

KVS ZONAL INSTITUTE OF EDUCATION & TRAINING, MUMBAI


तत् त्वं पुण्यं अयावृणु
केन्द्रीय विद्यालय संगठन


COMPETENCY
THINK • APPLY
SOLVE • EXCEL

COMPETENCY BASED QUESTIONS IN SCIENCE FOR CLASS IX

SESSION 2026-27

Aligned with NEP 2020 & NCF 2023
and CBSE Competency Framework 2025-26

PHYSICS
CHEMISTRY
BIOLOGY
EARTH SCIENCE

THINK CRITICALLY
ANALYZE DEEPER
APPLY KNOWLEDGE
SOLVE PROBLEMS
MAKE CONNECTIONS
PERFORM BETTER

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KVS ZONAL INSTITUTE OF
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आंचलिक शिक्षा एवं प्रशिक्षण संस्थान, मुंबई
Inspire • Empower • Transform



CLASS – IX Competency Based Questions
CLASS-IX SCIENCE

Chapter 1 - Exploration: Entering the World of Secondary Science

Section A: Multiple Choice Questions (MCQs)

1. A student wants to study the motion of a football after it is kicked. Which of the following information is **least important** for preparing a simple scientific model?

- (A) Initial speed of the football
- (B) Direction of the kick
- (C) Colour of the football
- (D) Mass of the football

2. A scientist ignores air resistance while studying the motion of a falling stone. This is done mainly because

- (A) air does not affect falling objects.
- (B) ignoring small effects helps simplify the model.
- (C) gravity is absent.
- (D) air resistance cannot be measured.

3. A weather forecast predicts rain tomorrow based on humidity, pressure and wind direction. This prediction is an example of

- (A) guessing.
- (B) superstition.
- (C) scientific reasoning using evidence.
- (D) personal opinion.

4. During an experiment, two groups obtain different results because they used different units for measuring mass. Which scientific practice could have prevented this problem?

- (A) Using local units
- (B) Using SI units
- (C) Estimation only
- (D) Using diagrams

5. Which situation best illustrates the use of estimation?

- (A) Measuring the diameter of a wire using a micrometer screw gauge.
- (B) Estimating the amount of water needed for a garden.
- (C) Finding the exact mass of a chemical.
- (D) Determining the melting point of ice.

Section B: Assertion–Reason Questions

6.

Assertion (A): Scientific models deliberately ignore some details.

Reason (R): Ignoring less important details helps scientists understand complex systems more easily.

7.

Assertion (A): Scientific theories can change with new evidence.

Reason (R): Science accepts only ideas that continue to match observations.

Section C: Case-Based Questions

Case Study 1: Designing a Bicycle Model

A student wants to estimate the time taken to travel from school to home by bicycle. She notes the distance and average speed but ignores the colour of the bicycle, type of shoes worn, and design of the school bag.

8. Identify two variables that are relevant for developing the model.
9. Explain why ignoring certain details makes the model more useful.
10. Suggest one additional factor that may improve the accuracy of the model.

Case Study 2: Weather Prediction

Rahul says, "Dark clouds always mean it will rain."

His friend asks him to collect humidity, temperature, wind direction and previous weather records before making the prediction.

11. Why is Rahul's original statement not scientifically reliable?
12. Which observations suggested by the friend make the prediction testable?
13. How can repeated observations improve confidence in the prediction?

Case Study 3: Viral Social Media Claim

A social media post claims that food becomes poisonous during a solar eclipse.

Priya decides to investigate the claim scientifically.

14. Mention two scientific questions Priya should ask before accepting the claim.
15. Which characteristic of scientific thinking is demonstrated by Priya?
16. Why is evidence more important than popular belief in science?

Section D: Source-Based/Data Interpretation Questions

17. A laboratory records the following observations while studying a moving object.

Trial Distance (m) Time (s)

1	20	4
2	40	8
3	60	12

Answer the following:

- a) Which mathematical relationship can be observed between distance and time?
- b) Predict the distance travelled in 16 seconds if the same trend continues.
- c) Explain why mathematics is called the language of science in this situation.

18. A grocery store uses both kilograms and pounds for weighing vegetables. One customer becomes confused and receives less quantity than expected.

Answer the following:

- a) Why are standard units necessary?
- b) What scientific principle is violated in this situation?
- c) Suggest one real-life consequence of incorrect unit conversion.

Section E: Short Answer Questions

19. Explain how a scientific model differs from the real object it represents.

20. Why is mathematics considered a language rather than merely a calculation tool in science?

21. Differentiate between a scientific law and a scientific theory using suitable examples.

22. Explain how predictions help scientists improve scientific theories.

23. Why should scientific claims always be supported by measurable evidence?

24. State two situations where estimation is more useful than exact calculation.

Section F: Long Answer / Competency Questions

25. Your school wants to estimate the total amount of drinking water required during a sports day.

Describe how you would develop a scientific model for this purpose. Clearly mention:

- variables to include,
- assumptions made,
- factors ignored,
- possible limitations of your model.

26. Explain how different branches of science work together in understanding the functioning of a face mask during a pandemic.

27. A mobile phone is an example of interdisciplinary science.

Describe how Physics, Chemistry, Biology and Mathematics contribute to its functioning.

28. A scientist's prediction does not match the experimental result.
Explain the scientific steps that should be followed before rejecting the theory.

Section G: Higher Order Thinking Skills (HOTS)

29. Two students disagree about whether eating food during an eclipse is harmful. One relies on social media while the other plans an experiment.
Whose approach is more scientific? Justify your answer using scientific reasoning.

30. Imagine scientists never questioned existing theories.
How would this affect scientific progress? Explain with suitable reasoning.

Section H: Competency-Based Project Questions

31. Observe a daily activity at home (e.g., cooking rice, charging a mobile phone, watering plants). Develop a simple scientific model by identifying:

- Important variables
- Variables that can be ignored
- Assumptions
- Predictions that can be tested

32. Select any viral scientific claim from social media. Prepare a plan to verify it scientifically by identifying:

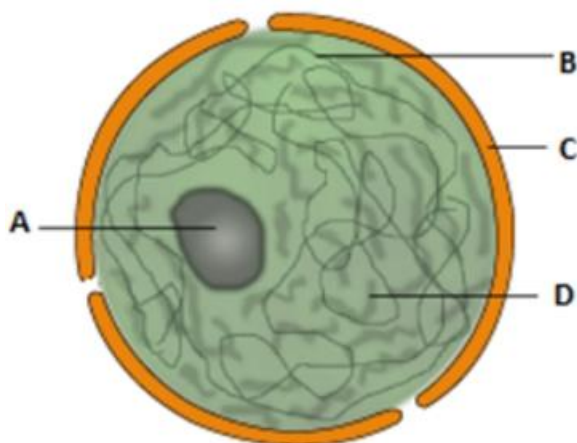
- the evidence required,
- observations to be recorded,
- measurable variables,
- conclusion criteria.

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Chapter 2 - Cell: The Building Block of Life

MCQ

1. A cell will swell up if
 - (a) The concentration of water molecules in the cell is higher than the concentration of water molecules in the surrounding medium.
 - (b) The concentration of water molecules in the surrounding medium is higher than the concentration of water molecules in the cell.
 - (c) The concentration of water molecules is same in the cell and in the surrounding medium
 - (d) The concentration of water molecules does not matter.
2. Which of the following statement marks as a difference between plant cell and animal cell?
 - (a) Plant cells have cell wall which animal cells do not.
 - (b) Plant cells do not have vacuole while animal cells do have.
 - (c) Plant cells have only cell membrane while animal cells have both cell wall as well as cell membrane.
 - (d) Plant cells have more plastids while animal cells have few plastids.
3. Osmosis is a process by which molecules of a solvent tend to pass through a semipermeable membrane from a less concentrated solution into a more concentrated one. Can you pick out the option among the following which does not belong to this process?
 - (a) The movement of water across a semipermeable membrane is affected by the amount of substances dissolved in it.
 - (b) Membranes are made of organic molecules such as proteins and lipids.
 - (c) Molecules soluble in organic solvents can easily pass through the membrane.
 - (d) Plasma membranes contain chitin sugar in plants.
4. The nucleus controls all the activities of the cell and acts as a site of DNA material and protein synthesis. It is composed of some components which all together give the nucleus its functionality. Here is shown a figure of nucleus with some of its components labeled as A, B, C and D. can you name these components correctly?



Structure of Nucleus

- (a) A – Nucleons; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm
- (b) A – Nucleus; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm

- (c) A – Nucleolus; B – Chromatin; C – Nuclear membrane; D – Nucleoplasm
(d) A – Nucleolus; B – Chromatin; C – Nuclear membrane; D – Nuclear wall

5. You must have observed that a fruit when unripe is green but it becomes beautifully coloured when ripe. According to you what is the reason behind this colour change.

- (a) Chloroplasts change to chromoplasts
(b) Chromoplasts change to chromosomes
(c) Chloroplasts change to chromosomes
(d) Chromoplasts change to chloroplasts

6 Rahul's mother was going to make pickle. For this she cut the vegetables into small pieces and put them in the sun for few hours. Rahul was observing all her activities very curiously and asked his mother why she had put the salted vegetables in the sun, among the following what might be the most appropriate answer for his question?

- (a) So that the pickle may get extra flavour.
(b) So that the cut vegetables may absorb the vitamin d as a nutrient from the sun rays.
(c) So that the vegetables may lose all the water by diffusion and evaporation and become dry.
(d) So that the salt may get evenly and properly absorbed by the vegetables.

7. The process of plasmolysis in plant cell is defined as:

- (a) Breakdown of plasma membrane in hypotonic solution.
(b) Shrinkage of cytoplasm in hypertonic medium.
(c) Shrinkage of Nucleoplasm.
(d) None of these.

8. Mitochondria are the sites of respiration in the cell. They oxidize carbohydrates and fats present in the cell to produce carbon dioxide, water and a lot of energy. The energy so released is stored in the form of ATP molecules. Since mitochondria in the cell are used to synthesize energy so, they are also called:

- (a) Energy currency of the cell (b) Energy generator of the cell
(c) Kitchen of the cell (d) Power house of the cell

9. Cell is the structural and functional unit of life. The word cell is derived from the Latin word 'cellula' which means "a little room". Can you name the scientist who coined the term cell?

- (a) Robert Hooke (b) Anton Von Leeuwenhoek
(c) Robert Brown (d) Ernst Haeckel

10. In a test, a teacher collected the answers written by four students as the definition of osmosis as given below. Read carefully and select the correct one.

- (a) Movement of water molecules from a region of higher concentration to a region of lower concentration through a semipermeable membrane.
(b) Movement of solvent molecules from its higher concentration to lower concentration.
(c) Movement of solvent molecules from higher concentration to lower of solution through a permeable membrane.
(d) Movement of solute molecules from lower concentration to higher concentration of solution through a semipermeable membrane.

MCQ-MS

1) b 2) a 3) c 4) c 5) a 6) c 7) b 8) d 9) a 10) a

ASSERTION AND REASON QUESTIONS

1. Assertion (A): Cell walls of plants, fungi and bacteria help withstand hypotonic external media without bursting.

Reason (R): The cell swells up which builds up pressure against the cell wall.

2. Assertion (A): The cell membrane is a dead part of the cell.

Reason (R): It regulates the movement of materials between the inner and the outer environment.

3. Assertion (A): Passive transport does not involve energy.

Reason (R): It occurs due to concentration gradient of materials.

4. Assertion (A): RBCs kept in hypotonic solution will swell.

Reason (R): Movement of water occurs from outside to inside the RBC.

5. Assertion (A): The outer membrane of mitochondria is folded into cristae.

Reason (R): Cristae increase the surface area.

6. Assertion (A): Ribosomes are present in both eukaryotes and prokaryotes.

Reason (R): Ribosomes are the sites of protein synthesis.

7. Assertion (A): Plant cells have a single large vacuole.

Reason (R): Vacuole is responsible for ingestion of food substance.

8. Assertion (A): A cell swells up when present in a hypotonic solution.

Reason (R): Water molecules enter the cell from the solution.

9. Assertion (A): The endoplasmic reticulum without ribosomes is called smooth endoplasmic reticulum(SER).

Reason (R): SER is mainly involved in protein synthesis.

10. Assertion (A): Plasma membrane is selectively permeable.

Reason (R): Plasma membrane allows all molecules to pass through it.

AR-MS

1)b 2)d 3)a 4)a 5)d 6)b 7)c 8)a 9)c 10)c

2 MARKS QUESTIONS

1: State two conditions required for osmosis.

2: What is plasmolysis?

3. What happens when a de- shelled egg is placed in a concentrated salt solution.

4: Give the function of nuclear membrane.

5: Name the cell-organelles that have their own DNA and ribosomes.

6: State the difference between smooth endoplasmic reticulum and rough endoplasmic reticulum.

7: What is endocytosis?

8: What is the function of vacuoles?

3 MARKS QUESTIONS

1. Why are lysosomes known as 'suicide-bags' of a cell?
2. Do you agree that "A cell is a building unit of an organism". If yes, Explain why?
3. Why is endocytosis found in animals only?
4. Name any cell organelle which is non membranous.
5. We eat food composed of all the nutrients like carbohydrates, Proteins, fats, vitamins, minerals and water. After digestion, these are absorbed in the form of glucose, amino acids, fatty acids, Glycerol etc.
6. What mechanisms are involved in absorption of digested food and water?
7. If you are provided with some vegetables to cook. You generally add salt into the vegetables during cooking process. After adding salt, vegetables release water. What mechanism is responsible for this?
8. If cells of onion peel and RBC are separately kept in hypotonic solution, what among the following will take place? Explain the reason for your answer.
 - (a) Both the cells will swell.
 - (b) RBC will burst easily while cells of onion peel will resist the bursting to some extent.
 - (c) a and b both are correct.
 - (d) RBC and onion peel cells will be had similarly.

5 MARKS QUESTIONS

Q1. List in tabular form the main function(s) of each of the following cell organelles: (1+1+1+2)

	Cell Organelles	Function(s)			
(a)	Vacuoles				
(b)	Chromosomes				
(c)	Lysosomes				
(d)	ER {Rough Endoplasmic Reticulum (RER) Smooth Endoplasmic Reticulum (SER) }				

Q2.i) Differentiate between prokaryotic and eukaryotic cell

ii) Draw diagram of a prokaryotic cell.

Q3. i) Why is cell membrane called selectively permeable.

ii) How is cell wall different from cell membrane.

Q4. Write any four differences between plant and animal cell. Draw diagram of plant cell.

Q5. i) What will happen to the cell if it is placed -

In a medium having lower concentration of water than cell.

If it is placed in a medium having exactly the same water concentration as the cell.

ii) How do the substances like carbon dioxide and water move in and out of the cell

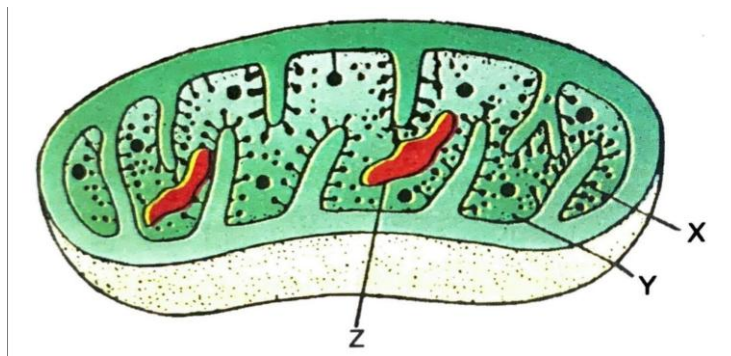
Q6. i) What are plastids.

ii) What are the different types of plastids. Mention their functions.

iii) In what respect plastids are similar to mitochondria

CASE BASED/COMPETENCY BASED QUESTIONS

1. The cell is the smallest structural and functional unit of life. Though the cells show diversity in cell shape, size, number and function but all the eukaryotic cells have similar basic structure. A eukaryotic cell has three functional regions: Plasma membrane, cytoplasm and nucleus. Cytoplasm of the cell has a number of cytoplasmic structures: cell inclusions and cell organelles. Following diagram is that of cell organelle which has special adaptations to perform the specific function. Observe the diagram and answer the questions listed below the diagram:



i. Identify the cell organelle and its common name:

- (a) Chloroplast; kitchen of the cell
- (b) Mitochondria; powerhouse of the cell
- (c) Lysosome; suicidal bags
- (d) Ribosome; protein factory

ii. Identify the components labeled as X, Y and Z in the diagram:

- (a) Crista, mitochondrial matrix and DNA
- (b) Mitochondrial matrix, crista and DNA
- (c) DNA, mitochondrial matrix and crista
- (d) Mitochondrial matrix, crista and DNA

iii. Select the function of the component labeled as X:

- (a) Cellular secretion
- (b) Protein synthesis
- (c) Duplication of organelle
- (d) Increases surface area of respiration

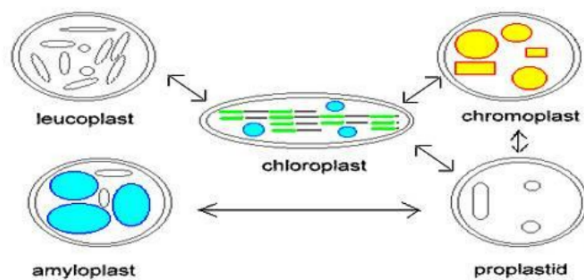
iv. Which of these labeled components is the site of Krebs cycle (breakage of pyruvate to CO₂, water and energy)?

(a) X (b) Y (c) Z (d) None of these

2.

Read the following and answer any four questions from (i) to (v)

Leucoplasts are colourless plastids. They store starch, oil, proteins. Chromoplasts are coloured plastids. They contain pigments. e.g. Chloroplasts contain green pigment present in the plant cell. Chromoplasts provide colour to various flowers and fruits.



(i) What is the function of leucoplasts?

- (a) They store starch, oil, proteins.
- (b) They provide colour various flowers and fruits.
- (c) They help in photosynthesis.
- (d) They give support to the plants.

(ii) Which plastids provide colour to fruits and flowers?

- (a) Leucoplasts (b) Chromoplasts (c) Chloroplasts (d) Proteinoplast

(iii) Which of the following statement is true?

- (a) Plastids are present in both plant and animal cell.
- (b) Plastids are absent in plant as well as animal cell.
- (c) Plastids are present only in plant cell.
- (d) Plastids are present only in animal cell.

(iv) Which plastids contain green pigment ?

- (a) Leucoplasts contain green pigment.
- (b) Chloroplasts contain green pigment.
- (c) Chromoplasts mainly contain green pigment.
- (d) None of the plastids contain green pigment.

(v) Which plastids bring about the process of photosynthesis ?

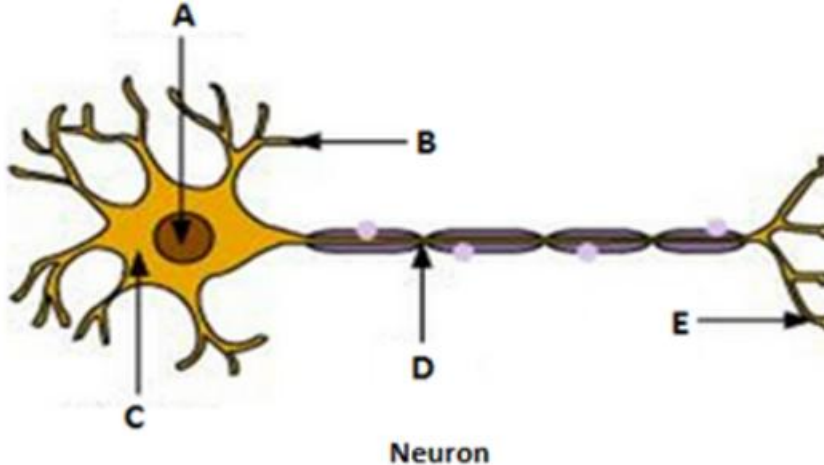
- (a) Leucoplasts
- (b) Chromoplasts mainly
- (c) Chloroplasts
- (d) None of the plastids bring about photosynthesis.

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Chapter 3 - Tissues in Action

MCQ

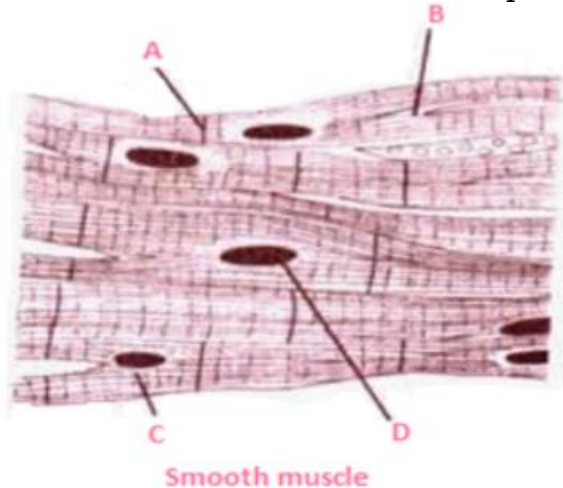
1. Tissue is a group of similar kind of cells specialized to perform a particular function in the body. Therefore presence of tissues in a multicellular organism ensures:
- (a) Faster development (b) Division of labour
(c) Higher reproductive potential (d) Body strength
2. Given below is a diagram showing the structure of a neuron tissue.



Choose the correct labeling for the parts A, B, C, D and E.

- (a) A – Nucleus; B – Cell body; C – Dendrite; D – Axon; E – Nerve ending.
(b) A – Nucleus; B – Dendrite; C – Cell body; D – Nerve ending; E – Axon.
(c) A – Nucleus; B – Axon; C – Cell body; D – Dendrite; E – Nerve ending.
(d) A – Nucleus; B – Dendrite; C – Cell body; D – Axon; E – Nerve ending
3. Lysosome is a cytoplasmic organelle containing enzymes that break down biological polymers. Lysosomes function as the digestive system of the cell. It is also called the suicide bag of the cell because:
- (a) It causes any cell to commit suicide (b) Its enzymes digest the cell itself
(c) Its enzymes kill surrounding cells (d) All of the above
4. While doing work and running, you move your organs like hands, legs, etc. Which among the following is correct?
- (a) Smooth muscles contract and pull the ligament to move the bones
(b) Smooth muscles contract and pull the tendons to move the bones
(c) Skeletal muscles contract and pull the ligament to move the bones
(d) Skeletal muscles contract and pull the tendon to move the bones
5. Cardiac muscle is one of the three major types of muscles, the others being skeletal and smooth muscles. It is found in the walls and histological foundation of the heart. Which one of the following statements is not related to the cardiac muscles?
- (a) They muscles show rhythmic contraction and relaxation throughout life.
(b) They do not work according to our will, so they are called involuntary muscles.
(c) They are non-striated, multinucleated and branched muscles.
(d) The contraction and relaxation of the heart muscles help to pump and distribute blood to different parts of the body.

6. In a test of biology a figure of smooth muscle labelled as A, B, C and D for different parts of the muscles. Four students P, Q, R and S in a way to attempt the question named the four parts as given below. But only one student could name all the four parts correctly.



Which of the following options is the answer written by that student?

- (a) A – Intercalated disc; B – Sarcoplasm; C – Branched fibres; D – Nucleus
- (b) A – Intercalated disc; B – Branched fibres; C – Sarcoplasm; D – Nucleus
- (c) A – Branched fibres; B – Intercalated disc; C – Sarcoplasm; D – Nucleus
- (d) A – Branched fibres; B – Sarcoplasm; C – Intercalated disc; D – Nucleus

7. Which of the following statements is incorrect?

- i. Parenchyma tissues have intercellular spaces.
 - ii. Collenchyma tissues are irregularly thickened at corners.
 - iii. Apical and intercalary meristems are permanent tissues.
 - iv. Meristematic tissues, in its early stage, lack vacuoles.
- (a) (i) and (ii) (b) Only (iii) (c) (iii) and (iv) (d) Only (ii)

8. Xylem is the specialized tissue of the plants that transports water and nutrients from the soil to the upper parts like stems and leaves of plant and provides mechanical support to them. It is composed of four different types of the cells. Which of the following is not one a type of cell found in xylem tissues?

- (a) Tracheids (b) Vessels (c) Xylem parenchyma (d) Sieve tubes

9. A person met with an accident in which two long bones of his hand were dislocated. Which among the following may be the possible reason for this?

- (a) Tendon breaks (b) Break of skeletal muscles tissue
- (c) Ligament breaks (d) Areolar tissue breaks

MCQ-MS

1) b 2) d 3) b 4) c 5) a 6) b 7) b 8) d 9) b

ASSERTION AND REASON QUESTIONS

1. Assertion (A): Permanent tissues are derived from meristematic tissue when they lose the ability to divide.

Reason(R): Meristematic tissue is the dividing tissue in the growing regions of the plant.

2. Assertion (A): The permeability of the cells plays an important role in regulating the exchange of materials between the body and the external environment.

Reason(R): Anything entering or leaving the body must cross at least one layer of epithelium.

3. Assertion(A): All plant tissues divide throughout their life.

Reason(R): Meristematic tissues are localised to certain regions.

4. Assertion(A): Apical meristems are present in tips of stems and roots.

Reason(R): Root and stems grow in length.

5. Assertion(A): Some columnar epithelial cells change into glandular cells.

Reason(R): Columnar epithelial cells are much longer and broad.

6. Assertion(A): Parenchyma tissue is non-living. Reason(R): Parenchyma cells have intercellular spaces.

7. Assertion(A): Striated muscles are attached to the bones in different body parts.

Reason(R): These are independent of voluntary control.

8. Assertion(A): Parenchyma cells help in storage of food.

Reason(R): Parenchyma cells are non-living cells.

9. Assertion(A): Meristematic tissues are present in every part of the plant body.

Reason(R): These tissues consist of undifferentiated cells.

10. Assertion(A): The inner lining of intestine has columnar epithelial cells.

Reason(R): Columnar cells facilitate absorption and secretion.

AR-MS

1)b 2)a 3)d 4)b 5)b 6)d 7)c 8)c 9)c 10)a

2 MARKS QUESTIONS

1: Give two differences between bone and cartilage.

2: How are striated muscles different from unstriated muscles

3: What are the different types of meristematic tissue on the basis of their location in plant body.

4: Fill in the blanks:

(i) Water and minerals are conducted by _____

(ii) In higher plants food is conducted by _____

(iii) Blood is a _____ tissue.

(iv) Bone consists of _____ cells.

(v) Cartilage consists of _____ cells.

(vi) Fibers are absent in _____ type of connective tissue.

5: What are the functions of areolar tissue?

6: Give difference between xylem and phloem.

7: What are fibers?

8: Name the tissues for the following:

(a) Stores fat in animal body.

- (b) Divides and re-divides to grow in plants.
- (c) Tissue that joins bone to bone.
- (d) Covers the external surface of animal body.

9: What is stomata?

10: Why does epidermal tissue have no inter cellular space?

3 MARKS QUESTIONS

- Q1. Why animals and plants are made up of different types of tissue?
- Q2. Differentiate between parenchyma and sclerenchyma. Draw their well labeled diagrams.
- Q3. What is meristematic tissue? Give characters of meristematic cells. Describe different types of meristematic tissues.
- Q4. What are complex permanent tissues? Describe the structure of complex permanent tissues with the help of well labeled diagrams
- Q5. Describe the structure and function of different type of epithelial tissue. Draw their well labeled diagrams.
- Q6. Describe various types of muscular tissues? Draw their well labeled diagrams.
- Q7. What is neuron? Write the structure and function of neuron.
- Q8. Give reasons-
- (a) Plants Like water hyacinth floats on water.
 - (b) Corks cells are impervious to gases and water.
 - (c) Plant will die within few days of cutting of root tips.

5 MARKS QUESTIONS

- Q1. Draw the labeled diagrams of:
- a) Location of meristematic tissue in plant body
 - b) Transverse section of parenchyma, collenchyma and sclerenchyma tissues.
- Q2. What is a nervous tissue? Give its functions. Explain the structure of a neuron with a diagram.
- Q 3. Anurag was injured while playing cricket. His friends took him to the hospital and doctor told that he is suffering from a sprain and advised bed rest. Deepak and Rahul visited him every day to enquire about his health and helped his mother.
- a. What happens during a sprain?
 - b. How bed rest can get relieve from pain and sprain?
 - c. Write two difference between ligament and tendon.

CASE BASED/COMPETENCY BASED QUESTIONS

1. The covering or protective tissues in the animal body are epithelial tissues. Epithelium covers most organs and cavities within the body. External and Internal covering of the body and organs are all made of epithelial tissue.

Epithelial tissue cells are tightly packed and form a continuous sheet. They have only a small or almost no intercellular spaces. It plays an important role in regulating the exchange of materials between the body and the external environment and also between different parts of the body.

Simple squamous epithelial cells are extremely thin and flat and form a delicate lining. The oesophagus and the lining of the mouth are also covered with squamous epithelium. The skin, which protects the body, is also made of squamous epithelium.

Where absorption and secretion occur, as in the inner lining of the intestine, tall epithelial cells are present. This columnar (meaning 'pillar-like') epithelium facilitates movement across the epithelial barrier. In the respiratory tract, the columnar epithelial tissue also has cilia, which are hair-like projections on the outer surfaces of epithelial cells. These cilia can move, and their movement pushes the mucus forward to clear it. This type of epithelium is thus ciliated columnar epithelium.

Cuboidal epithelium (with cube-shaped cells) forms the lining of kidney tubules and ducts of salivary glands, where it provides mechanical support. Epithelial cells often acquire additional specialisation as gland cells, which can secrete substances at the epithelial surface. Sometimes a portion of the epithelial tissue folds inward, and a multicellular gland is formed. This is glandular epithelium.

(1) The ciliated columnar epithelium is present in

- (a) Respiratory tract
- (b) Bile duct and oesophagus
- (c) Fallopian tube and urethra
- (d) Eustachian tube and stomach lining

(2) The cuboidal epithelium is present in

- (a) Bronchioles
- (b) Bile duct and oesophagus
- (c) Fallopian tube and urethra
- (d) Kidney tubules ducts of salivary glands

(3) External and Internal covering of the body and organs are all made of

-
- (a) Skin Tissue
 - (b) Epithelial Tissue
 - (c) Nerves Tissue
 - (d) Connective Tissue
- (4) How are cells arranged in epithelial tissue?
- (a) Loosely packed
 - (b) Closely packed
 - (c) Arranged in discontinuous form
 - (d) Both a and c

OR Enlist the types of Epithelial Tissue?

2. Division of labour is a type of adaptation where different cells are specialized to perform different types of work. The tissue which is responsible for an increase in the length and girth of the plant and used to divide actively throughout their life is known as meristematic tissues. Meristematic tissues work for division of cells thus have a prominent nucleus with dense cytoplasm which enables fast and easy division of cells to generate new cells.

(i) Which of the following statements are correct about meristematic tissues?

- a) Composed of cells that are incapable of cell division
- b) Composed of differentiated cells
- c) Composed of cells that can perform cell division
- d) all the above

(ii) Length in plants increase due to

- a) apical meristem
- b) lateral meristem
- c) intercalary meristem
- d) cortex

(iii) Meristems have dense cytoplasm with prominent nuclei and dense cytoplasm but lack _

- a) mitochondria
- b) ribosome
- c) vacuole
- d) starch

(iv) Non-dividing cells produced from meristems are called

- a) permanent tissue
- b) bark tissue
- c) epidermis
- d) Parenchyma

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Chapter 4 - Describing Motion Around Us

MCQ

1. If the displacement of an object is proportional to square of time, then the object moves with:

- (a) Uniform velocity
- (b) Uniform acceleration
- (c) Increasing acceleration
- (d) Decreasing acceleration

2. From the given v-t graph, it can be inferred that the object is

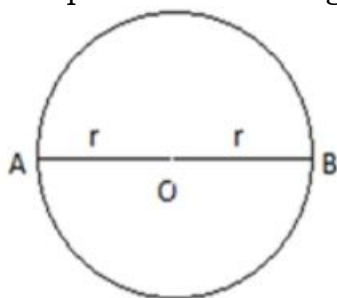


- (a) At rest
- (b) In uniform motion
- (c) Moving with uniform acceleration
- (d) In non-uniform motion

3. Suppose a boy is enjoying a ride on a merry-go-round which is moving with a constant speed of 10 m/s. It implies that the boy is:

- (a) At rest
- (b) Moving with no acceleration
- (c) In accelerated motion
- (d) Moving with uniform velocity

4. A particle is moving in a circular path of radius r .



The displacement after half a circle would be:

- (a) Zero
- (b) πr
- (c) $2r$
- (d) $2\pi r$

5. Which of the following can sometimes be 'zero' for a moving body?

- i. Average velocity
- ii. Distance travelled
- iii. Average speed
- iv. Displacement

- (a) Only (i)
- (b) (i) and (ii)
- (c) (i) and (iv)
- (d) Only (iv)

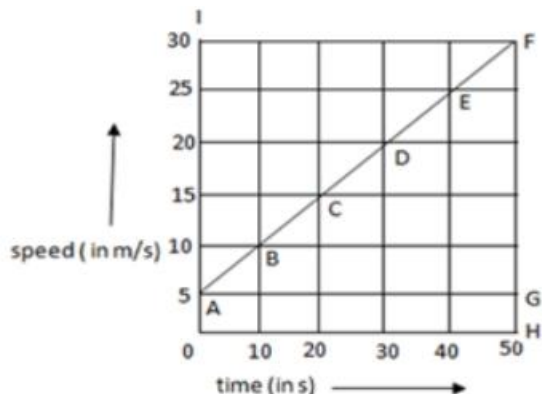
6. Which of the following statement is correct regarding velocity and speed of a moving body?

- (a) Velocity of a moving body is always higher than its speed
- (b) Speed of a moving body is always higher than its velocity
- (c) Speed of a moving body is its velocity in a given direction
- (d) Velocity of a moving body is its speed in a given direction

7. When a car driver travelling at a speed of 10 m/s applies brakes and brings the car to rest in 20 s, then the retardation will be:

- (a) + 2 m/s² (b) - 2 m/s² (c) - 0.5 m/s² (d) + 0.5 m/s²

8. The speed – time graph of a car is given here. Using the data in the graph calculate the total distance covered by the car.



- (a) 1250 m (b) 875 m (c) 1500 m (d) 870 m

9. A car of mass 1000 kg is moving with a velocity of 10 m/s. If the velocity-time graph for this car is a horizontal line parallel to the time axis, then the velocity of the car at the end of 25 s will be:

- (a) 40 m/s (b) 25 m/s (c) 10 m/s (d) 250 m/s

10. Which of the following is most likely not a case of uniform circular motion?

- (a) Motion of the earth around the sun
(b) Motion of a toy train on a circular track
(c) Motion of a racing car on a circular track
(d) Motion of hours' hand on the dial of a clock

MCQ-MS

- 1) b 2) b 3) b 4) c 5) d 6) d 7) b 8) d 9) c 10) d

ASSERTION AND REASON QUESTIONS

1. Assertion: Displacement for a course of motion may be zero but the corresponding distance covered is not zero.

Reason : Displacement and distance covered may not always be equal.

2. Assertion: A boy riding on bicycle in a crowded street exhibit non uniform motion.

Reason: The boy covers equal distance in equal interval of time.

3. Assertion: Velocity is the speed of an object in a particular direction.

Reason: SI unit of velocity is same as speed.

4. Assertion: A stone tied with a piece of thread describing a circular path with constant velocity on being released moves in a straight line.

Reason: Along the circular path direction of motion remains the same at every point.

5. Assertion: Weight of an object is the force with which a body is attracted towards the earth.

Reason: Its direction is vertically upward.

6. Assertion: Motion of satellites around their planets is considered an accelerated motion.

Reason: During their motion, the speed remains constant, while the direction of motion

changes continuously.

7. Assertion: A tiger can accelerate from rest at the rate of 4 m/s^2

Reason: The velocity attained by it in 10 s is 40 m/s.

8. Assertion (A) : The distance-time graph of uniform motion is a straight line.

Reason (R): Dependent variable is along y-axis and independent variable is along x-axis.

9. Assertion (A) : The velocity of a body is a scalar quantity.

Reason (R) : A vector quantity has both magnitude and direction.

10. Assertion (A) : Motion of Moon around Earth is a non-uniform motion.

Reason (R) : The size of Moon is smaller than that of Earth.

AR-MS

1)b 2)c 3)b 4)c 5)c 6)a 7)a 8)b 9)d 10)d

2 MARKS QUESTIONS

1: Give an example of a body which may appear to be moving for one person and stationary for the other.

2: Name the instruments used for measuring the speed and distance covered by a body .

3: What do you mean by average speed? What is its unit?

4: What is the difference between uniform velocity and non-uniform velocity?

5: Differentiate between distance and displacement.

6: An athlete completes one round of a circular track of diameter 200m in 40s. What will be the distance covered.

7: A cyclist cycles for t second at a speed of 3 m/s and then for the same time at a speed of 5 m/s along a straight road due north. What is the average speed of the cyclist?

8: When will you say a body is in (i) uniform acceleration? (ii) nonuniform acceleration?

9: A bus decreases its speed from 80 km/h to 60 km/h in 5 s. Find the acceleration of the bus.

10: A bus starting from rest moves with a uniform acceleration of 0.1 ms^{-2} for 2 minutes. Find (a) the speed acquired, (b) the distance travelled.

3 MARKS QUESTIONS

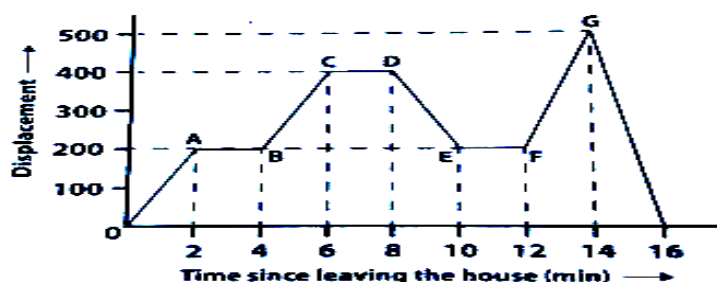
1) A body is moving along a circular path of radius R . What will be the distance and displacement of the body when it completes half a revolution?

2) Distinguish between uniform and non-uniform motion.

- 3) What is the difference between distance and displacement/
- 4) How does uniform linear motion differ from uniform circular motion? Give two points of differences.
- 5) An athlete completes one round of a circular track of diameter 49m in 20s. Calculate the distance covered and displacement at the end of 30s.
- 6) Draw distance-time graphs for
 - (a) an object at rest. (b) Non-uniform motion.
- 7) How is uniform motion in a straight line different from uniform circular motion? Explain.
- 8) A body can have zero average velocity but not zero average speed. Justify.
- 9) A train 100m long is moving with a velocity of 60 kmh⁻¹. Find the time it takes to cross the bridge 1 km long.
- 10) A girl moves with the speed of 6 km/h for 2h and with the speed of 4km/h for the next 3h. Find the average speed of the girl and the total distance moved.
- 12) An electric train is moving with a velocity of 120km/hr. how much distance will it cover in 30s.
- 13) A particle moves 3m north, then 4m east and finally 6m south. Calculate the displacement.
- 14) A bus decreases its speed from 80 km/h to 50km/h in 4s. Find the acceleration of the bus.
- 15) How uniform motion in a straight line different from uniform circular motion? Explain.

5 MARKS QUESTIONS

1. The given graph describes the motion of a girl who travels to meet her friend who stays 500 m from her house.



- (a) How much time did she take to reach her friend's house?
- (b) What distance did she travel in first 12 minutes?
- (c) During which time interval was she moving towards her own house?
- (d) For how many times was she at rest during her entire journey?
- (e) Calculate the velocity by which she returned home?

CASE BASED/COMPETENCY BASED QUESTIONS

1. Distance is the length of the actual path covered by an object, irrespective of its direction of motion. Displacement is the shortest distance between the initial and final positions of an object in a given direction. Distance is a scalar quantity. Displacement is a vector quantity. Distance covered can never be negative. It is always positive or zero. Displacement may be positive, negative or zero.

(a) The ratio of magnitude of displacement to distance is always

- (i) less than 1
- (ii) greater than 1
- (iii) equal to 1
- (iv) less than or equal to 1

(b) In which of the following cases of motions, the distance moved and the magnitude of displacement are equal?

- (i) If the car is moving on straight road
- (ii) If the car is moving in circular path
- (iii) The pendulum is moving to and fro
- (iv) The earth is revolving around the Sun

(c) A particle is moving in a circular path of radius r . The displacement after half a circle would be:

- (i) 0
- (ii) r
- (iii) $r/2$
- (iv) $2r$

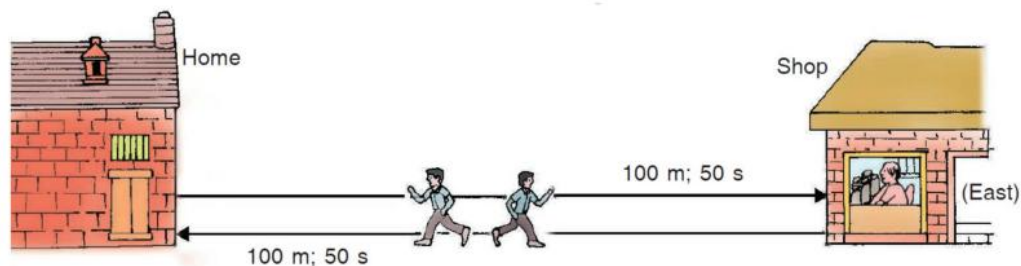
(d) Which of the following is true for distance and displacement?

- (i) Distance is scalar, displacement is vector
- (ii) Both are scalars
- (iii) Both are vectors
- (iv) Distance is vector, displacement is scalar

2.

Read the following and answer any four questions from (i) to (v)

Suppose the boy first runs a distance of 100 metres in 50 seconds in going from his home to the shop in the East direction, and then runs a distance of 100 metres again in 50 seconds in the reverse direction from the shop to reach back home from where he started (see Figure 21).



(i) Find the speed of the boy.

(a) 1 m/s (b) 2 m/s (c) 3 m/s (d) none of these

(ii) Find the Velocity of the boy.

(a) 1 m/s (b) 2 m/s (c) 3 m/s (d) 0 m/s

3. A boy is sitting on a merry-go-round which is moving with a constant speed of 10m/s. This means that the boy is :

a) at rest

b) moving with no acceleration

c) in accelerated motion

d) moving with uniform velocity

3. A particle is moving in a circular path of radius r . The displacement after half a circle would be :

(a) 0

(b) πr

(c) $2r$

(d) $2\pi r$

OR In which of the following cases of motion, the distance moved and the magnitude of displacement are equal ?

(a) if the car is moving on straight road

(b) if the car is moving on circular road

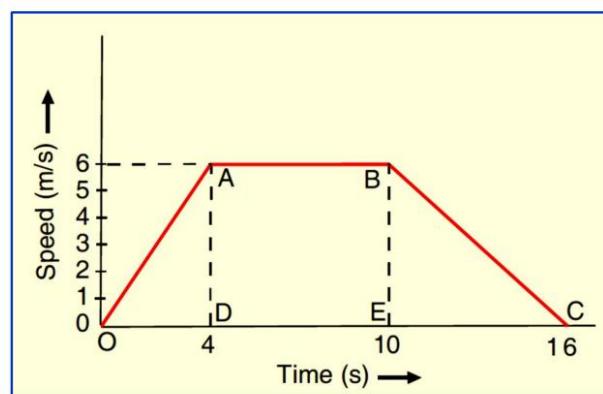
(c) if the pendulum is moving to and fro

(d) if a planet is moving around the sun

3.

Read the following and answer any four questions from (i) to (v)

Aditya started driving his car. He increases the speed till 4 seconds and then he kept his card in constant speed for 6 seconds. Then after he decreased the speed of the car upto another 6 seconds. After reaching at the starting place, he draws the speed-time graph of his 16 seconds driving as shown below:



(i) What type of motion is represented by OA ?

a) uniform velocity

b) uniform acceleration

c) negative acceleration

d) no acceleration

(ii) What type of motion is represented by BC ?

- (a) uniform velocity
- (b) uniform acceleration
- (c) negative acceleration
- (d) no acceleration

(iii) Find out the acceleration of the body.

- (a) 1.5 m/s^2 (b) 2 m/s^2 (c) 3 m/s^2 (d) 1 m/s^2

(iv) Calculate the retardation of the body.

- (a) 1.5 m/s^2 (b) 2 m/s^2 (c) 3 m/s^2 (d) 1 m/s^2

OR Find out the distance travelled by the body from A to B.

- (a) 15 m (b) 30 m (c) 36 m (d) 60 m

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Chapter 5 - Exploring Mixtures and their Separation

MCQ

1. What is the name of the metal which exists in liquid state at room temperature?
(a) Sodium (b) Potassium (c) Mercury (d) Bromine
2. When the liquid is spun rapidly, the denser particles are forced to the bottom and the lighter particles stay at the top. This principle is used in:
(a) Centrifugation (b) Fractional distillation
(c) Evaporation (d) hydraulic washing
3. What is the name of the metal which exists in liquid state at room temperature?
(a) Mercury (b) Bromine (c) Sodium (d) Potassium
4. Which of the following elements is not a metalloid?
(a) Boron (b) Silicon (c) Germanium (d) Tungsten
5. If we put camphor in an open container, its amount keeps on decreasing due to the phenomenon of
(a) Evaporation (b) Precipitation (c) Condensation (d) Sublimation
6. Heterogeneous mixture in which the solute particles do not dissolve and remain suspended throughout the solvent and the solute particles can be seen with the naked eye is known as:
(a) Colloidal solution (b) Super saturated solution
(c) Sublimation (d) Suspensions
7. In tincture of iodine, find the solute and solvent?
(a) alcohol is the solute and iodine is the solvent
(b) iodine is the solute and alcohol is the solvent
(c) any component can be considered as solute or solvent
(d) tincture of iodine is not a solution
8. The continuous zig-zag movement of colloidal particles in a dispersion medium is called
(a) Dispersion (b) Tyndall effect (c) Brownian movement (d) Oscillation
9. A pure substance which is made up of only one kind of atom and cannot be broken into two or more simpler substances by physical or chemical means is referred to as
(a) a compound (b) an element (c) a molecule (d) a mixture
10. Which of the following non-metal is a good conductor of electricity?
(a) Aluminium (b) Silicon (c) Graphite (d) Gold

MCQ-MS

- 1) c 2) a 3) a 4) d 5) d 6) d 7) b 8) c 9) b 10) c

ASSERTION AND REASON QUESTIONS

1. Assertion: When a beam of light passes through a colloidal solution placed in a dark place the path of the beam becomes invisible.

Reason: Light gets scattered by the colloidal particles.

2. Assertion: Mixture of benzoic acid and naphthalene could be separated by crystallization from water.

Reason: Benzoic acid and naphthalene are soluble in hot water.

3. Assertion: A solution of table salt in a glass of water is homogeneous.

Reason: A solution of different composition throughout is homogeneous.

4. Assertion: A mixture of sugar and benzoic acid can be separated when shook with ether.

Reason: Sugar is soluble in water and insoluble in ether.

5. Assertion: In sublimation, a substance changes from solid to vapour directly without passing through liquid state and vice-versa.

Reason: Distillation involves two processes which are vaporisation and condensation.

6. Assertion: Colloidal solution usually exhibits Tyndall effect.

Reason: Particles are usually very large in size.

7. Assertion : Colloidal solutions are stable and colloidal particles don't settle down.

Reason : Brownian movement counters the force of gravity acting on colloidal particles.

8. Assertion : Purification of impure benzoic acid can be done by sublimation.

Reason: Benzoic acid sublimes on heating.

9. Assertion : Tyndall effect come under optical property.

Reason : Electrophoresis comes under electrical property.

10. Assertion : Separation of a mixture of acetone and methanol can be done by fractional distillation.

Reason : The difference in their boiling points is very less.

AR-MS

1)d 2)c 3)c 4)a 5)b 6)d 7)a 8)a 9)b 10)a

2 MARKS QUESTIONS

1. Why is mixture called impure substance?

2. Give the differences between mixture and compound.

3. Distinguish between a physical change and chemical change.

4. State any two properties of a solution, suspension and colloidal solution.

5. What is Tyndall effect.

6. What is the effect of change of temperature on the solubility of a salt.

7. On the basis of physical properties how can we differentiate between metals and non- metals.

8. A solution contains 40g of common salt in 320g of water. Calculate the concentration in terms mass by mass percentage of the solution.

9. Water is a compound but air is a mixture. Give reason.

10. How homogeneous mixtures are different from heterogeneous mixtures.

3 MARKS QUESTIONS

1. Give the difference between mixture and compound.

2. A solution of alcohol in water has been prepared by mixing 150 ml of alcohol with 600 ml of water. Calculate the volume percentage of the solution.

3. (a) Define an element.

(b) What is meant by malleability. Name any two substances that are malleable.

4. Differentiate between an element and a compound. Write one example each.

5. (a) Name the separation technique you would follow to separate:

i. Dyes from black ink

ii. A mixture of salt and ammonium chloride

iii. Cream from milk

iv. Sodium chloride from its solution in water

(b) State the principle used in separating a mixture of two immiscible liquids.

6. Why copper sulphate solution in water does not show Tyndal effect but mixture of water and milk shows.

7. Name the separation technique by which we can obtain coloured components from ink? Give two more applications of the technique used.

8. Define evaporation. Explain any two factors that affect its rate.

9. What is chromatography? State its principle. Write one advantage of chromatography over other techniques.

5 MARKS QUESTIONS

Q1 Distinguish among soda water, milk and muddy water in a tabular form under the following heads: (i) Stability

(ii) Filterability

(iii) Type of mixture

(iv) Tyndall effect

(v) Transparency

Q2 Explain the following giving examples

Saturated solution

Pure substance

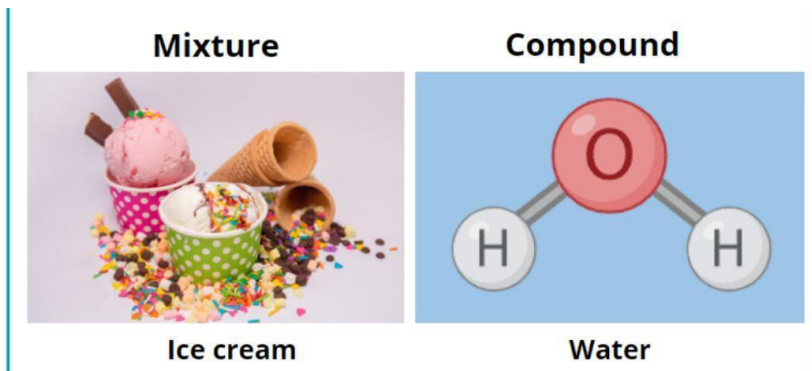
Mixture

Compound

Element

CASE BASED/COMPETENCY BASED QUESTIONS

1. The matter is divided into three main types Compounds, Mixtures, and Elements. Pure substances are compounds. Impure substances are Mixtures. The key difference between compounds and mixtures is that a compound is made up of molecules, each of which is composed of two or more different types of chemically bound atoms. While the mixture is a combination of two or more elements or compounds that are combined physically rather than chemically.



i) Alloys are a form of which of the following?

Mixtures

Compounds

Metals

None of these.

ii) Which of the following statements are true for pure substances?

i) Pure substances contain only one kind of particles

ii) Pure substances may be compounds or mixtures

iii) Pure substances have the same composition throughout

iv) Pure substances can be exemplified by all elements other than nickel

(a) (i) and (ii)

(b) (i) and (iii)

(c) (iii) and (iv)

(d) (ii) and (iii)

iii) Which statement identifies why oxygen is classified as a pure substance and air is classified as a mixture?

a) Oxygen is more reactive than air.

b) Oxygen has higher density than air.

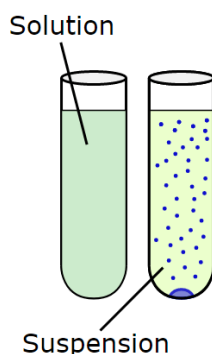
c) Oxygen undergoes a phase change, whereas air is always a gas.

d) Oxygen contains only one substance, but air contains several substances.

iv) When electricity passes through water, hydrogen and oxygen are produced. Which option labels the compounds and elements involved in the process?

- a) Water- compound Hydrogen- compound Oxygen- Element
- b) Water- Element Hydrogen- compound Oxygen- Element
- c) Water- compound Hydrogen- Element Oxygen- Element
- d) Water- Element Hydrogen- compound Oxygen- Compound

2. A suspension is a heterogeneous mixture of two or more substances. In it, the particles are suspended throughout the solution in bulk and can be easily seen by naked eyes. Here, the particles of the solute do not dissolve in the solution and are rather suspended. Particles of the suspension are large enough to scatter the rays of light and the path of ray is visible through it.



(i) What is one property of a suspension that is different from that of a solution or a colloid?

- a) Suspensions are colorless.
- b) A suspension is always clear
- c) If left to rest, the particles of a suspension will settle out.
- d) (c) Colloidal solution has big particles.

(ii) Which of the following can be called a suspension?

- a. Milk
- b. Milk of magnesia
- C. Salt solution
- D. vinegar

iii) The particle size in a suspension is-

- a) Smaller than 100 nm
- b) Larger than 100 nm
- c) Between 1 nm to 100 nm
- d) None of the above.

iv) Which of the following will show Tyndall Effect?

- a) Fog b) Salt solution c) Soda water d) Alcohol in water.

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Chapter 6 - How Forces Affect Motion

MCQ

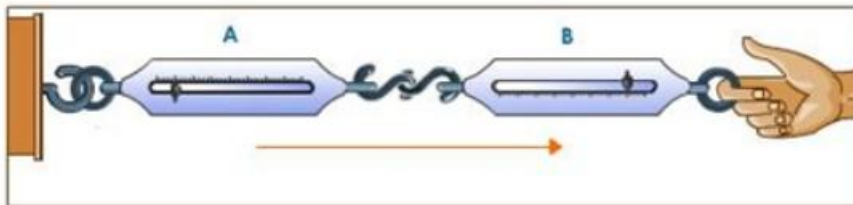
1. A goalkeeper in a game of football pulls his hands backwards after holding the ball shot at the goal. This enables the goalkeeper to:

- (a) Exert large force on the ball
- (b) Increases the force exerted by the ball on hands
- (c) Increase the rate of change of momentum
- (d) Decrease the rate of change of momentum

2. An object of mass 2 kg is sliding with a constant velocity of 4 m/s on a friction less horizontal table. The force required to keep the object moving with the same velocity is:

- (a) 32 N (b) 0 N (c) 2 N (d) 8 N

3. Newton's third law of motion explains the two forces namely 'action' and 'reaction' coming into action when the two bodies are in contact with each other. These two forces:



- (a) Always act on the same body
- (b) Always act on the different bodies in opposite directions
- (c) Have same magnitude and direction
- (d) Acts on either body at normal to each other

4. In a rocket, a large volume of gases produced by the combustion of fuel is allowed to escape through its tail nozzle in the downward direction with the tremendous speed and makes the rocket to move upward.



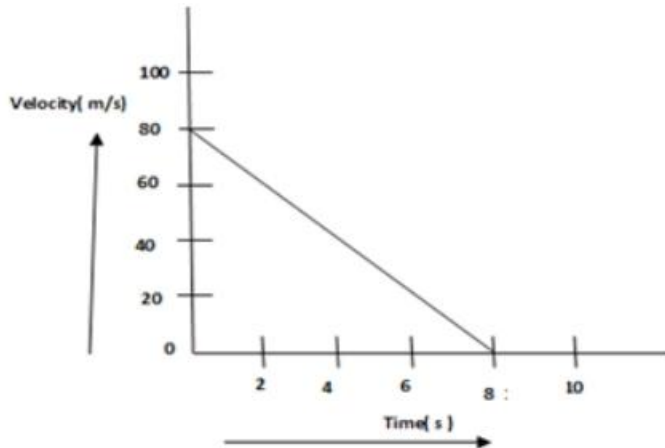
Which principle is followed in this take off of the rocket?

- (a) Moment of inertia (b) Conservation of momentum
- (c) Newton's third law of motion (d) Newton's law of gravitation

5. A water tank filled upto $\frac{2}{3}$ of its height is moving with a uniform speed. On sudden application of the brake, the water in the tank would

- (a) Move backward (b) Move forward (c) Come to the rest (d) Be unaffected

6. Velocity versus time graph of a ball of mass 50 g rolling on a concrete floor is shown in the figure below. What will be the frictional force of the floor on the ball?



- (a) 0.5 N (b) 50 N (c) 5 N (d) 0.05 N

7. The seat belts are provided in the cars so that if the car stops suddenly due to an emergency braking, the persons sitting on the front seats are not thrown forward violently and saved from getting injured. Can you guess the law due to which a person falls in forward direction on the sudden stopping of the car?

- (a) Newton's first law of motion (b) Newton's second law of motion
(c) Newton's third law of motion (d) Newton's law of gravitation

8. When a balloon held between the hands is pressed, its shape changes. This happens because:

- (a) Balanced forces act on the balloon (b) Unbalanced forces act on the balloon
(c) Frictional forces act on the balloon (d) Gravitational force acts on the balloon

9. Which of the following situations involves the Newton's second law of motion?

- (a) A force can stop a lighter vehicle as well as a heavier vehicle which are moving
(b) A force exerted by a lighter vehicle on collision with a heavier vehicle results in both the vehicles coming to a standstill
(c) A force can accelerate a lighter vehicle more easily than a heavier vehicle which are moving
(d) A force exerted by the escaping air from a balloon in the downward direction makes the balloon to go upwards

10. The speed of a car weighing 1500 kg increases from 36 km/h to 72 km/h uniformly. What will be the change in momentum of the car?

- (a) 15000 kg km/h (b) 15000 kg m/s (c) 54000 kg m/s (d) 54000 g m/s

MCQ-MS

- 1) d 2) d 3) b 4) c 5) b 6) d 7) a 8) b 9) a 10) b

ASSERTION AND REASON QUESTIONS

1. Assertion (A) : To every action, there is an equal and opposite reaction.

Reason(R): The action and reaction always act on two different objects.

2. Assertion (A) : Greater is the mass of a body, greater is its inertia.

Reason (R) : Mass of a body is a measure of inertia.

3. Assertion (A) : When we keep an object on a table, the object exerts a force downward and the table needs to exert an equal force upward or the table will collapse.

Reason (R) : The third law states that for every action there is an equal and opposite reaction.

4. Assertion (A) : A gun recoils after firing from a bullet.

Reason (R) : Action and reaction are equal and opposite and act on different bodies.

5. Assertion (A) : The wings of a bird push air downwards and the air must be pushing the bird upwards.

Reason (R) : For every action there is an equal reaction in the same direction.

6. Assertion (A) : When astronauts throw something in space, that object would move in opposite direction but with the same speed.

Reason (R) : The object would continue moving in the same direction with same speed.

7. Assertion (A) : The train has more inertia than the cart.

Reason (R) : The inertia of an object is measured by its mass.

8. Assertion (A) : Even though the action and reaction forces are always equal in magnitude,

these forces may not produce accelerations of equal magnitude.

Reason (R) : Each force acts on a different object that may have the same mass.

9. Assertion (A) : When astronauts throw something in space, that object would move in opposite direction but with the same speed.

Reason (R) : The acceleration of an object produced by a net applied force is directly related to the magnitude of the force, and inversely related to the mass of the object.

10. Assertion (A) : During athletics meet, a high jumping athlete is provided either a cushion or a heap of sand on the ground to fall upon.

Reason (R) : The cushion or sand is used as it increases the athlete's momentum.

AR-MS

1)b 2)a 3)a 4)a 5)c 6)d 7)a 8)c 9)c 10)c

2 MARKS QUESTIONS

- 1: State the difference balanced and unbalanced forces
- 2: What changes will force bring in a body?
- 3: When a motorcar takes a sharp turn at a high speed, we tend to get thrown to one side. Explain why?
- 4: Explain why it is dangerous to jump out of a moving bus.
- 5: Why do fielders pull their hand gradually with the moving ball while holding a catch?
- 6: In a high jump athletic event, why are athletes made to fall either on a cushioned bed or on a sand bed?
- 7: How does a karate player breaks a slab of ice with a single blow?
- 8: What is law of conservation of momentum?
9. Why are roads on mountains inclined inwards at turns?

3 MARKS QUESTIONS

1. If two masses in the ratio 3: 5 are accelerated by forces in the ratio 5 : 3 . Find the ratio of acceleration produced
2. An object experience a net zero external unbalanced force. Is it possible for the object to be travelling with a non-zero velocity? If yes state, the condition that must be placed on the magnitude and direction of the velocity. If no provide reason
3. Define Force and Momentum. Write the relation between them. What will happen to momentum if no force act on a body?
4. A Truck starting from rest rolls down a hill with constant acceleration. It travels a distance of 400m in 20 Seconds. Find its acceleration. Find the force acting on it, if its mass is 7 metrics Tonnes
5. State Newton's second law of motion and derive the expression for Force
6. A bullet of 10 g moving with a speed of 100 m/s penetrates a sandbag and comes to rest in $\frac{1}{10}$ th second
Find
 - a) The distance through which the bullet penetrates
 - b) The retarding force experienced
7. Give reason
 - a) The mangoes are detached from the branch if it is shaken well
 - b) If we Jerk out a piece of paper from under a heavy book, the book will not move
8. A dumb bell of 10 kg mass falls from a height of 0.8 m. What is the momentum transferred by the dumb bell while hitting the ground?
9. A constant retarding force of 50 N is supplied to a body of 70 kg moving initially with a speed of 15 m/s. How long does the body take to stop?

10 Explain why?

- a) a passenger standing in a bus fall backward when the bus suddenly starts moving forward
- b) A passenger standing in the bus falls forward when the bus suddenly stops

5 MARKS QUESTIONS

Q1.Explain the following.

- a) Why does a fireman struggle to hold a hose-pipe?
- b) Why does a gun recoil, when fired?
- c) Why do fielders pull their hands gradually with the moving ball while holding a catch?
- d) Why do you fall in the forward direction when a moving bus brakes to a stop?
- e) Why does a player run for some distance before taking a long jump?

Q2. a)A stone is thrown vertically upwards with a velocity of 40 m/s and is caught at the point of projection. Taking $g = 10 \text{ m/s}^2$, calculate the maximum height reached by the stone.

b) A stone is released from the top of a tower of height 50 m. Calculate its final velocity just before touching the ground.

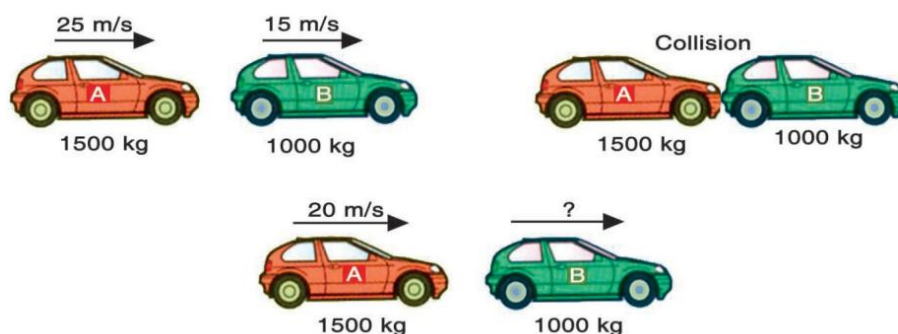
Q3. State Newton's 3rd law of motion explain it by giving one example.

CASE BASED/COMPETENCY BASED QUESTIONS

1.

Read the following and answer any four questions from (i) to (v)

The car A of mass 1500 kg, travelling at 25 m/s collides with another car B of mass 1000 kg travelling at 15 m/s in the same direction. After collision the velocity of car A becomes 20 m/s. Calculate the velocity of car B after the collision.



What is the momentum of the car A before collision?

(a) 30000 kg. m/s (b) 37500 kg. m/s (c) 15000 kg. m/s (d) 52500 kg. m/s

(ii) What is the total momentum of car A and car B before collision?

(a) 3750 kg. m/s (b) 37500 kg. m/s (c) 15000 kg. m/s (d) 52500 kg. m/s

(iii) What is the momentum of the car A after collision?

(a) 30000 kg. m/s (b) 37500 kg. m/s (c) 15000 kg. m/s (d) 52500 kg. m/s

(iv) What is the total momentum of car A and car B after collision?

(a) 30000 kg. m/s (b) 37500 kg. m/s (c) 15000 kg. m/s (d) 52500 kg. m/s

OR What is the velocity of car B after the collision?

(a) 22 m/s (b) 25 m/s (c) 20 m/s (d) None of these

2. Acceleration can be produced by force only. First law of motion defines both inertia and force. Newton's second law of motion gives us a measure of force.

When a body is accelerating in a straight line, the unbalanced force acts in the direction of motion of the body. When no external force acts on the system, the linear momentum of a system is constant. When external forces act on the system, the linear momentum of a system can be changed. When a bus

suddenly takes a turn, the passengers are thrown outwards because of inertia of direction.

Q i) A body is accelerating in a straight line. The unbalanced force acts;

(a) In the direction of motion of the body

(b) In the direction opposite to the motion of the body

(c) In a direction perpendicular to the direction of motion of the body

(d) None of these.

Q ii) The principle of conservation of momentum states that the linear momentum of a system ;

a. Cannot be changed

b. Cannot remain constant

c. Can be changed if only internal forces act

d. Can be changed if only external forces act

Q iii) A motor cycle and a car are moving on a horizontal road with the same velocity. If they are brought to rest by the application of brakes, which provided equal retardation, then

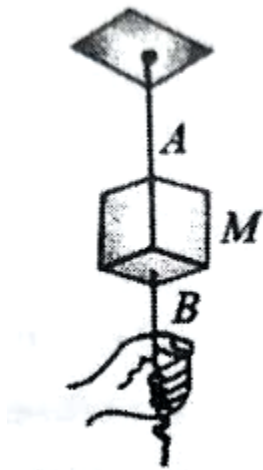
a) Motor cycle will stop at shorter distance

b) Car will stop at a shorter distance

c) Both will stop at the same distance

d) Nothing can be predicted

Q iv) A block of mass M is supported by a cord A from a rigid support and another chord B is attached to the bottom of the block as shown in the figure. Which of the following statement is correct?



- a. If you give a sudden jerk to B , it will break.
- b. If you give a sudden jerk to B , A will break.
- c. If you pull B gently , chord A will break
- d. Both options a) and c) are correct.

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Chapter 7 - Work, Energy, and Simple Machines

MCQ

1. A man is carrying the heavy luggage from one platform to the other of a Railway station but still according to the logics of science his work done is said to be zero. Can you opt out the correct reason?
(a) The force is acting along the direction of displacement of luggage
(b) The force is acting perpendicular to the direction of displacement of luggage
(c) The force is acting opposite to the direction of displacement of luggage
(d) None of these
2. When a body falls freely towards the earth, then its total energy
(a) Decreases (b) Increases
(c) First increases and then decreases (d) Remains constant
3. When a body like earth is moving in a circular path the work done in that case is zero because:
(a) Centripetal force acts in the direction of motion of the body
(b) Centripetal force acts along the radius of circular path
(c) Gravitational force acts along the radius of circular path
(d) Centrifugal force acts perpendicular to the radius of circular path
4. A car is accelerated on a leveled road and attains a velocity 4 times of its initial velocity. In this process, the kinetic energy of the car
(a) Becomes twice to that of the initial (b) Becomes four times to that of the initial
(c) Remains the same (d) Becomes 16 times to that of the initial
5. The momentum of a bullet of mass 20 g fired from a gun is 10 kg m/s. The kinetic energy of this bullet in kJ will be:
(a) 25 (b) 2.5 (c) 0.25 (d) 5
6. Which one of the following is not the unit of energy?
(a) Kilowatt (b) Kilowatt hour (c) Joule (d) Newton meter
7. The form of energy possessed by a flying bird is:
(a) Kinetic energy (b) Potential energy
(c) Both kinetic and potential energy (d) Can't say
8. In the dams water is stored in the high reservoirs and then made to fall down. This falling water then rotates the turbines to generate electricity. In this energy conversion process can you tell the initial and final energies respectively?
(a) Kinetic energy and electrical energy (b) Potential energy and kinetic energy
(c) Potential energy and electrical energy (d) Kinetic energy and potential energy
9. A man of mass 50 kg jumps to a height of 1 m. His potential energy at the highest point is($g = 10 \text{ m/s}^2$):
(a) 50 J (b) 500 J (c) 5 J (d) 5000 J
10. The type of energy possessed by a simple pendulum, when it is at the mean position is:

- (a) Kinetic energy (b) Potential energy
(c) Kinetic + Potential energy (d) Sound energy

MCQ-MS

1) d 2) d) 3) b 4) d 5) C 6) d 7) c 8) a 9) b 10) a

ASSERTION AND REASON QUESTIONS

1. Assertion : Push a pebble lying on a surface and the pebble moves through a distance.

Reason : You exerted a force on the pebble and the pebble got displaced.

2. Assertion : If $F = 1 \text{ N}$ and $s = 1 \text{ m}$ then the work done by the force will be 1 N m .

Reason : Work done by a force acting on an object is equal to the magnitude of the force multiplied by the distance moved in the direction of the force.

3. Assertion : The work done by a force can be either positive or negative.

Reason : The work done will be equal to the product of the force and displacement.

4. Assertion : Work done is negative when the force acts opposite to the direction of displacement.

Reason : Work done is positive when the force is in the direction of displacement.

5. Assertion : 1 J is the energy required to do 1 joule of work.

Reason : The energy possessed by an object is thus measured in terms of its capacity of doing work.

6. Assertion : A falling coconut, a speeding car, a rolling stone, a flying aircraft, flowing water, blowing wind, a running athlete etc. possess kinetic energy.

Reason : Objects in motion possess kinetic energy.

7. Assertion : Kinetic energy is the energy possessed by an object due to its motion.

Reason : The kinetic energy of an object decreases with its speed.

8. Assertion : The kinetic energy possessed by an object of mass, m and moving with a uniform velocity, v is $EK = \frac{1}{2} mv^2$.

Reason : The kinetic energy of an object increases with its speed.

9. Assertion : An object of mass 15 kg is moving with a uniform velocity of 4 m/s and kinetic energy of that object will be 120 J .

Reason : The kinetic energy possessed by an object of mass, m and moving with a uniform velocity, v is $EK = \frac{1}{2} mv^2$.

10. Assertion : An object increases its energy when raised through a height.

Reason : This is because work is done on it against gravity while it is being raised.

AR-MS

1)a 2)a 3)b 4)b 5)b 6)a 7)c 8)b 9)a 10)a

2 MARKS QUESTIONS

- 1: An electrical heater is rated 1200 W. How much energy does it use in 10 hours?
- 2: If an electric appliance is rated 1000 W and is used for 2 hours. Calculate the work done in 2 hours.
- 3: A man of mass 62 kg sums up a staircase of 65 steps in 12 s. If height of each step is 20 cm, find his power.
- 4: How is work done by a force measured? A porter lifts a luggage of 20 kg from the ground and puts it on his head 1.7 m above the ground. Find the work done by the porter on the luggage. ($g = 10\text{m/s}^2$)
- 5: The velocity of a body moving in a straight line is increased by applying a constant force F , for some distance in the direction of motion. Prove that the increase in the kinetic energy of the body is equal to the work done by the force on the body.
- 6: When a force retards the motion of a body, what is the nature of work done by the force? State reason. List two examples of such a situation.
- 7: When is the work done by a force said to be negative? Give one situation in which one of the forces acting on the object is doing positive work and the other is doing negative work.
- 8: (a) Under what conditions work is said to be done?
(b) A porter lifts a luggage of 1.5 kg from the ground and puts it on his head 1.5 m above the ground. Calculate the work done by him on the luggage.
- 9: Four persons jointly lift a 250 kg box to a height of 1 m and hold it.
(i) Calculate the work done by the persons in lifting the box.
(ii) How much work is done for just holding the box?
(iii) Why do they get tired while holding it? ($g = 10\text{ms}^2$)
- 10: A boy is pulling a cart by supplying a constant force of 8 N on a straight path of 20 m. On a roundabout of 10 m diameter, he forgets the path and takes $1\frac{1}{2}$ turns and then continues on the straight path for another 20 m. Find the net work done by the boy on the cart.

3 MARKS QUESTIONS

1. Is it possible that a force is acting on a body but still work done is zero? Explain giving one example.
2. What type of energy is possessed
(a) by the stretched rubber strings of a catapult?
(b) by the moving ceiling fan?
3. Define power. Two girls Rani and Gudiya each of weight 500 N climb up a rope through a height of 20m . Rani takes 20 s whereas Gudiya takes 50 s to accomplish this task. Calculate the power expended by them?

4. State the kind of energy transformation that takes place in the following devices:

□ Solar panel , Microphone, Battery, LED, Gas Stove, Radio

5. A body weighing 40 kg makes a high jump of 1.5m

(I) What is his kinetic energy at the highest point?

(II) What is his potential energy at the highest point? ($g = 10 \text{ m/s}^2$)

6. The velocity of a body moving in a straight line is increased by applying a constant force F , for some distance in the direction of motion. Prove that the increase in the kinetic energy of the body is equal to the work done by the force on the body?

7. How much work should be done on a bicycle of mass 20 kg to increase its speed from 2m/s to 5m/s?

8. Two bodies of equal masses move with uniform velocities v and $3v$ respectively. Find the ratio of their kinetic energies?

9. Which one has greater effect on kinetic energy of moving body doubling the mass or doubling the velocity. Explain by giving reason?

10. What happens to the potential energy of a moving body when its height is doubled and mass is halved?

11. What is the difference between gravitational potential energy and elastic potential energy. Give one example of each.

5 MARKS QUESTIONS

1. i) A force of 8 Newton acts on an object and produces a displacement of 9 m in the direction of force . Calculate the work done.

ii) Give examples of the situation where work done by a force is positive and negative.

iii) List the two conditions required for the work to be done.

2. i) How is kinetic energy different from potential energy.

ii) The kinetic energy of an object of mass 'm' moving with the velocity of 5 m per second is 25 joules what will be its kinetic energy when its velocity is doubled.

3. i) What do you mean by the law of conservation of energy.

ii) Write about the energy transformations in the following examples-

Riding of cycle

Lighting of a torch

4. i) Define one watt of power.

ii) A lamp consumes 1000 joules of electrical energy in 10 seconds. What is its power.

iii) A boy of mass 40 kg runs staircase 50 steps in 10 seconds if the height of each step is 10 cm. Find his power.

5. An object of mass 20 kg is at a certain height above the ground. If the potential energy of the object is 240 Joule find the height at which the object is with respect to the ground.

CASE BASED/COMPETENCY BASED QUESTIONS

1. A more powerful vehicle would complete a journey in a shorter time than a less powerful one. We talk of the power of machines like motorbikes and motor cars. The speed with which these vehicles change energy or do work is a basis for their classification. Power measures the speed of work done, that is, how fast or slow work is done. Power is defined as the rate of doing work or the rate of transfer of energy. If an object does a work W in time t , then power is given by

$P = \text{work}/\text{time}$

$P = W/T$. The unit of power is watt.

(i) The rate of doing work is defined as

(a) Energy (b) Force (c) Power (d) None of these

(ii) Total energy consumed divided by total time taken is called as

(a) Average power (b) Instant power

(c) Both a and b (d) None of these

(iii) Let A and B having same weight start climbing the rope and reach height of 10m. Let A takes 10sec while B takes 12sec then work done

(a) By both will be same (b) By A is more than work done by B

(c) By B is more than work done by A (d) None of these

(iv) Define 1 Watt of power

OR An electric bulb of 20W is used for 5h per day. Calculate the 'units' of energy consumed in one day by the bulb.

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Chapter 8 - Journey Inside the Atom

MCQ

1. Who discovered the electron?
(a) Rutherford (b) Chadwick (c) Thomson (d) Goldstein
2. Which isotope is used in the nuclear power plants to generate electricity?
(a) Uranium 235 (b) Iodine 131 (c) Cobalt 60 (d) Uranium 238
3. Why was the Thomson's Model of an atom failed?
 - i. It could not explain the screening of negative charges from that of positive
 - ii. It did not tell about the presence of electrons
 - iii. It did not give an idea about the discrete energy levels
 - iv. It explained the atom as a whole to be electrically neutralChoose the correct option from the following:
(a) Only (iii) (b) Both (i) & (iii) (c) Only (i) (d) Both (ii) & (iv)
4. What was the source of alpha particles in Rutherford scattering experiment?
(a) Hydrogen nucleus (b) Argon nucleus
(c) Helium nucleus (d) None of these
5. What property of an element determines its chemical behaviour?
(a) Size of an element (b) Valency of an element
(c) Molar mass of the element (d) None of these
6. Which of the following does not match the characteristics of an Isotope?
(a) Isotopes of some elements are radioactive
(b) Isotopes are the atoms of different elements
(c) Isotopes differ in number of neutrons
(d) Isotopes have similar chemical properties
7. Which of the two will be chemically more reactive, Sulphur(S) with atomic number 16 or Chlorine (Cl) with atomic number 17?
(a) Chlorine (b) Sulphur (c) Both are equally reactive (d) Can't say
8. Which of the following elements does not exhibit the electrovalency?
(a) Sodium (b) Calcium (c) Carbon (d) Chlorine
9. Which of the following statements is incorrect about the structure of an atom?
 - i. The whole mass of an atom is concentrated in the nucleus
 - ii. The atom is an indivisible particle
 - iii. The atom as a whole is neutral
 - iv. All the atoms are stable in their basic stateChoose the right option among the following:
(a) (i) and (iii) (b) only (ii) (c) (ii) and (iv) (d) none of these
10. Which scientist gave the concept of fixed energy levels around the nucleus?
(a) Ernest Rutherford (b) Neils Bohr (c) J.J.Thomson (d) None of these

MCQ-MS

- 1) c 2) a 3) b 4) c 5) b 6) b 7) a 8) c 9) c 10) b

ASSERTION AND REASON QUESTIONS

1.Assertion (A): Atom is electrically neutral.

Reason(R) : Atom contains only neutral particles, called neutrons, in its nucleus.

2.Assertion (A) : The physical and chemical properties of isobars are identical.

Reason (R) : Isobars have same mass numbers but different atomic numbers.

3.Assertion (A): Anions are larger in size than the parent atom.

Reason(R) : In an anion, the number of protons in the nucleus is less than the number of electrons moving around it.

4.Assertion: Electrons moving in the same orbit will lose or gain energy.

Reason: On jumping from higher to lower energy level, the electron will gain energy.

AR-MS

1)c 2)d 3)d 4)c

2 MARKS QUESTIONS

1: Name the scientist who discovered protons and neutrons in an atom.

2: What is the contribution of Bohr and Bury together in the structure of atom's explanation?

3: Draw the atomic structure of (i) an atom with same number of sub-atomic particles, (ii) an atom with same number of electrons in L and M shell.

4: Write the electronic configuration of a pair of isobars.

5: Find the valency of $^{14}_7\text{N}$ and $^{35}_{17}\text{Cl}$.

6: Number of protons and electrons are same in an atom. Then why is it wrong to say that atomic number of an atom is equal to its number of electrons.

7: An atom is electrically neutral On loss or gain of electrons why does it become charged?

8: What are nucleons? What is the name given to those atoms which have same number of nucleons in it?

9: Give the difference between three sub-atomic particles.

10. Give the names of three atomic species of hydrogen.

3 MARKS QUESTIONS

1. Give reasons:

a) Mass number of an atom excludes the mass of an electron.

b) Nucleus of an atom is charged.

c) Alpha particles scattering experiment was possible by using gold foil only and not by foil of any other metal.

2. An atom of an element has 6 electrons in its 'M' shell.

a) Identify the element.

- b) What is its atomic number?
- c) State its valency.
3. a) Which of the following are isotopes and which are isobars?
Argon, Protium, Calcium and Deuterium.
- b) Explain, why the isotopes have similar chemical properties but they differ in physical properties.
4. a) Chlorine occurs in nature in two isotopic forms with masses 35u and 37u in the ratio of 3:1. Calculate the average atomic mass of Chlorine atom on the basis of this data.
- b) Write the main drawback of Rutherford's model of an atom.
5. a) How many neutrons are present in C-14 isotope of carbon?
- b) How many protons does He^{2+} ion possess?
- c) How many electrons can be filled in the third orbit of an atom at a maximum?
6. State the observations in α – particle scattering experiment which led Rutherford to make the following conclusions:
- a) Most of the space in an atom is empty.
- b) Whole mass of an atom is concentrated at its center.
- c) Center is positively charged.
7. The description of atomic particles of two elements 'X' and 'Y' is given below.

	X	Y
Protons	8	8
Neutrons	8	9
Electrons	8	8

- a) What is the atomic number of 'Y'?
- b) What is the mass number of 'X'?
- c) What is the relation between 'X' and 'Y'?
- d) Which element/elements do they represent?
- e) Write the electronic configuration of 'X'.
- f) Write the cation / anion formed by the element.

5 MARKS QUESTIONS

1. An electrically charged atom of an element is called its ion. In an ion, the numbers of proton and electrons are different. A positively charged ion is called cation. In a cation, the number of protons in the nucleus is greater than the number of electrons in its energy shells.

A negatively charged ion is called anion. In an anion, the number of electrons is more than the number of protons in its nucleus.

(i) Three electrons are present in the outermost shell of the atom of an element X. What would be the nature and value of charge on the ion formed if this electron is removed from the outermost shell?

(ii) In the atom of an element Y, 6 electrons are present in the outermost shell. If it acquires noble gas configuration by accepting requisite number of electrons, then what would be the charge on the ion so formed?

(iii) Chemical formula of a metal sulphate is MSO_4 . What will be the formula of its oxide?

(iv) Valency of an element X is 2. Write the chemical formula of its chloride.

(v) The atomic number of Al and S are 13 and 16, respectively. What will be the number of electrons in Al^{3+} and S^{2-} ?

Q2. An element has an atomic number 12 and mass number 26. Draw a diagram showing the distribution of electrons in the orbits and the nuclear composition of the neutral atom. If this element X combines with another element Y whose electronic configuration is 2,8,7, what will be the formula of the compound thus formed? (CBSE CCE 2010)

Q3. Give reason for the following

- a) An atom is electrically neutral
- b) Noble gases show least reactivity
- c) Nucleus of an atom is heavy and positively charged.
- d) Ions are more stable than atoms.

CASE BASED/COMPETENCY BASED QUESTIONS

1. Neil's Bohr put forward the atomic structure. He proposed that only certain special orbits known as discrete orbits of electrons, are allowed inside the atom. Also, while revolving in discrete orbits the electrons do not radiate energy. Given below is the atomic structure of an element A as per the Bohr's model.

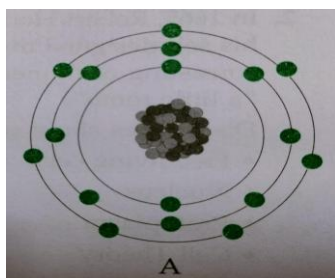
a) Element A as depicted in the diagram is

- (i) Chlorine (ii) Sodium (iii) Potassium (iv) Argon

b) There exists another atomic species with the same number of electrons as the element A. Its atomic mass is 35. The number of nucleons in this atomic species is

- (i) 52 (ii) 50 (iii) 17 (iv) 35

c) The element A attains noble gas electronic configuration of ____ after _____ electrons.



- (i) Argon, losing (ii) Argon, gaining

(ii) neon, losing (iv) neon, gaining

(d) Is the element A, a metal or a non-metal?

OR (d) Write the compound formed by element A with magnesium.

2. The maximum number of the electrons which are permitted to be assigned to an energy shell of an atom is called the electron capacity of that shell. The distribution of electrons in different orbits or shell is governed by a scheme known as Bohr-Bury scheme. According to this scheme :

(a) The maximum number of the electrons that can be present in any shell is given by the formula $2n^2$ where, n is the number of energy level.

(b) The maximum number of electrons that can be accommodated in the outermost shell is 8. Electrons are filled in the shells in a stepwise manner in increasing order of energy of the energy shell.

(i) What is the maximum electrons capacity of N shell?

(a) 24 (b) 8 (c) 18 (d) 32

(ii) Identify the element with the configuration K-2, L-8, M-3.

(a) Aluminium (b) Magnesium

(c) Sodium (d) Beryllium

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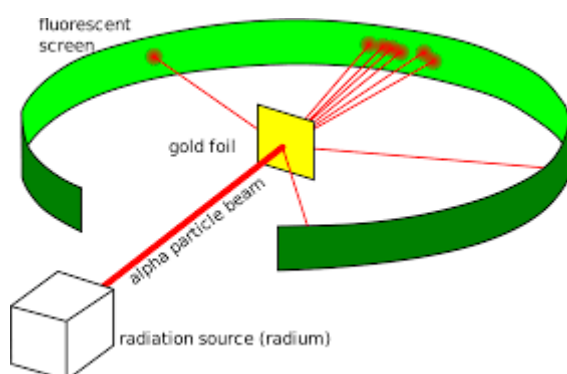
(a) Aluminium (b) Magnesium

(c) Sodium (d) Beryllium

(iii) Write the electronic configuration of Magnesium?

(iv) An electron can jump from lower energy orbit to a higher energy orbit only when it gains energy from outside. (State True/ False)

3.



Ernst Rutherford and his two students H. Geiger and M. Marsden bombarded a very thin foil of gold by alpha particles. The observations of this experiment provided evidence of the existence of atomic nucleus.

An alpha particle is formed when both the electrons are removed from a helium atom.

(i) Why did Rutherford select gold foil?

(ii) What is an alpha particle?

(iii) Most of the alpha particles pass through the gold foil without any deviation. What conclusion did Rutherford draw from this?

(iv) An atom is electrically neutral. Justify.

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Chapter 9 - Atomic Foundations of Matter

MCQ

- Which of the following correctly represents 360g of water?
(i) 2 moles of water
(ii) 20 moles of water
(iii) 6.022×10^{23} molecules of water
(iv) 1.2044×10^{25} molecules of water
(a) (i) (b) (i) and (iv) (c) (ii) and (iii) (d) (ii) and (iv)
- Which of the following statements is not true about an atom?
(a) Atoms are not able to exist independently.
(b) Atoms are the basic units from which molecules and ions are formed.
(c) Atoms are always neutral in nature.
(d) Atoms aggregate in large numbers to form the matter that we can see, feel or touch.
- 1 u or 1 amu means
(a) $1/12$ th mass of C-12 atoms (b) Mass of C-12 atom
(c) Mass of O-16 atom (d) Mass of Hydrogen molecule
- Which of the following contains maximum number of molecules?
(a) 19 CO₂ (b) 1 g N₂ (c) 1 g H₂ (d) 1 g CH₄
- A sample of NH₃ molecule irrespective of source contains 82.35% Nitrogen and 17.65% of Hydrogen by mass. This data supports:
(a) Law of Conservation of Mass (b) Law of Multiple Proportions
(c) Law of Definite Proportions (d) Avogadro's Law
- An element X is divalent and another element Y is tetravalent. The compound formed by these two elements will be:
(a) XY (b) XY₂ (c) X₂Y (d) XY₄
- The molecular formula of potassium nitrate is _____.
(a) KNO₃ (b) KNO (c) KNO₂ (d) KON
- 3.42 g of sucrose are dissolved in 18 g of water in a beaker. The numbers of oxygen atoms in the solution are:
(a) 6.68×10^{23} (b) 6.09×10^{22} (c) 6.022×10^{23} (d) 6.022×10^{21}
- Molecular mass is defined as the:
(a) Mass of one molecule of any substance compared with the mass of one atom of C – 12
(b) Mass of one atom compared with the mass of one atom of hydrogen
(c) Mass of one atom compared with the mass of one molecule
(d) None of the above
- A change in the physical state can be brought about
(a) only when energy is given to the system
(b) only when energy is taken out from the system
(c) When energy is either given to, or taken out from the system
(d) Without any energy change

MCQ-MS

- 1) a 2) C 3) C 4) C 5) a 6) d 7) c 8) b 9) b 10) b

ASSERTION AND REASON QUESTIONS

1. Assertion: Water molecules always contain hydrogen and oxygen in the ratio 1:8.

Reason: Water obeys law of constant proportions irrespective of source and method of preparation.

2. Assertion: Atoms can neither be sub-divided, created nor destroyed.

Reason: This postulate of Dalton's theory is the result of law of constant proportion.

3. Assertion: Carbonates are polyatomic ions.

Reason: The carbonate ion consists of one carbon atom and three oxygen atoms and carries an overall charge of 2^- .

4. Assertion: Relative atomic mass of the atom of element is the average masses of the atom as compared to the mass of one carbon- 12 atom.

Reason: Carbon-12 isotope is the standard reference for measuring atomic masses.

5. Assertion: Atoms always combine to form molecule and ions.

Reason: Atoms of most element are not able to exist independently.

6. Assertion: Atomicity of ozone is three while that of oxygen is two.

Reason: Atomicity is the number of atoms constituting a molecule.

7. Assertion: The number of particles present in one mole of a substance is fixed.

Reason: The mass of one mole of a substance is equal to its relative atomic mass in grams.

8. Assertion : 1 amu equals to 1.66×10^{-24} g.

Reason : 1.66×10^{-24} g equal to mass of a C- 12 atom.

9. Assertion : Molecular weight of oxygen is 16.

Reason : Atomic weight of oxygen is 16.

10.Assertion : On burning magnesium in oxygen, the mass of magnesium oxide formed is equal to the total mass of magnesium and oxygen

Reason : In a chemical substance, the elements are always present in a definite proportion.

AR-MS

1)a 2)c 3)a 4)c 5)d 6)a 7)a 8)a 9)d 10)b

2 MARKS QUESTIONS

1: What does the Law of conservation of mass state.

2: Write the symbols of mercury and sulphur as proposed by Dalton

- 3: Give the Latin name for sodium, potassium, gold, and mercury.
- 4: What is the ratio by mass of combining elements in H_2O , CO_2 and NH_3 ?
- 5: Define valency and give the valency for the following elements:
Magnesium, Aluminum, Chlorine, and Copper.
- 6: What is polyatomic ion? Give two examples.
- 7: Write down the formula for:
Copper nitrate, calcium sulphate and aluminum hydroxide.
- 8: What is formula unit mass? How is it different from molecular mass?
- 9: What will be the atomicity of -
Ozone
Sulphur
Phosphorus
Helium

3 MARKS QUESTIONS

- Q 1. Write down the chemical formulae of:
(a) Magnesium nitride (b) Calcium nitrate (c) Sodium nitrite
- Q 2. Find the number of atoms present in:
 SO_2 molecule (b) SO_4 ion
- Q3. Define formulae unit mass of compounds. Calculate the formulae unit mass of:
 $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (b) CuSO_4
- Q4. Write down the names of compounds represented by the following chemical formulae:
(a) $\text{Al}_2(\text{SO}_4)_3$ (b) CaCl_2 (c) NaNO_3

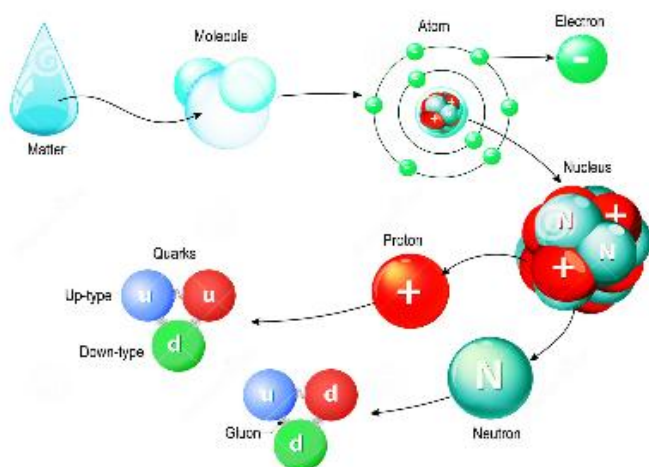
5 MARKS QUESTIONS

- Q1. Answer the following
State the law of conservation of mass. Explain by giving examples.
State the law of constant proportions. Explain by giving examples.
- Q2. Write the postulates of Dalton's Atomic Theory.
- Q3. What are ions? Write two difference between atoms and ions. How many atoms are present in each of the following compounds? (a) Aluminium Sulphate (b) Magnesium Hydroxide (c) Sodium Bicarbonate (d) Calcium Carbonate

CASE BASED/COMPETENCY BASED QUESTIONS

1. Atom can be described as in building houses the building blocks of all matter are atoms. A molecule is in general a group of two or more atoms that are chemically bonded together, that is, tightly held together by attractive forces. A molecule can be defined as the smallest particle of an element or a compound that is capable of independent existence and shows all the

properties of that substance. Atoms of the same element or of different elements can join together to form a molecule. The number of atoms constituting a molecule is known as its atomicity. Metals and some other elements, such as carbon, do not have a simple structure but consist of a very large and indefinite number of atoms bonded together.



(i) How many times an atom of sulphur is heavier than an atom of carbon?

- a) 32 times
- b) 12 times
- c) $8/3$ times
- d) $12/32$ times

(ii) Which of the following has a maximum number of the atom?

- a. 18 g H_2O
- b. 18 g of O_2
- c. 18 g of CO_2
- d. 18 g of CH_4

(iii) Which has the maximum number of molecules?

- a) 1 g of CO_2
- b) 1 g of N_2
- c) 1 g of H_2
- d) 1 g of CH_4

(iv) Which of the following correctly represents 360 g of water?

- I. 2 moles of H_2O
- II. 20 moles of water
- III. 6.022×10^{23} molecules of water
- IV. 1.2044×10^{25} molecules of water

- (a) (I) only
- (b) (I) and (IV)

(c) (II) and (III)

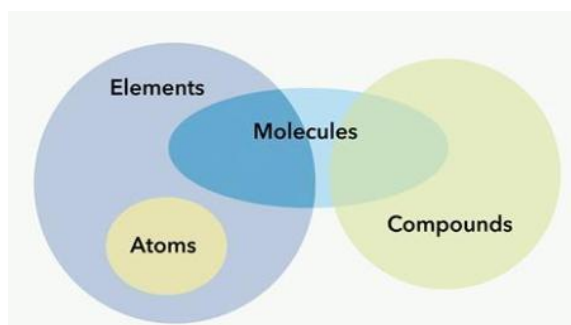
(d) (II) and (IV)

OR The molecule having atomicity of 4 is:

- a. Sulphate molecule
- b. Ozone molecule
- c. Phosphorus molecule
- d. Methane molecule

2. An atom or a molecule can lose or gain electron(s) to form an ion. At this level students only need to know that an ion is a positively or negatively charged particle. When an atom/ molecule gains negatively charged electron(s), a negative ion is formed. When an atom/ molecule loses

negatively charged electron(s), a positive ion is formed.



- a) Why does not every atom loose electron?
- b) Explain, why all the substances which form molecule is not always compounds?
- c) Differentiate between elements and molecules.

OR

Find the difference in number of electrons in Al^{3+} ion and S^{2-} ion.

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Chapter 10 - Sound Waves: Characteristics and Applications

MCQ

Q1. The sound can travel in air when:

- (a) Particles of medium travel from one place to another
- (b) There is no moisture in the atmosphere
- (c) Disturbance travel from one place to another
- (d) Both particles as well as disturbance travel from one place to another

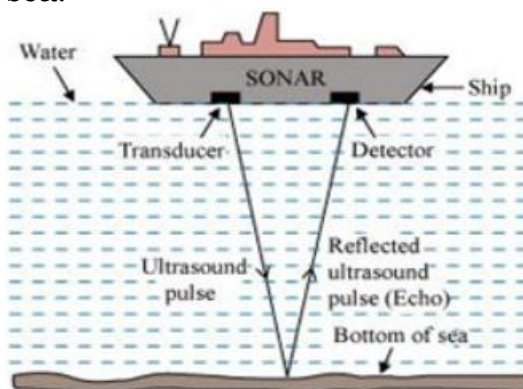
Q2. We can distinguish between a man's voice and a woman's voice of the same loudness even without seeing them. This is due to a characteristic of sound which measures the shrillness of sounds. Can you choose the correct unit of the quantity on which this characteristic of sound depends?

- (a) hertz
- (b) meter/second
- (c) meter
- (d) no units

Q3. A key of mechanical piano is first struck gently and then struck again but much harder this time. What kind of change in sound will you observe in the second case:

- (a) Sound will be louder but the pitch will not be different
- (b) Sound will be louder and the pitch will also be higher
- (c) Sound will be louder but the pitch will be lower
- (d) Both loudness and pitch will remain unaffected

Q4. The echo-receiver of a sonar attached to a ship, receives the echo from the bottom of sea 4 seconds after the ultrasonic waves were sent into the sea.



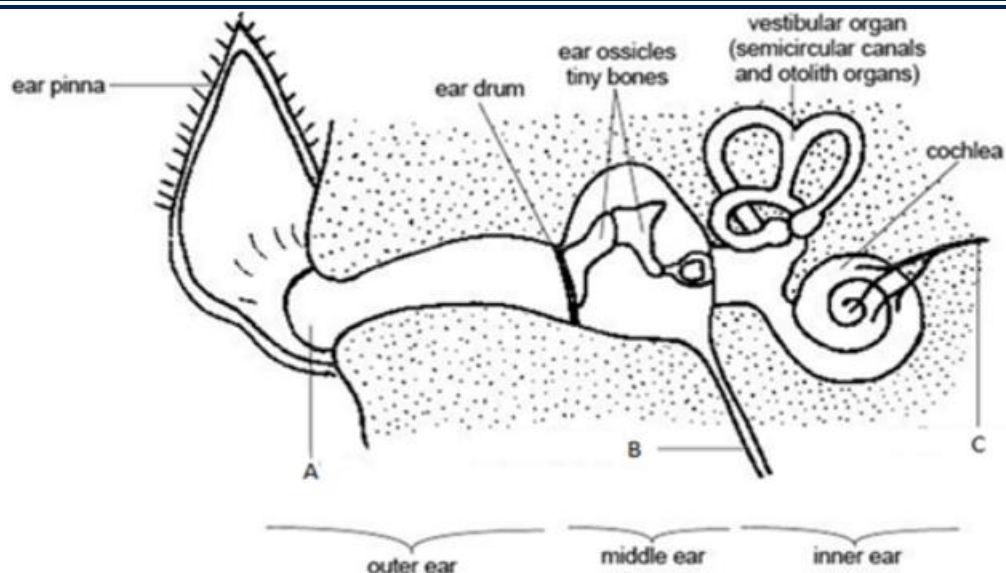
If the speed of sound in water is 1500 m/s, then what is the depth of the sea?

- (a) 6000 m
- (b) 3000 m
- (c) 15000 m
- (d) 3500 m

Q5. Before the main shock waves, the earthquake produces the characteristic sound waves which some animals like rhinoceros can hear. Can you guess the kind of sound waves produced here?

- (a) Infrasonic sounds
- (b) Ultrasonic sounds
- (c) Audible Sounds
- (d) None of these

Q6. Given below is the diagram of human ear. Choose the correct labeling of the parts A, B and C.



- (a) A-ear lobe, B-ear canal, C-auditory nerve
 (b) A-ear drum, B-auditory nerve, C-ear canal
 (c) A-ear canal, B-Eustachian tube, C-auditory nerve
 (d) A-ear canal, B-Eustachian tube, C-cochlea

Q7. On increasing the temperature, the speed of sound in air:

- (a) Increases (b) Decreases
 (c) Does not change (d) First increases then becomes constant

Q8. Loudness measures the sound energy reaching the ear per second and depends on the amplitude of the sound wave. What is the unit used to measure the loudness of sound?

- (a) hertz (b) decibel (c) meter/second (d) second

Q9. We can easily distinguish between the sounds of the different singers even without having seen them. This is all due the different quality or timber of their sounds. On what factor does the quality of sound depend?

- (a) Wavelength (b) Waveform (c) Wave frequency (d) Wave amplitude

Q10. Before playing the orchestra in a musical concert, a sitarist tries to adjust the tension and pluck the string suitably. By doing so, he is adjusting

- i. Amplitude of the sound
 ii. Frequency of the sitar string with the frequency of other musical instruments
 iii. Intensity of sound
 iv. Loudness of sound

Choose the correct option:

- (a) (i) and (iii) (b) only (ii) (c) (ii) and (iv) (d) only (iv)

MCQ-MS

- 1) d 2) d) 3) b 4) d 5) C 6) d 7) c 8) a 9) b 10) a

ASSERTION AND REASON QUESTIONS

1. Assertion : Sound is a form of energy which produces a sensation of hearing in our ears.

Reason : When you clap, a sound is produced.

2. Assertion : The sound of the human voice is produced due to vibrations in the vocal cords.

Reason : Vibration means a kind of rapid to and fro motion of an object.

3. Assertion : The particles do not travel all the way from the vibrating object to the ear.

Reason : A particle of the medium in contact with the vibrating object is first displaced from its equilibrium position.

4. Assertion : The matter or substance through which sound is transmitted is called a medium

Reason : Sound moves through a medium from the point of generation to the listener.

5. Assertion : A wave is a disturbance that moves through a medium when the particles of the medium set neighbouring particles into motion.

Reason : A particle of the medium in contact with the vibrating object is first displaced from its equilibrium position and produces a wave.

6. Assertion : Sound waves are characterised by the motion of particles in the medium and are called mechanical waves.

Reason : Air is the most common medium through which sound travels.

7. Assertion : Sound is a mechanical wave and needs a material medium like air, water, steel etc. for its propagation.

Reason : Sound cannot travel through vacuum.

8. Assertion : Echo is the repetition of sound due to reflection of original sound by a large and hard obstacle.

Reason : To hear a distinct echo, the time interval between the original sound and the reflected one must be at least 0.1 sec.

9. Assertion : Human ear converts pressure variations in air with audible frequencies into electric signals.

Reason : Audible sound lies in the range of 20 to 2000 Hz.

10. Assertion : Audible sound lies in the range of 20 to 200 Hz.

Reason : Infrasonic sound or Infra-sound has frequency less than 20 Hz.

AR-MS

1)b 2)b 3)b 4)b 5)a 6)a 7)b 8)c 9)d 10)d

2 MARKS QUESTIONS

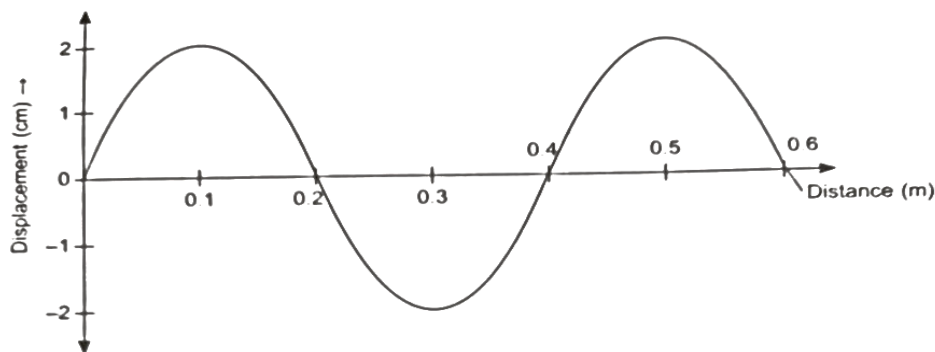
1. A cricket ball is seen to hit the bat first and the sound of hitting is heard a little later. Why?
2. Define wave-motion.
3. What is 'sonic boom'?
4. Why does sound become faint with distance?
5. Why do we say that sound waves are longitudinal?
6. Differentiate between longitudinal wave and transverse wave.
7. What is crest and trough?
8. The maximum oscillation disturbance of particles of air forms crest and trough. What is echo? Why don't we get echo in small room?
9. What is velocity of sound? Why does sound travel faster in summer season than in winter?
10. Draw a graphical representation of the wave shape for
 - (a) low pitched sound
 - (b) a high-pitched sound.

3 MARKS QUESTIONS

1. Define amplitude, time period and frequency of sound wave.
2. What is meant by reverberation? How can we reduce reverberation in big halls or auditoriums?
3. A child watching Dussehra from a distance sees the effigy of ravana burst into flames and hears the explosion associated with it 2 sec after that. How far was he from the effigy if the speed of sound in air that night was 335m/sec?
4. Explain three applications of SONAR.
5. A stone is dropped into a well 44 m deep and the sound of splash is heard after 3.12 sec. Find the speed of sound in air.
6. Explain the structure of human ear.
7. A ship sends out ultrasound that returns from the seabed and is detected after 3.42 s. If the speed of ultrasound through seawater is 1531 m/s. What is the distance of the seabed from the ship?
8. How does the sound produced by a musical instrument, reach your ears? Astronauts need radio transmitter to talk to each other on moon. Why?

5 MARKS QUESTIONS

1. The propagation of a wave travelling through a medium of a velocity of 340m/s is shown in the graph below



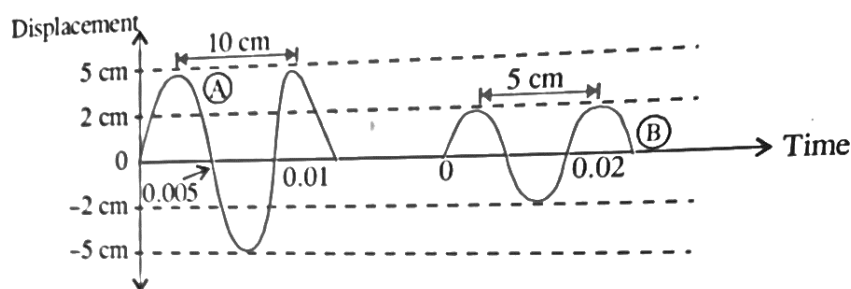
- i. Find the wavelength from the above graph.
- ii. Find the frequency from the above graph.
- iii. Find the time period from the above graph.
- iv. Find the amplitude from the above graph.

The sound wave propagating through a medium travel in the form of -

- i) crest and trough
- ii) crest and compression
- iii) compression and rarefaction
- iv) rarefaction and trough.

CASE BASED/COMPETENCY BASED QUESTIONS

1. Study the two waves A and B. shown in the figure.



- i. Name the physical quantity which determines the loudness of sound wave.
- ii. What is the difference between the amplitude of waves A and B shown in the figure?
- iii. What is the difference between the wavelength of wave A and B shown in the figure?
- iv. The frequency of wave A is 100 Hz. What is the velocity of wave A?

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Chapter 11 - Reproduction: How Life Continues

MCQ

1. In the list of organisms given below, those that reproduce by the asexual method are
 - i) Bandana ii) dog iii) yeast iv) amoeba
 - a) ii and iv
 - b) ii, iii, iv
 - c) i and iv
 - d) ii, iii, iv
2. In a flower, the parts that produce male and female gametes are
 - a) Stamen and anther
 - b) Filament and stigma
 - c) Anther and ovary
 - d) Stamen and style
3. Which of the following is the correct sequence of events of sexual reproduction in a flower?
 - a) Pollination, fertilization, seedling ,embryo.
 - b) Seedling, embryo, fertilization, pollination
 - c) Pollination ,fertilization, embryo ,seedling
 - d) Embryo, seedling, pollination, fertilization
4. Offsprings formed by asexual method of reproduction have greater similarity among themselves because
 - i) Asexual reproduction involves only one parent
 - ii) Asexual reproduction does not involve gametes
 - iii) Asexual reproduction occurs before sexual reproduction
 - iv) Asexual reproduction occurs after sexual reproduction
 - a) i and ii
 - b) i and iii
 - c) ii and iv
 - d) i,iii and iv
5. Characters transmitted from parents to offspring are present in
 - a) Cytoplasm
 - b) Ribosome
 - c) Golgi bodies
 - d) Genes
6. Characters that are transmitted from parents to offspring during reproduction show
 - a) Only similarities with parents
 - b) Only variations with parents
 - c) Both similarities and variations with parents
 - d) Neither similarities nor variations
7. A feature of reproduction that is common to amoeba, spirogyra and yeast is that
 - a) The reproduce asexually
 - b) There are all unicellular
 - c) They reproduce only sexually
 - d) They are all multicellular
8. In spirogyra, asexual reproduction takes place by breaking up of filaments into smaller pieces

- a) Division of a cell into two cells
 - b) Division of a cell into many cells
 - c) Formation of young cells from older cells
 - d) None of these
9. The ability of a cell to divide into several cells during reproduction in plasmodium is called
- a) Budding
 - b) Reduction division
 - c) Binary fission
 - d) Multiple fission
10. The correct sequence of reproductive stages seen in flowering plants is
- a) Gametes, zygote embryo, seedling
 - b) Zygote, gametes, embryo, seedling
 - c) Seedling, embryo, zygote, gametes
 - d) Gametes, embryo, zygote, seedling
11. The number of chromosomes in parents and offsprings of a particular species remains constant due to
- a) Doubling of chromosomes after zygote formation
 - b) Halving of chromosomes due to gamete formation
 - c) Doubling of chromosomes after gamete formation
 - d) Halving optimal rules after gamete formation
12. In rhizopus, tubular thread like structure bearing sporangium at their tips are called
- a) Elements
 - b) Hyphae
 - c) Rhizoids
 - d) Roots
13. Vegetative propagation refers to formation of new plants from
- a) Stem ,roots and flowers
 - b) Stem ,roots and leaves
 - c) stem ,flowers and fruits
 - d) Stem ,leaves and flowers
14. Factor responsible for the spread of bread mould on slices of bread are
- i) Large number of spores
 - ii) Availability of moisture and nutrients in bread
 - iii) Presence of tubular branched hyphae
 - iv) Formation of round shaped sporangia
- a) I and iii
 - b) ii and iv
 - c) i and ii
 - d) iii and iv

ASSERTION - REASON TYPE QUESTION

Following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true

1. **Assertion (A)** : Asexual reproduction is a primitive type of reproduction.
Reason (R) : Asexual reproduction involves only mitotic cell division.

2. **Assertion (A)** : Spores are unicellular bodies.
Reason (R) : The parent body simply breaks up into smaller pieces on maturation.
3. **Assertion (A)** : Clones are offspring of an organism formed by asexual reproduction.
Reason (R) : Clones have exact copies of DNA as their parent.
4. **Assertion (A)** : Colonies of yeast multiply in sugar solution.
Reason (R) : Sugar is made of sucrose which provides energy for sustaining all life activities.

VERY SHORT ANSWER QUESTIONS (2 MARKS)

1. Protozoans reproduce by binary fission as well as multiple fission. Which process is better and why?
2. Name the kind of organisms that reproduce by spore formation. How will an organism be benefitted if it reproduces through spores?
3. Compare the vegetative propagation in *Bryophyllum* and money plant.
4. How fragmentation is different from regeneration
5. A student noticed that an organism by mistake was cut into parts. After some time, both developed into new individuals.
 - (i) Name the mode of reproduction followed by the organism.
 - (ii) Give an example of organism which multiply by this process.
6. A plant that has lost the capacity to produce seed. Name a process using which it can reproduce?
7. Differentiate between binary and multiple fission.
8. Name two plants which are grown by the technique of tissue culture.
9. Which methods will you use for growing jasmine and rose plants? Why?
10. Name the part of *Bryophyllum* where the buds are produced for vegetative propagation. Draw diagram also.

SHORT ANSWER QUESTIONS (3 MARKS)

1. What are the advantages of sexual reproduction over asexual reproduction?
2. Describe double fertilization in plants.
3. Write three methods used for regulation of childbirth.
4. a) Explain the terms i) implantation ii) placenta.
b) What is the average duration of human pregnancy?
5. What are sexually transmitted diseases? Name four such diseases. Which one of them damages the immune system of human body?
6. Explain with the help of labelled diagram the development that takes place in each of the body parts of a *Planaria* where body is cut into three pieces. Name this

process and give an example of an organism in which is similar process can be observed.

7. List any four methods of contraception used by humans. How does the use of these methods have a direct effect on the health and prosperity of a family?
8. List two functions each of the following points of human reproductive organs.
 - a. ovaries
 - b. fallopian tube
 - c. uterus
9. Reproduction is one of the most important characteristics of living beings. Give three reasons in support of the statement.
10. What is vegetative propagation? State two advantages and two disadvantages of this method.

LONG ANSWER QUESTIONS (5 MARKS)

1. What does HIV-AIDS stand for? Is it a STD? Name three more STDs. What are the means of transmission of HIV?
2.
 - a) Name the female & the male reproductive glands which produces gametes.
 - b) State the hormones produce by the above glands.
 - c) Where does fertilization occur in case of human female & name the place where fertilized egg gets implanted?
3. Define menstrual cycle. Name the hormones associated with menstrual cycle. What are the cycle of events that occur in the female uterus is
 - a) Fertilisation takes place
 - b) If fertilisation do not take place
4.
 - a) Name two glands that contribute fluid to the semen.
 - b) State two advantages semen offers to the sperms.
 - c) Why are testes in males located outside the abdominal cavity in scrotum?
5. Draw a labelled diagram of the longitudinal section of a flower/ male reproductive system/ female reproductive system
 - a) What are the advantages of sexual reproduction over asexual reproduction?
 - b) What is the importance of DNA copying in reproduction?

CASE BASED QUESTION (4 MARKS)

CASESTUDY 1

The male reproductive system consists of portions that produce the germ cells and other portions that deliver the germ cells to the site of fertilization. Testes are located outside the abdominal cavity in the scrotum because sperm formation requires a lower temperature than normal body temperature. It also has a role of secretion of male sex hormone which brings changes in appearance seen in boys at the time of puberty. Vas deferens unites with a tube coming from the urinary bladder. The urethra is a common passage for sperms and urine. The prostate gland and seminal vesicles add their secretions so that sperms are now in a fluid.

1. Name the sex hormone associated with males.
 - (a) Testosterone
 - (b) Progesterone
 - (c) Oestrogen
 - (d) None of these
2. Which of the following statements is incorrect?
 - (a) Sperms are present in a fluid
 - (b) Fluid provides nutrition to sperms

- (c) Fluid makes easier transportation of sperms
- (d) Fluid helps to bind the sperms together

3. Why testes are are located outside the abdominal cavity in scrotum?

(OR)

Mentions the functions of urethra in human males.

CASESTUDY 2

Rohit collected some pond water which was dark green in colour in a test tube. She took out green-coloured mass from it and separated its filaments by using needles. She broke some filaments into small fragments and put them in a Petri dish containing clean water. She observed that after a few days the small fragments gave rise to complete filaments.

1. What do you think the mass of green filament was?
 - (a) It was a mass of Spirogyra filament.
 - (b) It was a colony of Volvox algae.
 - (c) It was large brown algae.
 - (d) It was a mass of fungal filaments
2. Organisms that reproduces in similar ways as Spirogyra is :
 - (a) yeast
 - (b) hydra
 - (c) Planaria
 - (d) Cow
3. Name the type of reproduction that you observe here.

(OR)

How vegetative propagation are is advantageous to plants?

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Chapter 12 - Patterns in Life: Diversity and Classification

Section A: Multiple Choice Questions (1 Mark each)

Q1. Which of the following best describes biodiversity?

- A. The number of forests in a country
- B. The variety of living organisms and their habitats
- C. The number of endangered animals
- D. The total population of plants

Q2. Which of the following is an endemic species of India?

- A. Kangaroo
- B. Polar Bear
- C. Nilgiri Tahr
- D. Penguin

Q3. Which of the following is **NOT** a biodiversity hotspot mentioned in the chapter?

- A. Western Ghats
- B. Himalayas
- C. Indo-Burma
- D. Thar Desert

Q4. Scientists classify living organisms mainly to:

- A. Increase the number of species
- B. Organise and study biodiversity systematically
- C. Reduce biodiversity
- D. Eliminate endangered species

Q5. Which criterion is **NOT** generally used for biological classification?

- A. Cell structure
- B. Mode of nutrition
- C. Colour of flowers only
- D. Genetic similarity

Q6. According to Whittaker's five-kingdom classification, bacteria belong to:

- A. Protista
- B. Monera
- C. Fungi
- D. Plantae

Q7. Which kingdom includes organisms having chitin in their cell wall?

- A. Plantae
- B. Monera
- C. Fungi
- D. Protista

Q8. Which plant group first shows vascular tissues?

- A. Thallophyta
- B. Bryophyta

- C. Pteridophyta
- D. Gymnosperms

Q9. Which of the following animal groups possesses an exoskeleton?

- A. Mollusca
- B. Arthropoda
- C. Echinodermata
- D. Cnidaria

Q10. The correct sequence in hierarchical classification is:

- A. Kingdom → Class → Phylum → Species
- B. Kingdom → Phylum → Class → Order → Family → Genus → Species
- C. Species → Genus → Family → Order → Class → Kingdom
- D. Phylum → Kingdom → Class → Order → Species

Section B: Assertion–Reason Questions (1 Mark each)

For Questions 11–15, choose the correct option.

- (a) Both Assertion and Reason are true and Reason is the correct explanation of Assertion.
- (b) Both Assertion and Reason are true but Reason is NOT the correct explanation.
- (c) Assertion is true but Reason is false.
- (d) Assertion is false but Reason is true.

Q11.

Assertion (A): Biodiversity is essential for maintaining ecological balance.

Reason (R): Every organism plays a specific role in an ecosystem.

Q12.

Assertion (A): Bryophytes are called the amphibians of the plant kingdom.

Reason (R): They require water for reproduction.

Q13.

Assertion (A): Gymnosperms produce seeds enclosed inside fruits.

Reason (R): Their seeds develop within flowers.

Q14.

Assertion (A): Arthropods are highly successful terrestrial animals.

Reason (R): They possess a hard exoskeleton that reduces water loss.

Q15.

Assertion (A): Scientific names are written in italics.

Reason (R): Scientific names are written in regional languages.

Section C: Very Short Answer Questions (2 Marks each)

- Q16.** Define biodiversity. Mention any two benefits of biodiversity.
- Q17.** What are endemic species? Give two examples from the chapter.
- Q18.** State any two advantages of biological classification.
- Q19.** Mention any two criteria used for classifying living organisms.
- Q20.** Differentiate between prokaryotic and eukaryotic cells on any two points.
- Q21.** Why are fungi called decomposers?
- Q22.** State any two distinguishing features of Bryophyta.
- Q23.** Why are Gymnosperms better adapted to terrestrial conditions than Pteridophytes?
- Q24.** What is a notochord? How is it useful in classification?
- Q25.** Write the scientific names of:
(a) Tiger
(b) Mango

Section D: Short Answer Questions (3 Marks each)

- Q26.** Explain any three reasons why India is considered one of the world's important biodiversity regions. Mention any one biodiversity hotspot found in India.
- Q27.** Compare **Bryophyta** and **Pteridophyta** on the basis of:
- Body organisation
 - Vascular tissues
 - Reproduction
- Q28.** Describe any three major features of **Kingdom Fungi**. Explain their ecological importance.
- Q29.** Explain the basis of **Whittaker's Five-Kingdom Classification**. Mention any three criteria used for classification.
- Q30.** State the rules for writing scientific names according to the **Binomial System of Nomenclature**. Why is scientific naming necessary?

Section E: Competency-Based Case Study Questions (4 Marks each)

Q31. Case Study-I

Study the figure showing the **Five Kingdom Classification** (Fig. 12.5) and answer the following questions.

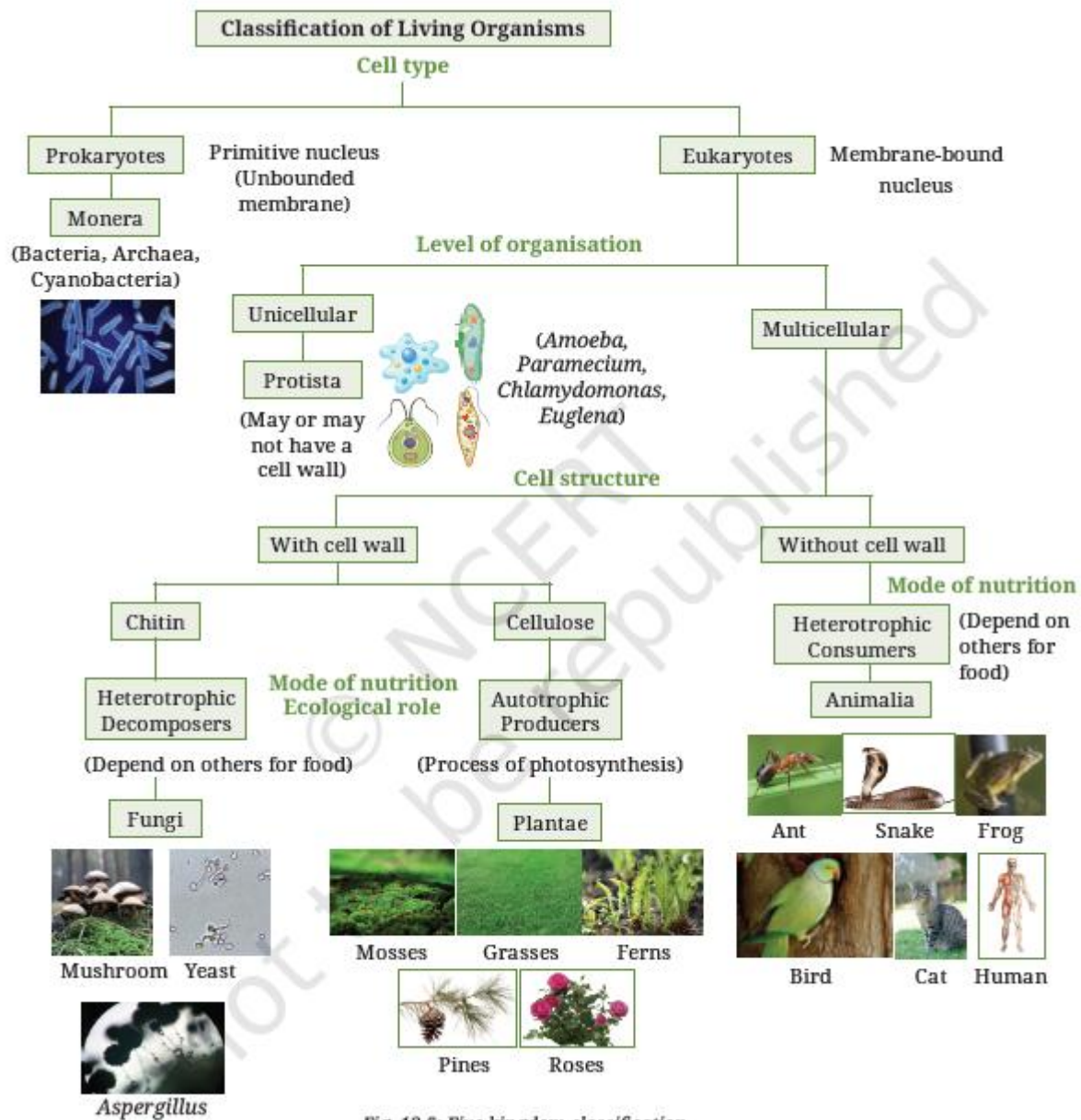


Fig. 12.5: Five kingdom classification

- Name the kingdom that includes prokaryotic organisms.
- Which kingdom contains organisms having chitin in their cell wall?
- Name one kingdom that includes both autotrophic and heterotrophic organisms.
- State any one criterion used in the five-kingdom classification besides mode of nutrition.

Q32. Case Study-II

Observe the figure showing different groups of **Kingdom Animalia** (Fig. 12.16) and answer the following questions.

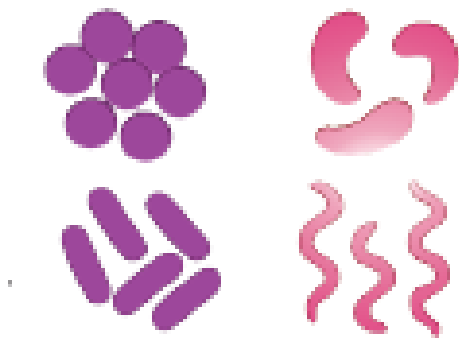


Fig. 12.6 Members of the Kingdom Monera

- (a) Which animal group possesses an exoskeleton?
- (b) Name the phylum represented by the earthworm.
- (c) Which group possesses an internal skeleton but lacks a notochord?
- (d) Mention one characteristic feature of Cnidaria.

Section F: Long Answer Questions (5 Marks each)

Q33. Explain the evolution of the biological classification system from **Aristotle's classification** to **Whittaker's Five-Kingdom Classification**. Highlight the limitations that led to the development of each successive classification system.

Q34. Describe the evolutionary trend in the plant kingdom from **Thallophyta** to **Angiosperms** with reference to the following features:

- Body organisation
- Vascular tissues
- Reproduction
- Seeds
- Adaptation to terrestrial life

Support your answer with suitable examples from each plant group.

Chapter 13 - Earth as a System: Energy, Matter, and Life

Section A: Multiple Choice Questions (1 Mark each)

1. Which of the following is the primary source of energy driving most processes on Earth?
 - (A) Earth's core
 - (B) Moon
 - (C) Sun
 - (D) Volcanoes
2. Which Earth sphere includes glaciers, snowfields and polar ice caps?
 - (A) Hydrosphere
 - (B) Biosphere
 - (C) Cryosphere
 - (D) Geosphere
3. Which sequence correctly represents the movement of snow into a lake?
 - (A) Melting → Runoff → Lake
 - (B) Evaporation → Condensation → Lake
 - (C) Weathering → Erosion → Lake
 - (D) Photosynthesis → Respiration → Lake
4. Increased warming of the Arabian Sea is most likely to directly influence the:
 - (A) Formation of mountains
 - (B) Southwest monsoon
 - (C) Earth's rotation
 - (D) Length of the day
5. Which Earth sphere includes forests, animals, coral reefs and plankton?
 - (A) Geosphere
 - (B) Atmosphere
 - (C) Biosphere
 - (D) Cryosphere

Section B: Assertion–Reason Questions (1 Mark each)

1.

Assertion (A): All Earth spheres continuously interact with one another.

Reason (R): A change in one sphere may produce changes in other spheres.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

2.

Assertion (A): Melting glaciers can increase sea level.

Reason (R): Glaciers are a part of the cryosphere.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

3.

Assertion (A): Large-scale deforestation may affect river flow.

Reason (R): Forests influence the movement and storage of water in an ecosystem.

- (a) Both A and R are true and R is the correct explanation of A.
- (b) Both A and R are true but R is not the correct explanation of A.
- (c) A is true but R is false.
- (d) A is false but R is true.

Section C: Very Short Answer Questions (2 Marks each)

- 1. Name any four Earth spheres and write one example of each.
- 2. Explain how snow in the Himalayas eventually becomes part of rivers and lakes.
- 3. State any two effects of reduced snowfall on lakes and nearby grasslands.
- 4. How does increased evaporation from the Arabian Sea influence the southwest monsoon?
- 5. Why is the Earth called a system? Give any two reasons.

Section D: Short Answer Questions (3 Marks each)

- 1. Explain how changes in the atmosphere can affect the cryosphere, hydrosphere and biosphere with suitable examples.
- 2. Describe the interaction among the geosphere, hydrosphere and biosphere in maintaining life on Earth.
- 3. Explain three consequences of global warming on Earth's different spheres.

Section E: Case Study Questions (4 Marks each)

Case Study-1 (Based on Chapter Illustration)

The chapter illustration shows mountains covered with snow, rivers, forests, industries, agricultural fields and animals. These represent different Earth spheres interacting with each other.

Answer the following:

- a) Identify the Earth sphere represented by the snow-covered mountains. (1)
- b) Name the sphere represented by rivers and lakes. (1)
- c) Explain how melting snow supports life in nearby grasslands. (1)
- d) What may happen if snowfall decreases continuously for several years? (1)

Case Study-2

A coastal state experiences unusually warm Arabian Sea water during summer. The increased evaporation affects the southwest monsoon. Some districts receive excessive rainfall causing floods, while others experience drought. Scientists also observe accelerated glacier melting and gradual sea-level rise.

Answer the following:

- a) Which Earth sphere first experiences increased evaporation? (1)
- b) Which sphere is directly affected by glacier melting? (1)
- c) Mention one effect on the biosphere due to sea-level rise. (1)
- d) Explain how this situation shows that Earth functions as an interconnected system. (1)

Section F: Long Answer Question (5 Marks)

- 1. Explain the concept of the Earth as a system. Describe the five major Earth spheres and discuss, with suitable examples, how changes in one sphere influence the other spheres. Use examples such as warming of the Arabian Sea, glacier melting and changes in rainfall to support your answer.