and Earth called the Red Planet and Blue Planet respectively?

Answer:

1. Mars is called the **Red Planet** because its soil is reddish in colour.
2. Earth is called the **Blue Planet** because a large portion of its surface is covered with water.

15. Write two facts about Venus.

Answer:

1. Venus is commonly called the **Morning Star or Evening Star**, although it is actually a planet.
2. After the Sun and Moon, Venus is the **brightest object in the sky**.

16. What are natural satellites? Give examples.

Answer:

1. Objects that move around planets are called **satellites**, and moons are natural satellites of planets.
2. Earth has one Moon, while **Mars has two moons**.

17. Write two important facts about the Moon.

Answer:

1. The Moon is Earth's natural satellite and takes about **27 days** to complete one revolution around Earth.
2. It is about **one-fourth the size of Earth in diameter** and has hardly any atmosphere.

18. What are craters on the Moon? How are they formed?

Answer:

1. Craters are **circular, bowl-like structures** found on the Moon's surface.
2. Most of them were formed by the impact of **asteroids or rocks from space** hitting the Moon.

19. What are asteroids? Where are many of them found?
Answer:
1. Asteroids are small, **rocky and irregularly shaped** objects in the Solar System.
2. Many asteroids revolve around the Sun in the **asteroid belt between Mars and Jupiter**.

20. What are comets? What are they made of?
Answer:
1. Comets are celestial objects from the outer regions of the Solar System that may develop **long tails**.
2. They are made up of **dust, gases, rocks and ice**.

21. What happens to a comet when it approaches the Sun?
Answer:
1. The frozen material in a comet begins to **evaporate** when it approaches the Sun.
2. This evaporating material forms the characteristic **tail of the comet**.

22. What objects together form our Solar System?
Answer:
1. The **Sun and eight planets with their moons** are major members of the Solar System.
2. Many smaller objects, including **asteroids and comets**, are also part of it.

23. Write two facts about the Milky Way Galaxy.
Answer:
1. The Milky Way Galaxy, also called **Ākāśha Gangā**, is our home galaxy.
2. It contains millions to billions of stars, and our **Solar System is part of it**.

24. What are exoplanets? Why are scientists interested in them?
Answer:
1. Exoplanets are planets discovered **revolving around other stars** in our galaxy.
2. Scientists study them as part of the continuing **search for life elsewhere in the Universe**.

25. How does a telescope help in observing the night sky?
Answer:
1. A telescope makes celestial objects appear **brighter and larger**.
2. It also helps us observe many **dim objects** that cannot be seen directly with the naked eye.

12.8. Two-mark questions with Answers of HOTS Type: (15 Questions)

Two-Mark Descriptive Questions with Answers – HOTS Type:

1. Why is it easier to observe stars from a village than from a brightly lit city?
Answer:
1. Villages generally have less **artificial light and light pollution** than cities.
2. Therefore, faint stars and other celestial objects can be seen more clearly from villages.

2. How can the Pole Star help a traveller who has lost direction at night?
Answer:
1. The Pole Star appears nearly stationary in the **North direction**.
2. By locating it, the traveller can identify North and determine the other directions.

3. A student reaches a dark place for sky watching but cannot immediately see faint stars. What should the student do and why?
Answer:
1. The student should wait for about **half an hour** without looking at bright lights.

2. This allows the eyes to adjust to darkness and makes faint celestial objects easier to see.

4. How can the Big Dipper be used to locate the Pole Star?
Answer:
1. Draw an imaginary line through the two stars at the end of the Big Dipper's cup towards the North.
2. Extend it about **five times the distance between the two stars** to reach the Pole Star.

5. If the distance between the two pointer stars of the Big Dipper is 4 cm on a sky diagram, approximately how far away should the Pole Star be located? Explain.
Answer:
1. The Pole Star should be approximately **20 cm away** because its distance is about five times the separation of the pointer stars.
2. Thus, $4 \times 5 = 20\text{cm}$ along the imaginary line gives its approximate location.

6. Why does the Sun appear bigger and brighter than the other stars in the sky?
Answer:
1. The Sun is the **closest star to Earth**, while the other stars are extremely far away.
2. Therefore, the Sun appears much bigger and brighter to us than other stars.

7. If the stars are present in the sky during daytime, why can we normally not see them?
Answer:
1. The Sun is extremely bright and makes the daytime sky very bright.
2. Hence, the much fainter light from other stars cannot normally be seen during the day.

8. Earth takes about 24 hours for one rotation; how many rotations will it complete in 72 hours?
Answer:
1. The number of rotations is $72 \div 24 = 3$.
2. Therefore, Earth completes approximately **three rotations in 72 hours**.

9. If Earth completes five revolutions around the Sun, approximately how much time has passed?
Answer:
1. Earth takes nearly **one year** to complete one revolution around the Sun.
2. Therefore, five revolutions correspond to approximately **five years**.

10. How could you distinguish a star from a planet by observing them in the night sky?
Answer:
1. Stars generally appear to **twinkle much more** than planets.
2. Therefore, an object showing more noticeable twinkling is more likely to be a star.

11. Venus is farther from the Sun than Mercury, yet Venus is hotter; what can you infer from this?
Answer:
1. A planet's distance from the Sun is not the only factor determining its surface temperature.
2. Venus is hotter because its **atmosphere traps heat**, greatly increasing its temperature.

12. The Moon takes about 27 days to revolve around Earth; approximately how many days will it take to complete three revolutions?
Answer:
1. The required time is $27 \times 3 = 81\text{days}$.
2. Therefore, the Moon takes approximately **81 days** to complete three revolutions.

13. If Earth's diameter is about four times the Moon's diameter, what would be the Moon's diameter when Earth's diameter is represented as 12 cm in a model?
Answer:
1. The Moon's diameter would be $12 \div 4 = 3\text{cm}$.

2. Therefore, the Moon should have a diameter of approximately **3 cm** in the model.

14. Why are impact craters clearly visible on the Moon for a very long time?

Answer:

1. The Moon has **hardly any atmosphere** and lacks conditions that would rapidly alter its surface.
2. Therefore, craters formed by impacts can remain visible for very long periods.

15. An irregular rocky object is found revolving around the Sun between Mars and Jupiter; how would you classify it and why?

Answer:

1. The object would most likely be classified as an **asteroid**.
2. This is because many rocky, irregularly shaped asteroids are found in the asteroid belt between Mars and Jupiter.

16. Why does a comet develop a tail when it approaches the Sun?

Answer:

1. As a comet approaches the Sun, some of its **frozen material begins to evaporate**.
2. This released material forms the characteristic **tail of the comet**.

17. Why do planets appear bright even though they do not produce their own light?

Answer:

1. Planets receive light from the **Sun**.
2. They appear bright because their surfaces **reflect sunlight** towards us.

18. Why would a telescope be more useful than the naked eye for observing distant celestial objects?

Answer:

1. A telescope makes celestial objects appear **brighter and larger**.
2. Hence, it enables us to observe dim objects that cannot be seen clearly with the naked eye.

19. Why is the Milky Way easier to observe on a dark, moonless night?

Answer:

1. The Milky Way appears as a **faint band of light**, so bright surrounding light can make it difficult to see.
2. A dark, moonless sky provides better conditions for observing its faint appearance.

20. If the Solar System is part of the Milky Way Galaxy, what does this indicate about their relative sizes?

Answer:

1. The Solar System occupies only a **small part of the Milky Way Galaxy**.
2. The Milky Way is enormously larger and contains millions to billions of stars.

21. Why are scientists interested in studying exoplanets?

Answer:

1. Exoplanets are planets that revolve around **stars other than the Sun**.
2. Studying them can help scientists in their continuing **search for life elsewhere in the Universe**.

22. If a celestial object produces its own light, while another only reflects sunlight, how would you classify them?

Answer:

1. The object producing its own light can be classified as a **star**.
2. The object reflecting sunlight could be a **planet, moon, asteroid, or another Solar System object**.

23. Why is the Sun essential for maintaining life on Earth?

Answer:

1. The Sun provides the **heat and light** needed for life and helps plants grow.

2. It also influences Earth's **climate, seasons, weather, water cycle and winds**.

24. If the Earth–Sun distance is one astronomical unit, what would a distance three times the Earth–Sun distance be?

Answer:

1. One astronomical unit represents approximately the **Earth–Sun distance**.
2. Therefore, three times this distance would be **3 AU**.

25. Why is observing the night sky from an open area better than observing it from between tall buildings?

Answer:

1. Tall buildings can **block parts of the sky** and restrict the observer's view.
2. An open area provides a wider, clearer view for locating stars, constellations and other celestial objects.

12.9. Three-mark questions with Answers of LOTS Type: (10 Questions)

Three-Mark Descriptive Questions with Answers – LOTS Type:

1. What are constellations? Explain their importance.

Answer:

1. A **constellation** is a defined region of the sky that often contains a recognizable pattern of stars.
2. Different cultures imagined different shapes and stories by joining stars into patterns.
3. In earlier times, these star patterns also helped people, especially sailors and travellers, to identify stars and find directions.

2. Write three facts about the Pole Star.

Answer:

1. The Pole Star is also known as **Polaris** or **Dhruva tārā**.
2. It is part of the **Little Dipper** and appears nearly stationary in the northern sky.
3. It is useful for finding the **North direction** in the Northern Hemisphere.

3. Explain how the Pole Star can be located using the Big Dipper.

Answer:

1. First, locate the **Big Dipper** and identify the two stars at the end of its cup.
2. Imagine a straight line passing through these two stars towards the North.
3. Extend this line about **five times the distance between the two stars** to locate the Pole Star.

4. Mention three precautions or preparations for observing the night sky.

Answer:

1. Choose a **dark, open area** away from artificial lights, tall buildings and trees.
2. Use a sky map or suitable application to identify the date, time and objects you wish to observe.
3. Allow your eyes about **half an hour to adjust to darkness** and avoid looking at bright lights.

5. Write three important characteristics of the Sun.

Answer:

1. The Sun is the **star closest to us** and is an extremely hot spherical ball of gases.
2. It provides enormous amounts of **heat and light** to Earth.
3. The Sun is about **150 million kilometres** away from Earth.

6. Explain three ways in which the Sun is important for Earth.

Answer:

1. The Sun provides the **heat and light** necessary for sustaining life on Earth.
2. Sunlight enables **plants to grow** and supports living organisms directly or indirectly.

3. The Sun influences Earth's **climate, seasons, weather, water cycle and winds**.

7. Write three facts about the movement of Earth.

Answer:

1. Earth **rotates about its axis** and takes about 24 hours to complete one rotation.
2. Earth also **revolves around the Sun**.
3. It takes nearly **one year** to complete one revolution around the Sun.

8. Name the eight planets and state how they move.

Answer:

1. The eight planets are **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.
2. All these planets **revolve around the Sun** along their paths.
3. The planets also **rotate about their own axes**.

9. Write three characteristics of the inner planets.

Answer:

1. The four inner planets are **Mercury, Venus, Earth and Mars**.
2. These planets are relatively **smaller in size** compared with the outer planets.
3. They have **solid surfaces with rocks** on them.

10. Write three characteristics of the outer planets.

Answer:

1. The four outer planets are **Jupiter, Saturn, Uranus and Neptune**.
2. They are much **larger than Earth** and are mostly made of gas and ice.
3. These planets have **large ring-like structures** around them.

11. Write three important facts about the Moon.

Answer:

1. The Moon is Earth's **natural satellite** and our nearest celestial neighbour.
2. It takes about **27 days** to complete one revolution around Earth.
3. Its diameter is approximately **one-fourth of Earth's diameter**, and it has hardly any atmosphere.

12. Describe the craters found on the Moon.

Answer:

1. The Moon's surface contains many **circular, bowl-like structures called craters**.
2. Most of these craters were formed when **asteroids or rocks from space struck the Moon**.
3. These craters remain visible for very long periods because the Moon has hardly any atmosphere and lacks conditions that would rapidly alter its surface.

13. What are asteroids? Give three facts about them.

Answer:

1. Asteroids are **small, rocky and irregularly shaped objects** that are part of the Solar System.
2. Many asteroids revolve around the Sun in the region between **Mars and Jupiter**.
3. This region containing a large number of asteroids is known as the **asteroid belt**.

14. What are comets? Describe them in three points.

Answer:

1. Comets are celestial objects made up of **dust, gases, rocks and ice**.
2. When a comet approaches the Sun, some of its frozen material begins to **evaporate**.
3. The evaporating material produces the characteristic **long tail of the comet**.

15. Describe the Solar System in three points.

Answer:

1. The Solar System consists of the **Sun, eight planets and their moons**.
2. It also includes smaller objects such as **asteroids and comets**.

3. The Sun is the largest and heaviest object in the Solar System and provides almost all the energy received by its other members.

16. Write three facts about the Milky Way Galaxy.

Answer:

1. A galaxy is a vast collection containing **millions to billions of stars**.
2. Our home galaxy is called the **Milky Way Galaxy**, also known as **Ākāśha Gangā**.
3. Our **Solar System is a part of the Milky Way Galaxy**.

17. What is a telescope? State its usefulness.

Answer:

1. A **telescope** is an instrument used for observing celestial objects in the sky.
2. It can make celestial objects appear **brighter and larger**.
3. It helps us observe many **dim objects** that cannot be seen with the naked eye.

18. Write three facts about exoplanets and the search for life beyond Earth.

Answer:

1. **Exoplanets** are planets that revolve around stars other than the Sun.
2. Scientists study such planets while searching for possible **life beyond our Solar System**.
3. So far, the chapter states that there is **no evidence of life beyond Earth**.

12.10. Three-mark questions with Answers of HOTS Type: (18 Questions)

Three-Mark Descriptive Questions with Answers – HOTS Type:

1. A student living in a brightly lit city cannot see many stars. What could be the reason, and what should the student do for better observation?

Answer:

1. Excessive artificial light causes **light pollution**, which makes faint stars difficult to see.
2. The student should move to a **dark, open area** away from bright lights and tall buildings.
3. The student should allow the eyes about **half an hour to adjust to darkness** before observing the sky.

2. A traveller is lost at night in the Northern Hemisphere. How can the Big Dipper help the traveller find North?

Answer:

1. The traveller should first identify the **Big Dipper** and its two stars at the end of the cup.
2. An imaginary line through these two stars should be extended about **five times their separation** to locate the Pole Star.
3. Since the Pole Star appears nearly stationary in the northern sky, it can help the traveller identify **North**.

3. The two pointer stars of the Big Dipper are 5 cm apart on a sky diagram. At approximately what distance should you look for the Pole Star? Explain.

Answer:

1. The Pole Star is located approximately **five times the distance** between the two pointer stars.
2. Therefore, the required distance is $5 \times 5 = 25$cm.
3. The Pole Star should be located approximately **25 cm away** along the imaginary line towards the North.

4. The Sun and Sirius are both stars, yet the Sun appears much bigger and brighter to us. Why?

Answer:

1. The Sun is the **closest star to Earth**, whereas Sirius and other stars are much farther away.
2. Because of its comparatively small distance from us, the Sun appears much **larger and brighter**.
3. Thus, the apparent size and brightness of a star are strongly influenced by its **distance from Earth**.

5. If Earth completes six rotations, how much time has passed? Explain your calculation.
Answer:
1. Earth takes approximately **24 hours** to complete one rotation about its axis.
2. For six rotations, the time taken is $6 \times 24 = 144$hours.
3. Therefore, **144 hours or 6 days** have passed.

6. If Earth completes four revolutions around the Sun, what period of time does this represent?
Answer:
1. Earth takes nearly **one year** to complete one revolution around the Sun.
2. Four revolutions would therefore take approximately $4 \times 1 = 4$years.
3. Hence, four complete revolutions of Earth represent approximately **four years**.

7. Mercury is closer to the Sun than Venus, but Venus is hotter. What does this tell us about planetary temperature?
Answer:
1. Distance from the Sun is **not the only factor** that determines the temperature of a planet.
2. Venus has an atmosphere that **traps heat**, making it extremely hot.
3. Therefore, a planet farther from the Sun can sometimes be hotter than a nearer planet because of its **atmospheric conditions**.

8. A student sees two bright objects in the night sky, but one twinkles much more than the other. What can the student infer?
Answer:
1. Stars generally **twinkle much more** than planets when observed from Earth.
2. Therefore, the object that twinkles more is more likely to be a **star**.
3. The object showing less twinkling could be a **planet**.

9. The Moon takes about 27 days to complete one revolution around Earth. How many days would it take to complete four revolutions?
Answer:
1. One revolution of the Moon takes approximately **27 days**.
2. Four revolutions would take $27 \times 4 = 108$days.
3. Therefore, the Moon would take approximately **108 days** to complete four revolutions.

10. If Earth's diameter is represented by 20 cm in a model, what should be the approximate diameter of the Moon? Explain.
Answer:
1. The Moon's diameter is approximately **one-fourth of Earth's diameter**.
2. Therefore, its model diameter would be $20 \div 4 = 5$cm.
3. Hence, the Moon should have an approximate diameter of **5 cm** in the model.

11. Why are craters on the Moon preserved for very long periods compared with many surface features on Earth?
Answer:
1. The Moon has **hardly any atmosphere** and does not have conditions like those on Earth that continuously alter the surface.
2. Therefore, the effects of impacts are not easily erased or changed.
3. As a result, many **impact craters remain visible for very long periods** on the Moon.

12. An astronomer discovers a small, irregular rocky object revolving around the Sun between Mars and Jupiter. How should it be classified?

Answer:

1. The object is small, rocky and irregular in shape, which are characteristics of an **asteroid**.
2. Many asteroids revolve around the Sun in the region between **Mars and Jupiter**.
3. Therefore, the newly observed object would most likely be classified as an **asteroid**.

13. A celestial object made of ice, dust, gases and rocks develops a tail near the Sun. Identify the object and explain why its tail forms.

Answer:

1. The celestial object is a **comet** because comets contain dust, gases, rocks and ice.
2. As it approaches the Sun, some of its **frozen material evaporates**.
3. This material produces the characteristic **tail** seen behind the comet.

14. Why would a telescope be preferred over the naked eye for studying a very faint celestial object?

Answer:

1. Some celestial objects are too **dim** to be observed clearly with the naked eye.
2. A telescope can make such objects appear **brighter and larger**.
3. Therefore, a telescope allows astronomers to observe celestial objects that may otherwise remain invisible.

15. The planets are visible from Earth even though they do not produce their own light. Explain this observation.

Answer:

1. Unlike stars, planets do not produce their own visible light.
2. They receive light from the **Sun and reflect sunlight** from their surfaces.
3. This reflected sunlight reaches our eyes and makes the planets appear bright in the sky.

16. Why is the Milky Way more difficult to observe from a city than from a dark countryside?

Answer:

1. The Milky Way appears as a relatively **faint band of light** in the night sky.
2. Artificial lights in cities create **light pollution**, which reduces the visibility of faint celestial objects.
3. Therefore, the Milky Way can be observed more clearly from a **dark location** with little artificial light.

17. If our Solar System is only a part of the Milky Way Galaxy, what can you infer about the scale of the Milky Way?

Answer:

1. The Solar System consists of the Sun, planets, moons and several smaller objects.
2. The Milky Way contains **millions to billions of stars**, including our Sun.
3. Therefore, the Milky Way Galaxy is **vastly larger than our Solar System**.

18. Scientists discover a planet revolving around a star other than the Sun. What would it be called, and why is such a discovery important?

Answer:

1. A planet revolving around a star other than the Sun is called an **exoplanet**.
2. Scientists study exoplanets to understand planetary systems beyond our Solar System.
3. Such studies are also important in the continuing **search for possible life elsewhere in the Universe**.

12.11 Five-mark questions with Answers of LOTS Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – LOTS Type:

1. Describe the Sun and explain its importance to Earth.

Answer:

1. The **Sun is the star closest to us** and is an extremely hot spherical ball of gases.
2. It gives out enormous amounts of energy in the form of **heat and light**.
3. The Sun's heat keeps Earth warm enough to support **life**.
4. Sunlight is essential for the growth of **plants**, which provide food and oxygen for living organisms.
5. The Sun also influences Earth's **climate, seasons, weather, water cycle and winds**.

2. Describe the planets of our Solar System.

Answer:

1. There are **eight planets** in our Solar System: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
2. All the planets **rotate about their axes** and revolve around the Sun.
3. The four inner planets—**Mercury, Venus, Earth and Mars**—are relatively smaller and have solid, rocky surfaces.
4. The four outer planets—**Jupiter, Saturn, Uranus and Neptune**—are much larger than Earth and are mostly made of gas and ice.
5. The outer planets also have **large ring-like structures** around them.

3. Describe the Moon and its important features.

Answer:

1. The **Moon is Earth's natural satellite** and our nearest celestial neighbour.
2. It takes about **27 days** to complete one revolution around Earth.
3. The Moon has hardly any atmosphere, and its diameter is approximately **one-fourth of Earth's diameter**.
4. Its surface has many circular, bowl-like structures called **craters**, most of which were formed by impacts of asteroids or rocks from space.
5. The average distance between Earth and the Moon is about **3,84,000 kilometres**.

4. Explain how to prepare for and carry out night-sky observation.

Answer:

1. Choose a **dark and open area** away from artificial lights, tall buildings and trees.
2. Select a suitable date and time and use a **sky map or application** to identify the objects you want to observe.
3. Night-sky observation should preferably be done under **adult supervision**.
4. After reaching the observation site, allow about **half an hour for the eyes to adjust to darkness**.
5. Avoid looking at bright lights during observation because they make it more difficult to see faint celestial objects.

5. Explain how the Pole Star can be located with the help of the Big Dipper.

Answer:

1. First, identify the **Big Dipper** in the northern part of the night sky.
2. Locate the **two stars at the end of the cup** of the Big Dipper.
3. Imagine a straight line passing through these two stars towards the North.
4. Extend this imaginary line to about **five times the distance between the two pointer stars**.
5. The star found near this position is the **Pole Star**, which appears nearly stationary in the northern sky.

6. Describe asteroids and comets as members of the Solar System.

Answer:

1. **Asteroids** are small, rocky and irregularly shaped objects that revolve around the Sun.

2. Many asteroids are found between **Mars and Jupiter** in a region called the asteroid belt.
3. **Comets** are celestial objects made up of dust, gases, rocks and ice.
4. When a comet approaches the Sun, some of its frozen material **evaporates and forms a tail**.
5. Asteroids and comets are among the **smaller objects of our Solar System**.

7. Describe the Solar System and its major members.
Answer:
1. The **Solar System** consists of the Sun, eight planets, their moons and many smaller objects.
2. The eight planets revolve around the Sun and are **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune**.
3. Natural satellites or **moons** revolve around planets, while smaller objects include asteroids and comets.
4. The **Sun is the largest and heaviest object** in the Solar System and provides almost all the energy received by its other members.
5. Planets and other Solar System objects that do not produce their own light appear bright because they **reflect sunlight**.

8. Explain the Milky Way Galaxy and the Universe.
Answer:
1. A **galaxy** is a vast collection containing millions to billions of stars.
2. Our home galaxy is the **Milky Way Galaxy**, which is also known as **Ākāśha Gangā**.
3. Our **Solar System is a part of the Milky Way Galaxy**.
4. There are many galaxies beyond the Milky Way in the **Universe**.
5. Thus, the Universe includes an enormous number of galaxies containing stars and other celestial objects.

9. Describe rotation and revolution with reference to Earth.
Answer:
1. Earth **rotates about its own axis** continuously.
2. It takes about **24 hours** to complete one rotation.
3. Earth also moves around the Sun, and this movement is called **revolution**.
4. Earth takes nearly **one year** to complete one revolution around the Sun.
5. Like Earth, the other planets also **rotate on their axes and revolve around the Sun**.

10. Describe stars, constellations and their usefulness in observing the night sky.
Answer:
1. **Stars** are celestial objects that shine with their own light.
2. A **constellation** is a defined region of the sky that often includes a recognizable pattern of stars.
3. The International Astronomical Union has officially divided the entire sky into **88 constellations**.
4. Some familiar star patterns and constellations discussed in the chapter include **Orion, the Big Dipper and the Little Dipper**.
5. In earlier times, star patterns were useful for identifying stars and helping **travellers and sailors find directions**.

12.12 Five-mark questions with Answers of HOTS Type: (5 Questions)

Five-Mark Descriptive Questions with Answers – HOTS Type:

1. A student living in a city wants to observe faint stars and the Milky Way. What difficulties might the student face, and how can they improve their observation?

Answer:

1. Excessive artificial lighting in cities causes **light pollution**, which makes faint celestial objects difficult to see.
2. The student should choose a **dark, open location** away from artificial lights, tall buildings and trees.
3. A suitable date and time should be selected with the help of a **sky map or application**.
4. The student should allow about **half an hour for the eyes to adjust to darkness** before observing faint objects.
5. Avoiding bright lights during observation will further improve the visibility of stars and the Milky Way.

2. A traveller has lost direction on a clear night in the Northern Hemisphere. Explain how the traveller can use the Big Dipper to determine North.

Answer:

1. The traveller should first locate the **Big Dipper** in the northern sky.
2. The two stars at the outer end of its cup should be identified as **pointer stars**.
3. An imaginary straight line should be drawn through these two stars and extended towards the North.
4. At approximately **five times the distance between the pointer stars**, the traveller can locate the Pole Star.
5. Since the Pole Star appears nearly stationary in the northern sky, its position can be used to determine the **North direction**.

3. Earth takes about 24 hours for one rotation and nearly one year for one revolution. If Earth completes 10 rotations and 3 revolutions, calculate the corresponding periods and explain the two motions.

Answer:

1. Earth takes approximately **24 hours** to complete one rotation about its axis.
2. Therefore, 10 rotations take $10 \times 24 = 240$hours, which is **10 days**.
3. Earth takes nearly **one year** to complete one revolution around the Sun.
4. Therefore, three revolutions represent approximately **three years**.
5. Thus, **rotation is Earth's motion about its axis**, while revolution is its movement around the Sun.

4. Mercury is closer to the Sun than Venus, yet Venus is hotter. What can you infer about the factors controlling the temperature of a planet?

Answer:

1. One might expect Mercury to be hotter because it is **closer to the Sun**.
2. However, the chapter states that **Venus is hotter than Mercury**.
3. Venus has an atmosphere that **traps heat**, causing its temperature to rise greatly.
4. This shows that distance from the Sun alone does not determine a planet's temperature.
5. Therefore, a planet's **atmospheric conditions can strongly influence its temperature**.

5. The Moon's diameter is about one-fourth of Earth's diameter. If Earth is represented by a ball 40 cm in diameter, design a proportional Moon model and explain your reasoning.

Answer:

1. The chapter states that the Moon's diameter is approximately **one-fourth of Earth's diameter**.
2. If Earth's model diameter is 40 cm, the Moon's diameter should be calculated as $40 \div 4$.
3. Therefore, the Moon model should have a diameter of approximately **10 cm**.
4. A 40 cm Earth model and a 10 cm Moon model would maintain the approximate **4:1 diameter relationship**.

5. This model helps students visually understand the **relative sizes of Earth and the Moon**.

6. Suppose the Moon had an atmosphere and surface-changing processes similar to Earth. How might its craters be different from those we see today?

Answer:

1. Most lunar craters were formed when **asteroids or rocks from space struck the Moon**.
2. The Moon currently has hardly any atmosphere and lacks conditions that rapidly change its surface.
3. If it had Earth-like surface-changing processes, the craters could gradually become **worn down or altered**.
4. Older craters might therefore become less distinct or even disappear over long periods.
5. Hence, the Moon's present conditions help its **impact craters remain visible for very long periods**.

7. An astronomer observes a small, rocky, irregular object revolving around the Sun between Mars and Jupiter. Identify the object and justify your answer.

Answer:

1. The object is most likely an **asteroid** because it is small, rocky and irregular in shape.
2. Asteroids are smaller objects that **revolve around the Sun**.
3. Many asteroids are concentrated in the region between **Mars and Jupiter**.
4. This region is known as the **asteroid belt**.
5. Therefore, both the object's characteristics and its location indicate that it is an **asteroid**.

8. A celestial object made of ice, dust, gases and rocks becomes brighter and develops a tail as it approaches the Sun. Explain what is happening.

Answer:

1. The object can be identified as a **comet** because comets contain dust, gases, rocks and ice.
2. As the comet approaches the Sun, it receives increasing **heat from the Sun**.
3. Some of its frozen material begins to **evaporate**.
4. The released material forms the characteristic **tail of the comet**.
5. Thus, the development of the tail is associated with the comet's **approach towards the Sun**.

9. A student says, "Anything bright in the night sky must be a star." Explain why this statement is incorrect.

Answer:

1. Stars produce their **own light**, but they are not the only bright objects visible in the night sky.
2. Planets can also appear bright because they **reflect sunlight**.
3. For example, **Venus** is extremely bright even though it is a planet.
4. Stars generally appear to **twinkle more than planets**, which can help distinguish them.
5. Therefore, brightness alone cannot be used to decide whether a celestial object is a star or a planet.

10. Explain how the Solar System, Milky Way Galaxy and Universe are related to one another.

Answer:

1. Our **Solar System** consists of the Sun, eight planets, their moons and smaller objects such as asteroids and comets.
2. The Solar System is only a **small part of the Milky Way Galaxy**.
3. The Milky Way contains **millions to billions of stars**, including our Sun.
4. The Universe contains the Milky Way along with **many other galaxies**.

5. Thus, the hierarchy can be understood as **Earth → Solar System → Milky Way Galaxy → Universe**.

12.13 Five-mark questions with Answers of Applied Type: (10 Questions)

Five-Mark Descriptive Questions with Answers – Applied Type:

1. Your school plans to organise a night-sky observation programme. How would you plan the activity so that students can observe celestial objects clearly?

Answer:

1. I would select a **dark and open place** away from artificial lights, tall buildings and trees.
2. I would choose a suitable date and time and use a **sky map or application** to identify the celestial objects that can be observed.
3. The activity would be conducted under **adult/teacher supervision** for safety.
4. Students would be asked to wait for about **half an hour for their eyes to adjust to darkness** and avoid looking at bright lights.
5. We would then observe and identify visible objects such as **stars, constellations, planets and the Pole Star**.

2. During a camping trip, your group loses direction at night. Explain how you would use your knowledge of the Big Dipper and Pole Star to find North.

Answer:

1. I would first search for the **Big Dipper** in the northern part of the sky.
2. I would identify the **two stars at the end of its cup** that act as pointer stars.
3. I would imagine a straight line passing through these two stars and extend it in the required direction.
4. At about **five times the distance between the two pointer stars**, I would locate the Pole Star.
5. Since the Pole Star appears nearly stationary in the northern sky, I would use it to identify the **North direction**.

3. You are asked to make a scale model of Earth and the Moon. If the Earth model has a diameter of 32 cm, calculate the Moon's diameter and explain how you would prepare the model.

Answer:

1. The chapter states that the Moon's diameter is approximately **one-fourth of Earth's diameter**.
2. Therefore, the diameter of the Moon model would be $32 \div 4 = 8$cm.
3. I would use a **32 cm diameter sphere for Earth** and an **8 cm diameter sphere for the Moon**.
4. The model would therefore maintain the approximate **4:1 diameter relationship** between Earth and the Moon.
5. I would label both objects clearly so that students can compare their **relative sizes** easily.

4. While observing the night sky, you see two bright objects: one twinkles strongly while the other shines more steadily. How would you identify them?

Answer:

1. I would carefully compare the amount of **twinkling** shown by the two objects.
2. The object that twinkles more strongly is likely to be a **star**.
3. The object that appears to shine more steadily could be a **planet**.
4. Planets are visible because they **reflect sunlight**, rather than producing their own light like stars.

5. Thus, observing the difference in twinkling can help me distinguish a **star from a planet**.

5. Your friend says that Mercury must be the hottest planet because it is closest to the Sun. How would you use the chapter to explain why this conclusion is incorrect?

Answer:

1. Mercury is indeed the **closest planet to the Sun**, so it receives strong solar energy.
2. However, the chapter states that **Venus is hotter than Mercury**.
3. Venus has an atmosphere that can **trap heat**, making the planet extremely hot.
4. This shows that distance from the Sun is **not the only factor** affecting a planet's temperature.
5. Therefore, we must also consider a planet's **atmospheric conditions** when comparing planetary temperatures.

6. During a science project, you observe photographs of an irregular rocky object located between Mars and Jupiter. How would you identify and explain this object?

Answer:

1. I would identify the object as an **asteroid** because it is small, rocky and irregular in shape.
2. Asteroids are smaller celestial objects that **revolve around the Sun**.
3. Many of them are found in the region between **Mars and Jupiter**.
4. This region containing numerous asteroids is known as the **asteroid belt**.
5. Therefore, both its physical appearance and its location indicate that the object is an asteroid.

7. During an astronomy exhibition, you are shown an icy celestial object that develops a long tail near the Sun. How would you explain this phenomenon to visitors?

Answer:

1. I would identify the celestial object as a **comet**, which contains dust, gases, rocks and ice.
2. As the comet moves closer to the Sun, its frozen material receives **heat from the Sun**.
3. Some of this frozen material begins to **evaporate**.
4. The released material produces the comet's characteristic **tail**.
5. Therefore, the appearance of the tail becomes prominent when the comet **approaches the Sun**.

8. Your school wants to reduce light pollution so that students can observe the night sky more clearly. Suggest five suitable actions based on the chapter's discussion.

Answer:

1. The school should switch off **unnecessary outdoor lights** during night-sky observation.
2. Students should move away from brightly illuminated buildings to a **darker observation area**.
3. The observation site should be selected where artificial light interferes as little as possible with the night sky.
4. Students should avoid looking at **bright lights** after their eyes have adjusted to darkness.
5. These measures would reduce the effect of light pollution and make **faint stars and other celestial objects easier to observe**.

9. Suppose you are given a telescope during a school astronomy programme. How would it improve your observation compared with using only your eyes?

Answer:

1. I would use the telescope to observe celestial objects that appear **very dim or distant**.
2. A telescope can make celestial objects appear **brighter** than they do to the naked eye.

3. It can also make them appear **larger**, allowing better observation.
4. It would help me see some objects that may not be visible at all with the **naked eye**.
5. Therefore, a telescope would allow me to explore more objects in the **night sky**.

10. Imagine you have to prepare a classroom chart showing Earth's place in the Universe. How would you arrange the information from the smallest level to the largest?

Answer:

1. I would begin with **Earth**, the planet on which we live.
2. Earth belongs to the **Solar System**, which contains the Sun, eight planets, moons and smaller objects.
3. Our Solar System is a small part of the **Milky Way Galaxy**.
4. The Milky Way is one among the many galaxies present in the **Universe**.
5. Therefore, I would arrange the chart as **Earth** → **Solar System** → **Milky Way Galaxy** → **Universe**.

12.14 Multiple Choice Questions with answers for Olympiad type Competitive Exams:

Olympiad-Type Multiple Choice Questions:

1. Which statement correctly distinguishes a star from a planet?

A. A planet produces its own light, but a star does not.
B. A star produces its own light, while a planet reflects sunlight.
C. Both stars and planets produce their own light.
D. Neither stars nor planets can be seen at night.

Answer: B. A star produces its own light, while a planet reflects sunlight.

2. A student wants to observe the maximum number of faint stars. Which location would be most suitable?

A. A brightly lit playground in a city
B. A shopping area at night
C. A dark, open area away from artificial lights
D. A room with all lights switched on

Answer: C. A dark, open area away from artificial lights.

3. Why should an observer wait for about half an hour after reaching a dark observation site?

A. To allow the stars to become brighter
B. To allow the eyes to adjust to darkness
C. To allow the Moon to rise
D. To allow Earth to stop rotating

Answer: B. To allow the eyes to adjust to darkness.

4. The Pole Star is especially useful because it:

A. is the brightest star in the entire sky
B. appears nearly stationary in the northern sky
C. revolves around Earth every 24 hours
D. is the closest star to Earth

Answer: B. It appears nearly stationary in the northern sky.

5. On a sky diagram, the two pointer stars of the Big Dipper are 3 cm apart. Approximately how far along the imaginary line should the Pole Star be located?

A. 3 cm
B. 6 cm
C. 10 cm
D. 15 cm

Answer: D. 15 cm.

6. Which sequence correctly describes how to locate the Pole Star?
A. Orion → Sirius → Pole Star
B. Big Dipper → two pointer stars → extend imaginary line → Pole Star
C. Moon → Venus → Pole Star
D. Mars → Jupiter → Pole Star
Answer: B. Big Dipper → two pointer stars → extend imaginary line → Pole Star.
7. If you identify the three middle stars of Orion, extending an imaginary line through them towards the east can help you locate:
A. Sirius
B. Polaris
C. Venus
D. Mars
Answer: A. Sirius.
8. Why does the Sun appear much larger than other stars?
A. The Sun is the only star made of gases.
B. The Sun is much closer to us than other stars.
C. Other stars do not produce light.
D. The Sun is part of Earth.
Answer: B. The Sun is much closer to us than other stars.
9. The average Earth–Sun distance is approximately 150 million km. This distance is approximately:
A. 1 light-year
B. 1 astronomical unit
C. 1 parsec
D. 1 lunar unit
Answer: B. 1 astronomical unit (AU).
10. Earth completes five rotations. Approximately how much time has passed?
A. 24 hours
B. 48 hours
C. 120 hours
D. 365 hours
Answer: C. 120 hours.
11. Earth completes three revolutions around the Sun. Approximately how much time has passed?
A. 3 days
B. 3 months
C. 3 years
D. 30 years
Answer: C. 3 years.
12. Which of the following correctly lists the four inner planets?
A. Mercury, Venus, Earth, Mars
B. Earth, Mars, Jupiter, Saturn
C. Jupiter, Saturn, Uranus, Neptune
D. Venus, Earth, Jupiter, Neptune
Answer: A. Mercury, Venus, Earth, Mars.
13. Which feature is common to Jupiter, Saturn, Uranus and Neptune as described in the chapter?
A. They are smaller than Earth.
B. They have only rocky surfaces.
C. They are mostly made of gas and ice and have rings.

D. They do not revolve around the Sun.
Answer: C. They are mostly made of gas and ice and have rings.
14. Which planet is hotter even though Mercury is closer to the Sun?
A. Earth
B. Mars
C. Venus
D. Neptune
Answer: C. Venus.
15. Two bright objects are observed at night. Object X twinkles much more than Object Y. Which inference is most appropriate?
A. X is more likely a star and Y may be a planet.
B. X must be the Moon.
C. Both must be planets.
D. Y must be a comet.
Answer: A. X is more likely a star and Y may be a planet.
16. Which instrument would be most useful for observing a celestial object too dim to be seen with the naked eye?
A. Microscope
B. Telescope
C. Thermometer
D. Barometer
Answer: B. Telescope.
17. The Moon completes one revolution around Earth in about 27 days. Approximately how long would four revolutions take?
A. 54 days
B. 81 days
C. 108 days
D. 135 days
Answer: C. 108 days.
18. Earth's diameter is represented by 24 cm in a model. What should be the approximate diameter of the Moon in the same scale?
A. 3 cm
B. 6 cm
C. 8 cm
D. 12 cm
Answer: B. 6 cm.
19. The bowl-like structures seen on the Moon's surface are mainly the result of:
A. flowing rivers
B. heavy rainfall
C. impacts of asteroids or rocks from space
D. plant growth
Answer: C. Impacts of asteroids or rocks from space.
20. An astronomer discovers a small, irregular rocky object revolving around the Sun between Mars and Jupiter. It is most likely a:
A. star
B. moon
C. comet
D. asteroid
Answer: D. Asteroid.

21. Which combination correctly describes a comet?
A. Only hot gases; no movement
B. Dust, gases, rocks and ice; may develop a tail near the Sun
C. Only rocks; always located between Mars and Jupiter
D. Liquid water; revolves around Earth
Answer: B. Dust, gases, rocks and ice; may develop a tail near the Sun.
22. Why does a comet develop a prominent tail when it approaches the Sun?
A. It collects stars behind it.
B. Its frozen material begins to evaporate.
C. It stops revolving around the Sun.
D. Its rocky core turns into a planet.
Answer: B. Its frozen material begins to evaporate.
23. Which of the following is the correct order from smaller system to larger system?
A. Universe → Milky Way → Solar System → Earth
B. Earth → Solar System → Milky Way → Universe
C. Earth → Milky Way → Solar System → Universe
D. Solar System → Earth → Universe → Milky Way
Answer: B. Earth → Solar System → Milky Way → Universe.
24. Which statement about the Solar System is correct?
A. It contains only the Sun and Earth.
B. It contains the Sun, eight planets, their moons and smaller objects such as asteroids and comets.
C. It contains all galaxies in the Universe.
D. It contains only objects that produce their own light.
Answer: B. It contains the Sun, eight planets, their moons and smaller objects such as asteroids and comets.
25. Planets can be visible even though they do not produce their own light because they:
A. reflect sunlight
B. produce electricity
C. absorb all sunlight
D. are made entirely of fire
Answer: A. Reflect sunlight.
26. Which statement best describes the relationship between the Sun and the Milky Way?
A. The Milky Way revolves around Earth.
B. The Sun is one of the stars in the Milky Way Galaxy.
C. The Milky Way is inside the Sun.
D. The Sun is larger than the Milky Way.
Answer: B. The Sun is one of the stars in the Milky Way Galaxy.
27. A planet discovered revolving around a star other than the Sun is called:
A. an asteroid
B. a natural satellite
C. an exoplanet
D. a constellation
Answer: C. An exoplanet.
28. Which observation would provide the best evidence that an object is a planet rather than a star?
A. It is visible at night.
B. It appears bright.
C. It reflects light and twinkles less than stars.

D. It is above the horizon.
Answer: C. It reflects light and twinkles less than stars.
29. If the Sun–Earth distance is 1 AU, an object located at four times this distance from the Sun would be approximately:
A. 0.25 AU
B. 1 AU
C. 4 AU
D. 150 AU
Answer: C. 4 AU.
30. Which conclusion is best supported by the chapter's discussion of the Universe?
A. The Solar System is the entire Universe.
B. The Milky Way is the only galaxy.
C. The Universe contains many galaxies, and our Solar System belongs to the Milky Way.
D. Earth is located outside all galaxies.
Answer: C. The Universe contains many galaxies, and our Solar System belongs to the Milky Way.
Answer Key
1-B, 2-C, 3-B, 4-B, 5-D, 6-B, 7-A, 8-B, 9-B, 10-C, 11-C, 12-A, 13-C, 14-C, 15-A, 16-B, 17-C, 18-B, 19-C, 20-D, 21-B, 22-B, 23-B, 24-B, 25-A, 26-B, 27-C, 28-C, 29-C, 30-C

12.15 Best Practices Opportunity List from the Chapter: (10 Ideas)

"Best Practices" Opportunities for Teaching:
Based on the concepts and activities in the uploaded chapter, the following **Best Practices** can make teaching more engaging, experiential and student-centred:

(1) **Night-Sky Observation Activity** – Organise a supervised night-sky observation session in a dark, open area where students identify visible stars, planets and constellations. Encourage them to follow the chapter's recommended practices, such as avoiding bright lights and allowing their eyes time to adjust to darkness.

(2) **Learning to Locate the Pole Star** – Use a star chart or classroom simulation to help students identify the **Big Dipper** and then locate the Pole Star by extending an imaginary line through its two pointer stars. This develops observation, spatial reasoning and direction-finding skills.

(3) **Constellation Identification and Sky Mapping** – Ask students to identify **Orion, the Big Dipper, the Little Dipper and Sirius** using diagrams, sky maps or suitable digital applications. Students can maintain a simple observation journal recording the date, time and objects observed.

(4) **Solar System Model-Making** – Engage students in creating a labelled model of the **Sun, eight planets, moons, asteroid belt and comets** using low-cost or recycled materials. Emphasise that ordinary classroom models may not represent the actual sizes and distances to scale.

(5) **Earth–Moon Size Comparison Activity** – Use balls or circular cut-outs to demonstrate that the Moon's diameter is approximately **one-fourth of Earth's diameter**. Students can calculate suitable dimensions and create their own proportional Earth–Moon models.

(6) **Light-Pollution Investigation** – Encourage students to compare the visibility of stars from brightly lit and darker locations and discuss how **artificial lighting affects night-sky observation**. This connects astronomy with environmental awareness.

(7) **Rotation and Revolution Demonstration** – Use a globe and a lamp representing the Sun to demonstrate **Earth's rotation and revolution**. Reinforce that Earth takes about **24 hours for one rotation** and nearly **one year for one revolution around the Sun**.

(8) **Compare and Classify Celestial Objects** – Conduct a sorting activity in which students classify picture cards as **stars, planets, natural satellites, asteroids or comets** and explain the basis of their classification. This reinforces similarities and differences among Solar System objects.

(9) **Telescope-Based Learning** – Where possible, arrange a demonstration using a **telescope** or a visit to an astronomy facility so students can understand how telescopes make celestial objects appear brighter and larger.

(10) **Concept Mapping – Our Place in the Universe** – Ask students to prepare a visual concept map showing the hierarchy **Earth → Solar System → Milky Way Galaxy → Universe**. This helps students connect individual concepts from the chapter and understand Earth's place in the larger Universe.

These practices particularly support **observation, experiential learning, model-making, collaborative learning, environmental awareness, numerical reasoning and scientific curiosity**, which fit well with the activity-oriented approach of the chapter.

12.16 Innovations Opportunity List from the Chapter: (10 Ideas)

"Innovations" Opportunities in Teaching–Learning for 6th Standard:
Here are innovative, student-friendly ideas that can be used while teaching this chapter:

(1) **Virtual Night-Sky Exploration** – Use a digital sky-map or planetarium application to create a virtual night-sky experience in the classroom. Students can locate **Orion, Sirius, the Big Dipper and the Pole Star** and compare the simulation with their real-sky observations.

(2) **DIY Constellation Projector** – Students can make simple constellation projectors using cardboard cups or boxes with small holes representing star patterns. Shining a torch through them onto a dark wall can help students visualise and recognise **constellation patterns** discussed in the chapter.

(3) **"Find the Pole Star" Classroom Challenge** – Create a large simulated night sky on the classroom wall and challenge teams to locate the Pole Star using the **Big Dipper's pointer stars and the five-times-distance rule**. This converts a chapter concept into a problem-solving game.

(4) **Human Solar System Simulation** – Assign students the roles of the **Sun and eight planets** and let them physically demonstrate rotation and revolution. This kinesthetic activity helps students visualise how planets rotate about their axes and revolve around the Sun.

(5) **Scale-and-Size Mathematics Lab** – Integrate mathematics by asking students to create proportional models using the chapter's relationships, such as the Moon's diameter being about **one-fourth of Earth's diameter**. Students can calculate different model sizes before constructing them.

(6) **Light-Pollution Citizen Science Project** – Students can record how many stars they can see from different locations or under different lighting conditions and prepare a simple comparison chart. They can then propose ways to reduce unnecessary artificial lighting for better night-sky visibility.

(7) **Build-a-Comet Experiment** – Students can construct a safe model of a comet using classroom craft materials to represent **ice, dust, gases and rocks** and then demonstrate how a tail appears when a comet approaches the Sun through animation or role-play. This provides a visual representation of the process described in the chapter.

(8) **Celestial Object Mystery Cards** – Prepare clue cards such as "I produce my own light," "I revolve around a planet," "I am rocky and found mainly between Mars and Jupiter," or "I may develop a tail near the Sun." Students identify the mystery object as a **star, moon, asteroid or comet** and justify their answers.

(9) **Space Mission Design Challenge** – After discussing the Moon and **Chandrayaan**, divide students into teams and ask them to design an imaginary lunar exploration mission. They can decide what instruments their spacecraft would carry and what features of the Moon they would investigate.

(10) **3D "Our Cosmic Address" Display** – Students can collaboratively create a layered or pop-up model showing **Earth → Solar System → Milky Way Galaxy → Universe**. Each layer can contain short facts, drawings and questions, helping students understand the enormous scale of space.

(11) **Astronomy QR Learning Stations** – Create classroom learning stations for the **Sun, planets, Moon, asteroids, comets and Milky Way**. Each station can have teacher-created QR codes leading to short animations, quizzes or student-made explanations, allowing groups to rotate through the stations.

(12) **"Space Scientist for a Day" Inquiry Activity** – Give students observation-based mysteries such as: *Why does Venus look like a star? Why do stars twinkle more than planets? Why are there so many craters on the Moon?* Students discuss evidence from the chapter and present their conclusions as young space scientists.

These innovations provide opportunities for **gamification, digital learning, experiential learning, STEM integration, inquiry-based learning, collaborative projects, model-making and creative problem-solving**, while keeping the activities appropriate for **6th Standard students**.

12.17: Practicing Questions/Question Bank

A. Fill in the Blanks:

1. The star closest to Earth is the __________.
   Answer: Sun

2. The brightest star in the night sky is __________.
   Answer: Sirius

3. The Pole Star is also known as __________.
   Answer: Polaris

4. The Big Dipper is a part of the constellation __________.
   Answer: Ursa Major

5. Excessive artificial light at night is called __________ **pollution**.
   Answer: light

6. The average distance between Earth and the Sun is approximately __________ **million kilometres**.
   Answer: 150

7. Earth takes about __________ **hours** to complete one rotation.
   Answer: 24

8. The Moon takes about __________ **days** to complete one revolution around Earth.
   Answer: 27

9. The region containing many asteroids between Mars and Jupiter is called the __________ **belt**.
   Answer: asteroid

10. Our Solar System is a part of the __________ **Galaxy**.
    Answer: Milky Way

B. One-Mark Descriptive Questions:

1. What is a star?
Answer: A star is a celestial object that shines with its own light.

2. What is a constellation?
Answer: A constellation is a defined region of the sky that often includes a recognizable pattern of stars.

3. Why is the Pole Star useful?
Answer: The Pole Star helps us identify the **North direction** because it appears nearly stationary in the northern sky.

4. What is an astronomical unit?
Answer: One astronomical unit (AU) is approximately the average distance between **Earth and the Sun**.

5. What is revolution?
Answer: Revolution is the movement of an object around the Sun.

6. Name the four inner planets.
Answer: The four inner planets are **Mercury, Venus, Earth and Mars**.

7. What is Earth's natural satellite?
Answer: The **Moon** is Earth's natural satellite.

8. What are asteroids?
Answer: Asteroids are small, rocky and irregularly shaped objects in the Solar System.

9. What are comets made of?
Answer: Comets are made of **dust, gases, rocks and ice**.

10. What is our home galaxy called?
Answer: Our home galaxy is called the **Milky Way Galaxy**.

C. Two-Mark Descriptive Questions:

1. What is light pollution? How does it affect sky watching?
Answer:

1. Excessive artificial light at night is called **light pollution**.
2. It makes faint stars and other celestial objects difficult to observe.

2. How can the Pole Star be located using the Big Dipper?
Answer:

1. Identify the two stars at the end of the Big Dipper's cup and imagine a line passing through them towards the North.
2. Extend the line about **five times their separation** to locate the Pole Star.

3. Differentiate between rotation and revolution of Earth.
Answer:

1. Earth takes about **24 hours** to rotate once about its axis.
2. It takes nearly **one year** to revolve once around the Sun.

4. State two characteristics of the inner planets.
Answer:

1. Mercury, Venus, Earth and Mars are the **four inner planets**.
2. They are relatively smaller and have **solid, rocky surfaces**.

5. Write two facts about the Moon.
Answer:

1. The Moon takes about **27 days** to complete one revolution around Earth.
2. Its diameter is approximately **one-fourth of Earth's diameter**.

6. What are asteroids and where are many of them found?
Answer:

1. Asteroids are small, rocky and irregularly shaped celestial objects.
2. Many are found in the **asteroid belt between Mars and Jupiter**.

7. Why does a comet develop a tail near the Sun?
Answer:

1. As a comet approaches the Sun, some of its frozen material begins to evaporate.
2. The released material forms the characteristic **tail of the comet**.

8. Why is a telescope useful for sky observation?
Answer:

1. A telescope makes celestial objects appear **brighter and larger**.
2. It helps us observe dim objects that cannot be seen with the naked eye.

D. Three-Mark Descriptive Questions:

1. Explain three ways in which the Sun is important for Earth.
Answer:

1. The Sun provides **heat and light** required for life.
2. Sunlight helps **plants grow**.
3. The Sun influences Earth's **climate, seasons, weather, water cycle and winds**.

2. Explain how to prepare for night-sky observation.
Answer:

1. Choose a **dark and open location** away from artificial lights and obstacles.
2. Use a sky map or application to plan which celestial objects to observe.
3. Allow about **half an hour for the eyes to adjust to darkness** and avoid bright lights.

3. Compare the inner and outer planets.
Answer:

1. Mercury, Venus, Earth and Mars are the **inner planets** and are relatively smaller with rocky surfaces.
2. Jupiter, Saturn, Uranus and Neptune are the **outer planets** and are much larger than Earth.
3. The outer planets are mostly made of **gas and ice** and have large ring-like structures.

4. Describe three important features of the Moon.
Answer:

1. The Moon is Earth's natural satellite and takes about **27 days** to revolve around Earth.
2. Its diameter is about **one-fourth of Earth's diameter**, and it has hardly any atmosphere.
3. Its surface contains many **craters** formed mainly by impacts of rocks from space.

5. Explain three important characteristics of comets.
Answer:

1. Comets are made of **dust, gases, rocks and ice**.
2. When they approach the Sun, some of their frozen material begins to evaporate.
3. The released material forms the characteristic **tail** of a comet.

6. If Earth completes five rotations, calculate the time taken.
Answer:

1. Earth takes approximately **24 hours** for one rotation.
2. Five rotations take $5 \times 24 = 120$hours.
3. Therefore, Earth takes **120 hours or 5 days** for five rotations.

E. Five-Mark Descriptive Questions:

1. Describe our Solar System and its major members.
Answer:

1. The Solar System consists of the **Sun, eight planets, their moons and many smaller objects**.
2. The eight planets are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
3. Natural satellites or **moons revolve around planets**.
4. Smaller Solar System objects include **asteroids and comets**.

5. The Sun is the largest and heaviest object in the Solar System and provides almost all the energy received by its other members.

2. Explain the Sun and its importance for life on Earth.
Answer:

1. The Sun is the **closest star to Earth** and is an extremely hot spherical ball of gases.
2. It provides enormous amounts of **heat and light**.
3. Its heat helps maintain temperatures suitable for life on Earth.
4. Sunlight supports the growth of plants.
5. The Sun also influences Earth's **climate, seasons, weather, water cycle and winds**.

3. Explain how you would organise a night-sky observation activity for your class.
Answer:

1. Select a **dark, open location** away from artificial lights, buildings and trees.
2. Choose a suitable date and time using a sky map or application.
3. Conduct the activity with appropriate **adult supervision**.
4. Allow students about half an hour to adjust their eyes to darkness and ask them to avoid bright lights.
5. Students can then identify visible stars, planets and constellations and record their observations.

4. Describe the Moon and its surface features.
Answer:

1. The Moon is Earth's **natural satellite** and our nearest celestial neighbour.
2. It takes approximately **27 days** to complete one revolution around Earth.
3. Its diameter is about **one-fourth of Earth's diameter**, and it has hardly any atmosphere.
4. Its surface contains numerous **circular, bowl-like craters**.
5. Most craters were formed when **asteroids or rocks from space struck the Moon**.

5. Explain Earth's place in the Universe from Earth to the largest level discussed in the chapter.
Answer:

1. **Earth** is one of the eight planets of our Solar System.
2. The **Solar System** contains the Sun, planets, moons and smaller objects such as asteroids and comets.
3. Our Solar System is part of the **Milky Way Galaxy**.
4. The Milky Way contains **millions to billions of stars**.
5. The **Universe** contains the Milky Way and many other galaxies.

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