Student Support Material
Graded Worksheets
Class – IX & X

Science
2025-26

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Experiential Learning and Presentation
(for TGT- Science) Batch-1 @ ZIET Gwalior

Prepared at
Zonal Institute of Education & Training, Gwalior
Kendriya Vidyalaya Sangathan

Director's Message

Dear Students and Esteemed Teachers,

As you open this booklet of thoughtfully crafted worksheets for classes IX and X, prepared by our dedicated teachers and meticulously refined by our resource persons, I extend my warmest greetings on behalf of ZIET Gwalior, Kendriya Vidyalaya Sangathan.

This compilation represents a collaborative effort, a testament to the unwavering commitment of our educators to provide you, our young learners, with engaging and effective tools for growth. Each worksheet has been designed with care to reinforce concepts, stimulate curiosity, and encourage independent learning.

Dear students, approach these exercises with enthusiasm and a spirit of exploration. Embrace the opportunity to strengthen your understanding and celebrate your progress with each completed task. Remember that every step you take, no matter how small, contributes to your journey of knowledge.

Dedicated teachers, your creativity and dedication in preparing this material is truly commendable. Your efforts in nurturing young minds and fostering a love for learning are the bedrock of our education system. This booklet stands as a tangible representation of your commitment to excellence. The resource persons who have lent their expertise to moderate and edit these worksheets have played a crucial role in ensuring their quality and effectiveness. Their contribution is deeply valued.

We also extend our sincere gratitude to the Kendriya Vidyalaya Sangathan Headquarter and our officials for their consistent guidance and support, which enables such collaborative endeavors.

Let this booklet serve as a companion in your journey of learning, a bridge connecting classroom instructions with independent practice. May it empower our students to achieve their full potential and inspire our teachers in their noble mission.

Wishing you all a rewarding and enriching learning experience!

With sincere appreciation,
B. L. Morodia
Director ZIET, Gwalior

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CHAPTER – 1, (MATTER IN OUR SURROUNDINGS)

GRADED WORKSHEET 1

TIME- 20 MINUTES **MAX MARKS- 20**

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Multiple Choice Questions (1 Mark Each)

Q1. Which of the following has the highest kinetic energy?
a) Ice
b) Water
c) Steam
d) Snow

Q2. The process of conversion of a solid directly into gas is called:
a) Condensation
b) Freezing
c) Sublimation
d) Evaporation

Q3. Which factor does not affect the rate of evaporation?
a) Surface area
b) Temperature
c) Wind speed
d) Insolubility

Assertion and Reason Type Questions (1 Mark Each)

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.

Q4. Assertion (A): Gases can be compressed easily.
Reason (R): Particles of gases are tightly packed.

Q5. Assertion (A): Evaporation causes cooling.
Reason (R): During evaporation, particles absorb heat energy from surroundings.

Short Answer Type Questions (2 Marks Each)

Q6. Define latent heat of fusion.
Q7. Why does water kept in an earthen pot become cool in summer?
Q.8 What happens to the rate of evaporation when humidity is high?

COMPETENCY-BASED QUESTIONS (3 MARKS EACH)

Q9. Ravi spilled perfume in one corner of the room. Soon, the smell spread throughout the room. Explain the scientific reason.
Q10 Explain how evaporation is a surface phenomenon and is different from boiling.
Q11. Why does a desert cooler cool better on a hot dry day?

WORKSHEET 1 – ANSWER KEY (MATTER IN OUR SURROUNDINGS)

MCQs:

1. **c**
2. **c**
3. **d**

4. c
5. a

Short Answers:

6. The amount of heat required to convert 1 kg of solid into liquid at its melting point.
7. Due to evaporation from the porous surface, which requires heat absorbed from water, cooling it.
8. Evaporation decreases.

Competency-Based:

9. Due to diffusion of gas particles.
10. Evaporation occurs at surface and at all temperatures; boiling is bulk and occurs at boiling point.
11. Dry air increases evaporation, enhancing cooling.

WORKSHEET- 2 (MATTER IN OUR SURROUNDINGS)

TIME- 20 MINUTES **MAX MARKS- 18**

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Choose correct option. (More than one option may be correct)

Q1. In which state of matter are particles most closely packed?
a) Solid
b) Liquid
c) Gas
d) Plasma

Q2. The boiling point of water changes with:
a) Volume of water
b) Temperature
c) Atmospheric pressure
d) Amount of solute

Q3. Physical state of water at 0°C is
a) Solid
b) Liquid
c) Gas
d) Plasma

SHORT QUESTIONS (2 MARKS EACH)

Q4. Explain why we are able to sip hot tea faster from a saucer than from a cup.
Q5. State the conditions under which solids can change into liquids and liquids into gases.
Q6. Why do we see water droplets on the outer surface of a glass containing ice-cold water?

LONG ANSWER (5 MARKS)

Q7. Describe the characteristics of the particles of matter. Explain with examples how they support the particulate nature of matter. Riya observed that when camphor is kept in an open container, it slowly disappears. In another case, she saw that when water is heated, it starts boiling and changes into steam.

(a) What is the name of the process by which camphor disappears? Explain why it happens.
(b) Explain how particles of matter behave in both cases.
(c) Why is it advised to keep perfumes in tightly closed bottles?

CASE-BASED QUESTION (4 MARKS)

Meena observes that when camphor is left open in a dish, it disappears over time. In another experiment, she noticed that water in a dish evaporates faster when kept near a fan.

Q8. Based on this, answer the following:
a) Name the process by which camphor disappears.
b) What is common in both observations?
c) List two factors affecting the second observation.
d) How is heat involved in both the processes?

Or

d) What would happen if humidity is very high in the room?

ANSWER KEY WORKSHEET 2 (MATTER IN OUR SURROUNDINGS)

1. a
2. c
3. a and b
4. Larger surface area increases evaporation, causing more cooling.
5. On heating, kinetic energy increases, leading to change in state.
6. Water vapor in air condenses on the cold surface.

Long Answer:

7. (a) The process is sublimation – where a solid directly changes into a gas without becoming liquid. Camphor undergoes sublimation due to its volatile nature.
(b) In the case of camphor, particles gain enough energy to break free from the solid state and escape into the air as gas. In the case of boiling water, heat energy increases kinetic energy of water molecules, allowing them to overcome inter-particle forces and turn into steam (gas).
(c) Perfumes are volatile substances. If not stored in tightly closed bottles, they evaporate easily, leading to loss of fragrance and wastage.

Case-Based:

8.
a) Sublimation
b) Change of state due to loss of mass
c) Surface area and wind speed
d) Heat is absorbed from surroundings

OR

d) Evaporation would slow down

CHAPTER – 2, (IS MATTER AROUND US PURE?)

Worksheet - 1

TIME- 20 MINUTES **MAX MARKS- 20**

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MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. Which of the following is a pure substance?
   a) Air b) Milk c) Sodium d) Soil
2. Which method is used to separate cream from milk?
   a) Sublimation b) Filtration c) Centrifugation d) Sedimentation
3. A mixture of salt and ammonium chloride can be separated by:
   a) Filtration b) Distillation c) Sublimation d) Chromatography

Assertion Reason type Questions

Directions: In each of the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Options: 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.

4. Assertion (A): Air is a homogeneous mixture.
   Reason (R): Air has uniform composition throughout.

5. Assertion (A): Colloids do not settle down when left undisturbed.
   Reason (R): Colloids are unstable mixtures.

SECTION B: SHORT ANSWER QUESTIONS (2 MARKS EACH)

6. Differentiate between homogeneous and heterogeneous mixtures with examples.
7. How can you separate a mixture of ink and water?
8. What is a solution? Mention its properties.

SECTION C: COMPETENCY BASED QUESTIONS (3 MARKS EACH)

9. Explain how you can separate a mixture of salt, sand, and ammonium chloride.
10. Identify the type of mixtures: (i) milk, (ii) soda water, (iii) soil. Give reasons.
11. State the principle involved in the technique of chromatography. Mention one application.

ANSWER KEY: WORKSHEET 1

SECTION A: MCQS

1. c) Sodium
2. c) Centrifugation
3. c) Sublimation
4. a) Both A and R are true and R is the correct explanation of A.
5. c) A is true but R is false.
6. Homogeneous: Same composition (e.g., salt water). Heterogeneous: Different composition (e.g., soil).
7. By evaporation or distillation.
8. A solution is a homogeneous mixture; particles are not visible; no Tyndall effect.
9. Use sublimation (ammonium chloride), filtration (sand), evaporation (salt).
10. (i) Milk: Colloid, (ii) Soda water: Solution, (iii) Soil: Heterogeneous mixture.
11. Chromatography separates based on solubility; Used in ink separation.

CHAPTER – 2 (IS MATTER AROUND US PURE?

Worksheet – 2

TIME- 20 MINUTES **MAX MARKS- 15**

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MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. Which of the following is not a colloid?
   a) Fog b) Milk c) Blood d) Sugar solution
2. Which of the following will show the Tyndall effect?
   a) True solution b) Colloid c) Suspension d) Both (b) and (c)
3. Brass is an example of:
   a) Compound
   b) Element
   c) Homogeneous mixture
   d) Heterogeneous mixture

SHORT ANSWER QUESTIONS (2 MARKS EACH)

4. What is meant by a saturated solution? Suggest a method to prepare saturated solution at our home, if possible.
5. Define suspension. State one property of suspension.

Long Answer Question (5 Marks)

6. Ravi was given a mixture of sand, salt, and iron filings in the school laboratory. His teacher asked him to separate all the components of the mixture.

(a) Which separation techniques should Ravi use to separate the components?
(b) Write the steps of the method he should follow.
(c) What type of mixture is this? Justify your answer.

Section E: Case Based Question (4 Marks)

7. Ramesh prepared a mixture of iron filings and Sulphur powder. He heated the mixture strongly and noticed a change.

Answer the following questions:
a) What type of mixture is iron and Sulphur before heating?
b) What is the product formed after heating?
c) How will you prove that a chemical change has taken place?
d) Can the product formed be separated by physical means? Why or why not?

OR

d) Name one property that the product shows which is different from the original components.

WORKSHEET -2, ANSWER KEY

1. d) Sugar solution
2. d) Both (b) and (c)
3. c) Homogeneous mixture
4. A solution in which no more solute can dissolve at a given temperature.
5. Suspension: Heterogeneous mixture where particles settle. Property: Tyndall effect is shown.

5. (a) Ravi should use the following techniques:
Magnetic separation
Filtration
Evaporation

(b) Steps to separate the components:
Magnetic Separation: Move a magnet over the mixture to separate iron filings, as they are magnetic.
Filtration: Add water to the remaining mixture of sand and salt. Stir well and filter the mixture. Sand will remain on the filter paper (residue), and salt solution (salt dissolved in water) will pass through (filtrate).
Evaporation: Heat the salt solution. Water will evaporate, leaving behind salt.
(c) This is a heterogeneous mixture because all components (sand, salt, and iron) can be seen and separated physically using simple methods.

6. a) Heterogeneous mixture.
b) Iron sulphide (FeS)
c) New substance formed, change in properties.
d) No, because a chemical compound is formed. Or
d) Non-magnetic nature unlike iron.

CHAPTER – 2, (IS MATTER AROUND US PURE?)

Worksheet - 3

TIME- 20 MINUTES **MAX MARKS- 18**

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MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. Which of the following is a heterogeneous mixture?
a) Vinegar b) Air c) Sand and salt d) Sugar solution
2. The method used to separate dyes in black ink is:
a) Filtration b) Chromatography c) Distillation d) Sedimentation
3. Which of the following shows the Tyndall effect?
a) Salt solution b) Blood c) Sugar solution d) Alcohol
4. Which of these is not a characteristic of a mixture?
a) Components retain their properties b) Fixed melting point
c) Can be separated physically d) Composition can vary

Assertion and Reason type Questions

Directions: Choose the correct option: 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.

5. Assertion (A): Salt dissolves in water to form a solution.
Reason (R): Solute particles are visible in a solution.
6. Assertion (A): Mixtures have variable compositions.
Reason (R): Mixtures are formed by physical mixing of two or more substances.

SHORT ANSWER QUESTIONS (2 MARKS EACH)

7. State two differences between compounds and mixtures.
8. What is centrifugation? Give one application.
9. What do you observe when a beam of light is passed through a colloid?

COMPETENCY BASED QUESTIONS (2 MARKS EACH)

10. How would you separate a mixture containing kerosene and water?
11. How can you prove that a colloid is different from a solution?
12. Identify the types of mixtures: (i) lemonade, (ii) blood, (iii) muddy water. Explain with reasons.

ANSWER KEY: WORKSHEET 3
SECTION A: MCQS

1. c) Sand and salt
2. b) Chromatography
3. b) Blood
4. b) Fixed melting point
5. c) A is true but R is false.
6. a) Both A and R are true and R is the correct explanation of A.
7.

SECTION B

7. Compounds: Fixed ratio, chemically combined. Mixtures: Variable ratio, physically combined.
8. Centrifugation is separation using rapid spinning; used to separate cream from milk. 10. A colloid is a mixture with intermediate particle size; e.g., milk.
9. Scattering of light is observed — Tyndall effect.

SECTION C

10. Use separating funnel based on immiscibility.
11. Use Tyndall effect — visible in colloid, not in solution.
12. (i) Lemonade: Homogeneous mixture, (ii) Blood: Colloid, (iii) Muddy water: Suspension.

WORKSHEET – 4, IS MATTER AROUND UP PURE

TIME- 20 MINUTES **MAX MARKS- 14**

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Short Answer Questions (2 Marks Each)

1. Describe the process of separating a mixture of oil and water. What property is used?
2. State two properties each of suspensions and colloids.

LONG ANSWER QUESTION (5 MARKS)

3. A student was provided with three samples: tap water, distilled water, and muddy water. She was asked to identify which one is a pure substance and which are mixtures.
(a) Classify each sample as pure substance or mixture.
(b) Explain the reason for your classification.
(c) Suggest a method to purify muddy water for drinking purposes.

CASE BASED QUESTION (5 MARKS)

4. An experiment was conducted in the lab to separate a mixture of acetone and water using a distillation apparatus.
a) What property difference is used in distillation?
b) Which liquid will boil first, acetone or water?
c) Why can't distillation be used for separating alcohol and water?
d) What is the name of the liquid collected after condensation? Or
d) State one advantage of simple distillation.

WORKSHEET – 4, ANSWERKEY – IS MATTER AROUND US PURE

1. Separating funnel; property used — difference in densities.
2. Suspensions: Settle on standing, show Tyndall effect. Colloids: Do not settle, stable.
3. (a) Tap water – Mixture
   Distilled water – Pure substance
   Muddy water – Mixture
   (b) Tap water contains dissolved salts, minerals, and gases — it is a homogeneous mixture.
   Distilled water is made by distillation and contains only H_2O — it is a pure substance.
   Muddy water has visible suspended particles — it is a heterogeneous mixture.

(c) To purify muddy water:
Sedimentation (allowing mud to settle)
Followed by filtration
Then boiling or using chlorine tablets for disinfection

4. a) Difference in boiling points.
   b) Acetone. c) Boiling points too close, requires fractional distillation.
   d) Distillate. Or d) Pure components can be recovered easily.

WORKSHEET – 5, IS MATTER AROUND UP PURE

TIME- 20 MINUTES **MAX MARKS- 15**

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Multiple Choice Questions (1×4=4 marks)

1. Which of the following statements are correct about properties of colloids?
   (I) A colloid is a homogeneous mixture.
   (II) The size of particles of a colloid is too small to be individually seen by naked eye.
   (III) Colloids are big enough to scatter a beam of light passing through it and make its path visible.
   (a) 1, 2 and 3.
   (b) 2 and 3
   (c) 1 and 2.
   (d) 1 and 3
2. Which of the following involves both physical and chemical change?
   (a) Burning of a candle
   (b) Rusting of iron
   (c) Cooking of food
   (d) Boiling of water

ASSERTION AND REASON

DIRECTION FOR QUE. No. 3 and 4: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true, but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true, but reason (R) is false.
(d) Assertion (A) is false, but reason (R) is true.
3. **Assertion :** When a beam of light is passed through a colloidal solution placed in a dark place the path of the beam becomes visible.
Reason : Light gets scattered by the colloidal particles.

4. **Assertion :** A solution of table salt in a glass of water is homogeneous.
   Reason : A solution having different composition throughout is homogeneous.

Short Answer Type Questions (2×3=6 marks)

5. Give some examples where the property : malleability and ductility of metals are used in our life.
6. Why is water considered as compound? Why is water considered as compound?
7. What are the major properties that differentiates homologous and heterogeneous mixture.

Long Answer Type Questions (5 marks)

8. (I) How much water should be mixed with 12 ml of alcohol to obtain 12% of alcohol? Calculate.
   (II) 110 g solution of salt is present in 550 g of solution. Calculate the concentration of solution.
   (III) Identify the elements in- (a) Bronze, (b) Brass

ANSWER KEY: WORKSHEET 5

1.Ans : (b) 2 and 3. Colloidal solutions are heterogeneous in nature.
2. Ans : (a) Burning of a candle.
3. Ans : (a) Both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of assertion (A).
4. Ans : (C) Assertion (A) is true but reason (R) is false.
5. Ans : Malleability means that metals can be hammered into Sheets and foils. For example : Aluminium foils are Used for wrapping food stuffs, silver foils are used for Decorative purposes for sweets and fruits.
Ductility means that metals can be drawn into Wires. Example : Gold and silver wires are used in ornaments, aluminium and copper wires are used for conduction of electric current.
6. Ans : Water is considered as compound because :
(i) Water is composed of two elements : hydrogen and oxygen.
(ii) The ratio of hydrogen and oxygen by mass in any sample of pure water is the same.
(iii) The properties of water are different from its constituent elements : hydrogen and oxygen.
(iv) Water can be decomposed by chemical means only (e.g. electrolytically) into hydrogen and oxygen.
7. Any two different properties of each.
8. (I) Ans : Volume of water = 88 ml
(II) Concentration = 20% by mass
(III) (a) Copper, tin (b) Copper, zinc

CHAPTER – 3, ATOMS AND MOLECULES
GRADED WORKSHEET 1

TIME- 20 MINUTES **MAX MARKS- 17**

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SECTION A: MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. The smallest unit of an element is:
   a) Atom
   b) Molecule
   c) Ion
   d) Compound
2. Which of the following is a triatomic molecule?
   a) O_2 b) H_2O c) N_2 d) He

Assertion Reason type Questions

Directions: In each of the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Options: 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):** Atoms of most elements cannot exist independently.
   Reason (R): Atoms are highly reactive.
4. **Assertion (A):** The formula of carbon dioxide is CO.
   Reason (R): Carbon forms a double bond with oxygen.

SECTION B: SHORT ANSWER QUESTIONS (2 MARKS EACH)

5. Write the chemical formula of the following compounds: (i) Ammonia (ii) Calcium chloride.
6. What is a molecular mass? Calculate the molar mass of water (H_2O).

SECTION C: COMPETENCY BASED QUESTIONS (3 MARKS EACH)

7. Differentiate between molecules of an element and molecules of a compound with one example of each.
8. Calculate the number of molecules in 18g of water. (H = 1 u, O = 16 u, Avogadro number = 6.022×10^{23})
9. Explain why atoms form chemical bonds. What kind of bond is present in NaCl?

WORKSHEET -1, ANSWER KEY ATOMS AND MOLECULES

1.a
2.b
3.a
4.d
5. Atomicity: Number of atoms in a molecule. Monoatomic: He; Polyatomic: O3.
6. NH3, CaCl2
7. Molecular mass is the sum of atomic masses of all atoms in a molecule. 18 g/mol
8. Molecules of element: O2; Molecules of compound: H2O
9. 6.022×10^{23} molecules
10. To attain stability; Ionic bond

WORKSHEET –2, ATOMS AND MOLECULES

TIME- 20 MINUTES **MAX MARKS- 17**

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MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1 . The number of atoms in a molecule of sulphur (S8) is:
a) 1
b) 4
c) 6
d) 8

2. The chemical formula of quick lime is:
a) $CaCO_3$
b) $Ca(OH)_2$
c) CaO
d) $CaCl_2$

3. Which of the following is a correct chemical formula?
a) $NaCl_2$ b) H_2SO_4 c) C_2O d) Mg_2Cl

SHORT ANSWER QUESTIONS (2 MARKS EACH)

4. Write the valency of the following elements and their formulae with chlorine: (i) Magnesium (ii) Aluminium

5. Name the elements present in the following compounds: (i) H_2SO_4, (ii) NaHCO3

COMPETENCY BASED LONG QUESTION (5 MARKS)

6. A compound is formed when 6 g of carbon combines with 16 g of oxygen.
(a) Calculate the molecular formula of the compound if the compound contains only carbon and oxygen.
(b) Calculate the number of moles and molecules in 22 g of this compound.
(Atomic masses: C = 12 u, O = 16 u, Avogadro number = 6.022×10^{23})

CASE BASED QUESTION (5 MARKS)

7. A student was asked to write the formula of compounds formed between sodium and Sulphur, and calcium and chlorine. Answer the following:
a) What is the valency of sodium and Sulphur?
b) Write the formula of the compound formed between sodium and Sulphur.
c) Write the formula of the compound formed between calcium and chlorine.
d) Which rule helps you write chemical formulae? Or
d) What is the significance of valency in writing chemical formulae?

WORKSHEET -2, ANSWERKEY ATOMS AND MOLECULES

1.d
2.c
3.b

4. $MgCl_2$, $AlCl_3$
5. H_2SO_4: H, S, O; $NaHCO_3$: Na, H, C, O
6. (a)
Given:
Mass of Carbon (C) = 6 g
Mass of Oxygen (O) = 16 g
Step 1:
Calculate moles of C = 6 g / 12 g/mol = 0.5 mol
Calculate moles of O = 16 g / 16 g/mol = 1 mol
Mole ratio = C : O = 0.5 : 1 = 1 : 2

So the empirical/molecular formula is CO_2
(b)
Molar mass of $CO_2 = 12 + 16\times2 = 44$ g/mol
Moles in 22 g = 22 / 44 = 0.5 mol
Number of molecules = $0.5 \times 6.022 \times 10^{23} = 3.011 \times 10^{23}$ molecules

7. a) 1,2; b) Na_2S; c) $CaCl_2$; d) Criss-cross method; or
d) Helps determine correct formula

GRADED WORKSHEET 3
CHAPTER - ATOMS AND MOLECULES

TIME- 20 MINUTES **MAX MARKS- 16**

==========

MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. Which of the following laws is also known as the Law of Conservation of Mass?
a) Lavoisier's Law b) Dalton's Law c) Avogadro's Law d) Boyle's Law
2. The number of atoms present in one molecule of nitrogen gas (N2) is:
a) 1 b) 2 c) 3 d) 4
3. Which of the following represents a polyatomic ion?
a) Na+ b) OH− c) Cl− d) K+
4. The valency of hydrogen is:
a) 0 b) 1 c) 2 d) 3

Assertion Reason type Questions (1 MARK EACH)

Directions: In each of the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
Options: 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.

5. Assertion (A): One mole of any substance contains Avogadro number of particles.
Reason (R): One mole of oxygen contains 32 g of atoms.
6. Assertion (A): A chemical formula represents the mass of a compound.
Reason (R): A chemical formula tells the kind and number of atoms in a molecule.

SHORT ANSWER QUESTIONS (2 MARKS EACH)

7. Differentiate between an atom and a molecule.
8. What is an ion? Name one cation and one anion.

COMPETENCY BASED QUESTIONS (3 MARKS EACH)

9. What is meant by the term 'mole'? How many atoms are there in 1 mole of magnesium?
10. Give reasons: (i) Atoms combine to form compounds, (ii) Noble gases are stable.

WORKSHEET -3, ANSWER KEY ATOMS AND MOLECULES

1.a
2.b
3.b

4.b
5.c
6.c
7. Atom: Smallest particle of an element. Molecule: Two or more atoms chemically combined.
8. Ion: A charged particle. Cation: Na+, Anion: Cl−
9. Mole = 6.022×10^{23} particles. 1 mole Mg = 6.022×10^{23} atoms.
10. (i) To attain stable configuration, (ii) They have complete outer shells.

Chapter -4
Structure of Atom
WORKSHEET-1

TIME- 20 MINUTES **MAX MARKS- 19**

==========

MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. Dalton proposed that all atoms of a given element are identical. Which modern discovery most directly challenges this idea?
A) Law of conservation of mass B) Discovery of isotopes
C) Law of multiple proportions D) Discovery of chemical bonds
2. The formula unit mass of NaCl is: (Na = 23, Cl = 35.5)
A. 23 B. 35.5 C. 58.5 D. 59

Assertion Reason type Questions (1 MARK EACH)

Direction: In each of the following questions Q No. 5 and 6, a statement of Assertion is given followed by a corresponding statement of Reason. Of the statements, mark the correct answer as
(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 of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true

3. Assertion (A): The molecular mass of a compound is the sum of atomic masses of all atoms in a molecule.
Reason (R): A molecule is formed by the chemical combination of atoms in fixed proportion.
4. Assertion: Atoms always combine to form molecule and ions.
Reason: Atoms of most element are not able to exist independently
5. Which of the following represents a correct chemical formula? Name it. **(0.5 X 4)**
(a) CaCl (b) CaO (c) $NaSO_4$ (d) NaS
6. State the number of atoms present in each of the following chemical species **(0.5 X 4)**
(A) CO_3^{2-} (B) PO_4^{3-} (C) P_2O_5 (D) CO
7. Write the molecular formulae for the following compounds **(0.5 X 6)**
(a) Copper (II) bromide (b) Aluminium (III) nitrate
(c) Calcium (II) phosphate (d) Iron (III) sulphide
(e) Mercury (II) chloride (f) Magnesium (II) acetate.
8. Write the cations and anions present (if any) in the following compounds **(0.5 X 4)**
(a) CH_3COONa (b) NaCl (c) H_2 (d) NH_4NO_3

9. Give the formulae of the compounds formed from the following sets of elements **(0.5 X 6)**

(a) Calcium and fluorine (b) Hydrogen and sulphur (c) Nitrogen and hydrogen

(d) Carbon and chlorine (e) Sodium and oxygen (f) Carbon and oxygen

10. Classify each of the following on the basis of their atomicity. **(0.5 X 6)**

(a) F_2 (b) NO_2 (c) HCl (d P_4 (e) O_3 (f) He

WORKSHEET -1, ANSWER KEY

Q No.	Correct Answer	Marks
1	B	1
2	C	1
3	A	1
4	A	1
5	B Calcium oxide	2
6	A -4, B-5, C-7 ,D -2	2
7	CuBr2,Al(NO3)3,Ca3(PO4)2,FeS,HgCl2,Mg(CH3COO)2	3
8	A CH3+ COONa- B Na+ Cl- C No ions D NH4+ NO3-	3
9	A CaF2 B H2S C NH3 D CCl4 E Na2O F CO2	3
10	Atomicity 1- He Atomicity 2 – F2, HCl Atomicity 3- NO2, O3 Atomicity 4- P4	3

Chapter -4

Structure of Atom

WORKSHEET-1

TIME- 20 MINUTES **MAX MARKS- 19**

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Multiple Choice Questions (1 mark each)

1. The maximum number of electrons that can be accommodated in the L-shell is:
   A. 2 B. 8 C. 18 D. 32
2. The number of neutrons in Carbon-14 is:
   A. 6 B. 8 C. 14 D. 12
3. Which of the following is not a postulate of Dalton's atomic theory?
   A. Atoms can be created or destroyed in a chemical reaction.
   B. Atoms are indivisible.
   C. Atoms of the same element have identical mass.
   D. Atoms consist of electrons, protons and neutrons.
4. The valency of phosphorus (atomic number 15) is:
   A. 3 B. 5
   C. 2 D. Both A and B depending on the compound

Assertion and Reasoning (1 mark each)

Choose the correct option:

A. Both Assertion and Reason are true, and Reason is the correct explanation.
B. Both Assertion and Reason are true, but Reason is not the correct explanation.
C. Assertion is true, Reason is false.
D. Assertion is false, Reason is true.

5. **Assertion (A):** The nucleus of an atom is positively charged.
   Reason (R): The nucleus contains protons and neutrons.
6. **Assertion (A):** Electrons revolve in fixed orbits around the nucleus.
   Reason (R): Bohr's model explains the stability of atom due to quantized orbits.

Short Answer Type Questions (2 marks each)

7. Draw the atomic structure of magnesium (atomic number =12). Mention the number of electrons in each shell.
8. Differentiate between isotopes and isobars with examples.
9. Write the electronic configuration and valency of chlorine (atomic number = 17). Explain how valency is determined.

Answer key (Worksheet -2)

Q. No.	Correct Answer	Marks
1	B. 8	1
2	B. 8	1
3	D.	1
4	D.	1

Q. No.	Correct Option	Marks
5	A	1
6	A	1

Q. No.	Expected Answer (Key Points)	Marks
7	Mg atomic structure; 2, 8, 2 shell distribution; neat labeled diagram – 1 mark for configuration, 1 mark for diagram	2
8	1 mark for correct difference between isotopes and isobars, 1 mark for examples	2
9	Chlorine: Electronic configuration = 2, 8, 7; valency = 1 (needs 1 electron) – 1 mark for configuration, 1 mark for explanation	2

WORKSHEET 1
The Fundamen-tal Unit of Life

TIME- 20 MINUTES **MAX MARKS- 15**

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MULTIPLE CHOICE QUESTIONS (1 MARK EACH)

1. If the plasma membrane of a cell ruptures, what will most likely happen first?
A. The nucleus will divide uncontrollably
B. Organelles will multiply rapidly
C. The cell will lose its contents and die
D. The cell will become multicellular

2. A plant cell was placed in a concentrated salt solution. What will happen to the cell and why?
A. It will burst due to endosmosis
B. It will shrink due to exosmosis
C. It will swell and become turgid
D. No change will occur

3. Why are lysosomes called 'suicidal bags' of the cell?
A. They help in respiration
B. They destroy other cells
C. They digest their own cell when damaged
D. They transport nutrients

Assertion – Reason Type Questions (1x2)

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

4. Assertion (A): Mitochondria are known as the powerhouse of the cell.
Reason (R): Mitochondria synthesize proteins required for cell function

5. Assertion (A): Lysosomes are essential for the survival of the cell.
Reason (R): They help in intracellular digestion and destruction of worn-out organelles.

2 Marks question

6. A saltwater fish is accidentally placed in freshwater. Predict what will happen to its cells and explain the reason behind it.

3 Marks question

7. Why do onion peel cells not burst when placed in pure water, whereas red blood cells do? Justify.

5 Marks question

8.Ravi observed an onion peel and a human cheek cell under the microscope in his school lab. He noticed some differences between the two.

Based on his observation, answer the following:

a. What is the major differences between the two types of cells? 2
b. Name the structure responsible for maintaining the shape of the onion cell. 1
c. Which type of cell (plant or animal) has plastids and why? 2

WORKSHEET -1, ANSWER KEY (The fundamental unit of life)

1. C. The cell will lose its contents and die
2. B. It will shrink due to exosmosis
3. C. They digest their own cell damaged
4. Answer: C. A is true but R is false.
   Explanation: Mitochondria are the powerhouse because they produce energy (ATP), not proteins. Protein synthesis happens in ribosomes.
5. Answer: A. Both A and R are true and R is the correct explanation of A.
6. Water will enter the fish's cells by osmosis (hypotonic environment), causing the cells to swell and possibly burst. This is because freshwater has a lower solute concentration than the fish's body fluids.
7. Onion cells have a rigid cell wall that prevents bursting by withstanding internal pressure (turgor). Red blood cells lack a cell wall, so they may burst in a hypotonic solution due to excessive water intake.
8. a. Onion peel (plant cell) has a cell wall; cheek cell (animal cell) does not.
   b. The cell wall maintains the shape of the onion cell.
   c. Plant cells have plastids (e.g., chloroplasts) for photosynthesis; animal cells do not need them.

Work Sheet- 2
The Fundamental Unit of Life

TIME- 20 MINUTES **MAX MARKS- 17**

==========

MULTIPLE CHOICE QUESTIONS (1x3)

1. Which of the following organelles is primarily involved in the production of ATP through oxidative phosphorylation in eukaryotic cells?

A) Ribosome B) Mitochondrion C) Endoplasmic reticulum D) Golgi apparatus

2. 2: Which phase of the cell cycle is characterized by the replication of DNA?

A) G1 phase B) S phase C) G2 phase D) M phase

3. 3: The breakdown of glucose into two molecules of pyruvate occurs in which part of the cell?

A) Nucleus B) Mitochondrion C) Cytoplasm D) Endoplasmic reticulum

Assertion – Reason Type Questions (1x2)

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.

4. Assertion (A): Photosynthesis is a process by which plants convert light energy into chemical energy.
Reason (R): Chlorophyll absorbs light energy, which is used to convert carbon dioxide and water into glucose and oxygen.

5. Assertion (A): DNA replication occurs during the S-phase of the cell cycle.
Reason (R): During the S-phase, the cell grows and prepares for division.

Short Answer Type Questions (2x2)

6. Explain how the structure of the leaf is adapted for photosynthesis.

7. Why are xylem vessels more efficient than tracheids in conducting water in plants?

Short Answer Type Question (3 marks)

8. Explain the difference between prokaryotic and eukaryotic cells with any three points.

9.

5 Marks question

10. A student observes a cell under a microscope and notes the absence of a nucleus. What type of cell is it? Justify your answer. Draw the diagram of the type of cell.

WORKSHEET -2, ANSWER KEY (The fundamental unit of life)

1: B
2:B
3: C
4: A
5: C

6: Broad surface area – Maximizes light absorption.

7: Xylem vessels are more efficient because:

- They are longer and form continuous tubes, allowing faster water movement.
- They have wider lumens, reducing resistance to water flow.
- They lack end walls, unlike tracheids, so water can flow freely through the vessel elements.

8. The differences between prokaryotic and eukaryotic cells are:

1. **Nucleus:**

- *Prokaryotic cells* lack a well-defined nucleus; genetic material lies in the nucleoid.
- *Eukaryotic cells* have a well-defined, membrane-bound nucleus.

2. **Cell size:**
   - *Prokaryotic cells* are generally smaller (1–10 µm).
   - *Eukaryotic cells* are larger (10–100 µm).
3. **Organelles:**
   - *Prokaryotic cells* do not have membrane-bound organelles.
   - *Eukaryotic cells* have membrane-bound organelles like mitochondria, ER, etc.

9: It is a prokaryotic cell (e.g., bacterial cell). Prokaryotes lack a well-defined nucleus; their genetic material is not enclosed within a nuclear membrane.

WORKSHEET –3, FUNDAMENTAL UNIT OF LIFE

TIME- 20 MINUTES **MAX MARKS- 16**

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Multiple Choice Questions (1 Mark each)

1. Which structure is present in plant cells but not in animal cells?
   a) Nucleus
   b) Mitochondria
   c) Cell wall
   d) Ribosome
2. What is the main function of the plasma membrane?
   a) Photosynthesis
   b) Control movement of substances
   c) Store wastes
   d) Synthesize proteins
3. Which organelle contains genetic material and controls cell activities?
   a) Mitochondria
   b) Nucleus
   c) Vacuole
   d) Lysosome
4. What is the process by which substances move from high concentration to low concentration?
   a) Osmosis
   b) Endocytosis
   c) Diffusion
   d) Exocytosis
5. Which of the following is a function of vacuoles in plant cells?
   a) Cellular respiration
   b) Storing substances and maintaining turgidity
   c) Protein synthesis
   d) Carrying genetic information
6.

Short Answer Type Questions (2 Marks Each)

7. Explain in your own words why osmosis is important for plant cells.
8. Describe what would happen to an animal cell placed in a very concentrated salt solution and explain why.

Assertion-Reason Type Questions (1 Mark Each)

For each question, state whether both the assertion and the reason are true, and whether the reason correctly explains the assertion.

9. **Assertion**: Mitochondria are called the powerhouses of the cell.
   Reason: Mitochondria release energy in the form of ATP during cellular respiration.
10. **Assertion**: Plant cells do not burst when placed in hypotonic solutions.
    Reason: The cell wall in plant cells provides structural support and prevents bursting.
11.

Long Answer Question (5 marks)

12. Explain the differences between plant cells and animal cells, focusing on at least three major structural features. Also, discuss the importance of these differences in the life of the organism.

WORKSHEET – 3, ANSWER KEY

Multiple Choice Questions

1. c) Cell wall
2. b) Control movement of substances
3. b) Nucleus
4. c) Diffusion
5. b) Storing substances and maintaining turgidity

Open-Ended Questions (example responses)

6. Osmosis is important for plant cells because it helps them absorb water from the soil, which maintains turgidity and allows the plant to stay upright and healthy.
7. The animal cell will lose water and shrink because water moves out of the cell into the concentrated salt solution by osmosis.

Assertion-Reason Type Questions

8. Both the assertion and the reason are true, and the reason correctly explains the assertion.
9. Both the assertion and the reason are true, and the reason correctly explains the assertion.

Long Answer Question

10. Plant cells have a cell wall, large central vacuole, and plastids like chloroplasts, which are not found in animal cells. The cell wall gives structural support and protection, the vacuole helps maintain pressure and stores nutrients, and chloroplasts enable photosynthesis. These features allow plants to make their own food, maintain structure, and store essential substances, which are critical for their survival as non-motile organisms.

Tissues
Worksheet 1

TIME- 20 MINUTES **MAX MARKS- 20**

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Section A: Multiple Choice Questions (1 mark each)

1. Which of the following is not a type of simple permanent tissue?
   a) Parenchyma b) Collenchyma
   c) Sclerenchyma d) Xylem
2. Which connective tissue connects muscles to bones in humans?
   a) Cartilage
   b) Ligament
   c) Tendon
   d) Areolar
3. Which of these is a complex permanent tissue?
   a) Parenchyma
   b) Collenchyma
   c) Phloem
   d) Sclerenchyma
4. Which plant tissue is responsible for the transport of water?
   a) Xylem
   b) Phloem
   c) Collenchyma
   d) Parenchyma
5. Which type of muscle tissue is involuntary and found in the walls of internal organs?
   a) Skeletal b) Cardiac
   c) Smooth d) Voluntary
6.

Short Answer Questions (2 marks each)

7. What is the function of meristematic tissue in plants?
8. Differentiate between voluntary and involuntary muscles (any two points).
9.

Short Answer Questions (3 marks each)

10. Explain the structure and function of xylem tissue.
11. How does cardiac muscle differ from skeletal muscle in structure and function?

Long Answer Question (5 marks)

12. Describe the various types of epithelial tissues with diagrams and mention their functions.

Answer Key (Worksheet -1)

1. d) Xylem
2. c) Tendon
3. c) Phloem
4. a) Xylem
5. c) Smooth
6. Meristematic tissue helps in the growth of the plant by cell division.
7. Voluntary muscles are under conscious control; involuntary muscles are not. Voluntary muscles are striated; involuntary are non-striated.

8. Xylem consists of tracheids, vessels, xylem parenchyma, and xylem fibers. It transports water and minerals from roots to other parts of the plant.
9. Cardiac muscle is involuntary and found in the heart; it is striated and branched. Skeletal muscle is voluntary, striated, and unbranched.
10. Explanation with labeled diagrams of squamous, cuboidal, columnar, ciliated, and glandular epithelium]

Graded Worksheet - 2
Chapter – Tissue

TIME- 20 MINUTES **MAX MARKS- 18**

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Multiple Choice Questions (1Mark Each)

1. A person is unable to move his limbs voluntarily, but his heart is beating normally. Which tissues are functioning properly, and which are not?
A. Striated muscles working, cardiac muscles not
B. Cardiac muscles working, striated muscles not
C. Smooth muscles working, striated muscles not
D. Skeletal muscles working, cardiac muscles not

2. Which connective tissue connects muscles to bones?
A. Ligament B. Tendon C. Cartilage D. Areolar

3. Which plant tissue is made of living cells and helps in photosynthesis?
A. Sclerenchyma B. Collenchyma C. Xylem D. Chlorenchyma

4. Which muscular tissue is involuntary and found in the walls of internal organs?
A. Cardiac muscle B. Skeletal muscle C. Smooth muscle D. Voluntary muscle

5. During exercise, the movement of your arms and legs is possible due to which type of muscular tissue?
A. Smooth muscles B. Cardiac muscles C. Skeletal muscles D. Voluntary involuntary muscles

6. A gardener observes that the stem of a mature plant has become hard and woody. Which plant tissue is most responsible for this change?
A. Parenchyma B. Collenchyma C. Sclerenchyma D. Phloem

7. A person has trouble in Pumping blood due to damage in a specific muscle. Which muscle is most likely affected?
A. Skeletal muscle B. Smooth muscle C. Cardiac muscle D. Involuntary muscle

Assertion Reason Type Questions

Chose as per the options 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.

8. Assertion **(A):** Sclerenchyma cells are dead at maturity.
Reason (R): Sclerenchyma provides flexibility to plant parts.

9. Assertion (A): Striated muscles are also called voluntary muscles.
Reason (R): Striated muscles work according to our will and show alternate light and dark bands.

10. Assertion **(A):** Ligaments are flexible and can stretch.
Reason (R): Ligaments connect muscles to bones.

Case based questions

11. During a school race, Priya experienced an irregular heartbeat and muscle cramps. The school nurse explained that different types of muscles work in different parts of the body. She also checked Priya's reflexes and suggested hydration for better muscle function.

Questions:

A. Which muscle is responsible for heartbeat?

B. Which muscle type is responsible for leg movement during running?

C. Name the tissue responsible for transmitting reflex signals.

D. How is smooth muscle different from skeletal muscle?

E. Are cardiac muscles voluntary or involuntary?

12. During a science fair, students demonstrated a model of how the human body responds to a pinprick. The finger was pulled back immediately before pain was felt. The teacher explained how nerve and muscle tissues coordinate to produce this response.

Questions:

A. Which tissue helps in detecting the stimulus of a pinprick?

B. What is the function of motor nerves in this case?

C. Which muscle tissue contracts to move the finger?

D. What are the key features of nervous tissue?

Answer Key (worksheet -2)

1. B
2. B
3. D
4. C
5. C
6. C
7. C
8. C
9. A
10. C
11. A)Cardiac muscles
    B) Voluntary muscles
    C) Nervous tissue
    D) Smooth muscle is involuntary and unstriated while skeletal muscle is Voluntary and striated.
    E) Involuntary
12. A) Nervous tissue (sensory nerves)
    B) Motor nerves carry the command given by brain or spinal to Effector organ.
    C) Voluntary muscle
    D) Nervous tissue is the longest cell of the body it makes nervous system and make the organism able to respond to stimuli and play main role in control and Coordination.

Graded Worksheet -3
Chapter- Tissue

TIME- 20 MINUTES **MAX MARKS- 16**

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Multiple Choice Questions (1 Mark Each)

1.Xylem and phloem are types of complex permanent tissues. What does the word 'complex' signify in this context?
a) They are difficult to identify b) They perform multiple functions
c) They are made of more than one type of cell d) They are found only in complex organisms
2. Riya set up an experiment to test water transport in plants. She added coloured water to a beaker and placed a plant stem in it. After some time, she saw coloured streaks in the stem. Which tissue is responsible for this observation?
a) Phloem b) Xylem c) Parenchyma d) Collenchyma
3. A student observed a plant tissue under a microscope and found that the cells were elongated, had thickened corners, and no intercellular spaces. Which tissue is it likely to be?
a) Parenchyma b) Collenchyma c) Sclerenchyma d) Xylem
4.While observing a section of stem, a student finds cells with thick walls and no nucleus. Which function can these cells best perform?
a) Photosynthesis b) Transport of food c) Structural support d) Cell division
5.A gardener notices that a branch of a plant bends but does not break easily. Which tissue is most likely providing flexibility to the branch?
a) Sclerenchyma b) Collenchyma c) Xylem d) Phloem

Assertion Reason Questions (1 Mark Each)

Chose as per the options 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.
6.**Assertion (A)**: Xylem transports water and minerals from roots to other parts of the plant.
Reason (R): Xylem is composed of only living cells.
7.**Assertion (A):** Sclerenchyma cells are dead and have thick walls.
Reason (R): Sclerenchyma helps in the transport of food.
8. **Assertion (A):** Cardiac muscles are found in the walls of internal organs.
Reason (R): Cardiac muscles are involuntary in nature.

Short Answer type questions (2 Mark Each)

9. Compare and contrast the structure and functions of different types of muscular tissues.
10. What is the function of cardiac muscles and how are they different from striated muscles?

Case/ source-based Questions (1x 4)

11. Read the passage and answer the questions:
A farmer notices that the young parts of a plant, especially near the growing tips, are soft and green. As the plant matures, some parts become hard and woody. To improve crop yield, the farmer prunes the tips regularly and notices that the plant grows more bushy.
Questions:
A)Which plant tissue is responsible for the growth at the tips of the plant?
B).Why do the tips remain soft and green?
C).Name the tissue that provides mechanical support to mature, hard parts of the plant.
D) Which permanent tissue helps in transporting water and minerals in mature parts of plants.

Answer Key (Worksheet -3)

Chapter - Tissue

1. c
2. b
3. b
4. c
5. b
6. c
7. c
8. d
9. Smooth muscles- These are involuntary in function do not have light and dark coloured bands and are found in internal organs and are uninucleated.
Striated muscles- These are voluntary in function and are found in organs like hands ,legs, neck etc these have light and dark coloured bands and are multinucleated.
Cardiac muscles- These cells are involuntary in function but are smooth in structure These are uninucleated and are found in heart only.
10. Cardiac muscles are involuntary in nature and have light and dark coloured band these are uninucleated and branched and are found in heart.
11. A) Meristematic tissue
B) Because the meristematic cells are full of cytoplasm, thin walled and very delicate actively dividing cells
C) Sclerenchyma
D) Xylem

Motion
Worksheet -1

TIME- 20 MINUTES **MAX MARKS- 16**

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Multiple Choice Questions (1x6)

1. 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)2πr

2. A body is thrown vertically upward with velocity u, the greatest height h to which it will rise is,
(a) u/g (b) $u^2/2g$ (c) u^2/g (d)u/2g

3. The numerical ratio of displacement to distance for a moving object is
(a) always less than 1
(b) always equal to 1
(c) always more than 1
(d)Equal or less than 1

4. If the displacement of an object is proportional to the square of time, then the object moves with
(a) uniform velocity
(b) uniform acceleration
(c) increasing acceleration
(d)Decreasing acceleration

Assertion Reason Questions (1 Mark Each)

Chose as per the options 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.

5. **Assertion**: The graph between two physical quantities P and Q is a straight line when P/Q is constant.
Reason: The straight line graph means that P is proportional to Q or P is equal to constant multiplied by Q.

6. Assertion: An object in motion changes its position with respect to time.
Reason: Motion is defined as a change in the position of an object with respect to time.

Short Answer Type Questions (2 marks each)

7. What does constant speed in circular motion imply about acceleration?

8. An object has moved through a distance. Can it have zero displacements? If yes, support your answer with an example.

9. A bus decreases its speed from 80 km h−1 to 60 km h−1 in 5 s. Find the acceleration of the bus.

10. During an experiment, a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station? The signal travels at the speed of light, that is, 3×10^8 m s−1.

11. An athlete completes one round of a circular track of diameter 200 m in 40 s. What will be the distance covered and the displacement at the end of 2 minutes 20 s?

Answer (Worksheet – 1)

Q1. (c) 2r Q2.(b) $u^2/2g$ Q3. (d) Q4. b

Q5. (a) Both assertion and reason are true and the reason is the correct explanation of assertion.

Q6. a) Both Assertion and Reason are true, and the Reason is the correct explanation for the Assertion

Q7.In uniform circular motion, even with a constant speed, the object is always accelerating. This is because acceleration is a change in velocity, and velocity is a vector quantity that includes both magnitude (speed) and direction. While the speed might be constant, the direction of the velocity is constantly changing as the object moves along the circular path, resulting in a continuous change in velocity and therefore, acceleration.

Q8.Yes, Displacement is the change in position, and if the object ends up back where it began, its displacement is zero.

Example: Imagine a person walking around a circular park and returning to their starting point. They have traveled a distance equal to the circumference of the park, but their displacement is zero because their final position (starting point) is the same as their initial position.

Q9.Given: Initial velocity (U) = 80 km/hr = 80 × 5/18 = 400/18 = 22.22 m/sec

Final velocity (V) = 60 km/hr = 60 × 5/18 = 300/18 = 16.67 m/sec

Acceleration a = (V - U) / t

= (16.67 - 22.22)/5= -5.55/5= -1.11 m/s2

Negative sign indicates that the velocity is decreasing.

Q10.**Answer**: Time is taken by the signal to reach the ground station from the spaceship = 5 min = 5 × 60 = 300 s

Speed of the signal = 3×10^8 m/s

Speed = distance travelled/time taken

∴Distance travelled = Speed × Time taken = $3 \times 10^8 \times 300 = 9 \times 10^{10}$

Hence, the distance of the spaceship from the ground station is 9×10^{10}m.

Q11.**Answer**: diameter of a circular track, d = 200m

Radius of the track, r = d/2= 100m

Circumference = $2 \pi r$

In 40 s the athlete completes one round.

So, in 140 s the athlete will complete = 140÷40= 3.5 rounds.

Distance covered in 140 s = $2\pi r \times 3.5 = 2 \times 22/7 \times 100 \times 3.5 = 2200$m.

Worksheet – 2 (Chapter – Motion)

TIME- 20 MINUTES **MAX MARKS- 16**

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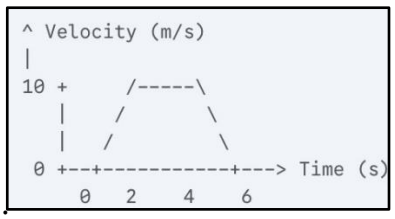
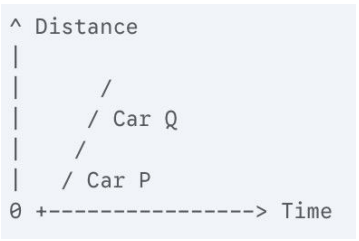
Multiple Choice Questions (1 mark each)

1. The velocity-time graph of an object moving in a straight line is shown below:


During which time interval does the object experience the greatest magnitude of acceleration (or retardation)?
(a) 0 to 2 s
(b) 2 to 4 s
(c) 4 to 6 s
(d) The magnitude of acceleration is the same in the intervals 0-2 s and 4-6 s.
2. A car accelerates uniformly from rest to a velocity of 20 m/s in 5 seconds. If the same car then accelerates uniformly from 20 m/s to 40 m/s in the next 5 seconds, what can be said about the acceleration in the two intervals?
(a) The acceleration is the same in both intervals. (b) The acceleration is greater in the first interval.
(c) The acceleration is greater in the second interval. (d) The information is insufficient to compare the accelerations.
3. Consider two objects, A and B, moving with constant velocities. The velocity of A is twice the velocity of B. If both objects start from the same point at the same time, what will be the ratio of the distances covered by A and B after a certain time *t*?
(a) 1:2 (b) 2:1 (c) 4:1 (d) 1:4
4. A ball is thrown vertically upwards. Which of the following statements is true about its velocity and acceleration at the highest point? (Neglect air resistance).
(a) Velocity is zero, and acceleration is zero. (b) Velocity is maximum, and acceleration is downwards.
(c) Velocity is zero, and acceleration is downwards. (d) Velocity is downwards, and acceleration is downwards.
5. The distance-time graph of two cars, P and Q, is shown below:


Based on the graph, which of the following conclusions is correct?
(a) Car P is moving faster than Car Q.
(b) Car Q is moving faster than Car P.
(c) Both cars are moving at the same speed.
(d) The relative speed of the two cars is zero.

Short Answer Questions (2 marks each)

6. Explain the difference between uniform circular motion and uniform linear motion. In which type of motion is the velocity constantly changing? Why?
7. A scooterist travels 60 km in the first hour and 40 km in the next hour. Calculate the average speed of the scooterist. Explain why this average speed might not represent the scooterist's speed at any given instant during the journey.

Assertion Reason Type Questions (1 mark each)

For each of the following questions, 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 of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

8. **Assertion:** An object can have zero velocity and still have non-zero acceleration.
Reason: Acceleration is the rate of change of velocity, and the velocity can be momentarily zero while it is changing.
9. Assertion**:** Displacement is a scalar quantity, while distance is a vector quantity.
Reason: Displacement has both magnitude and direction, while distance has only magnitude.

Long Answer Question (5 marks)

10. Imagine a scenario where a car starts from rest and accelerates uniformly for 10 seconds. For the next 10 seconds, it moves with a constant velocity. Finally, it decelerates uniformly and comes to rest in the subsequent 5 seconds.
    (a) Sketch a velocity-time graph for this entire motion. (2 marks)
    (b) Using the graph or otherwise, calculate the total distance traveled by the car. Show your steps clearly. (3 marks)

Answer (Worksheet -2) Chapter - Motion

Answers to Multiple Choice Questions:

1. **(d)** The magnitude of acceleration is the same in the intervals 0-2 s and 4-6 s.
2. **(c)** The acceleration is greater in the second interval.
3. **(b)** 2:1
4. **(c)** Velocity is zero, and acceleration is downwards.
5. **(b)** Car Q is moving faster than Car P.

Answers to Short Answer Questions:

6. Uniform linear motion is motion along a straight line with constant velocity (both speed and direction remain unchanged). Uniform circular motion is motion along a circular path with constant speed, but the velocity is constantly changing because the direction of motion is continuously changing. In uniform circular motion, the velocity is constantly changing due to the continuous change in direction.
7. Average speed = Total distance traveled / Total time taken. Total distance = 60 km + 40 km = 100 km Total time = 1 hour + 1 hour = 2 hours Average speed = 100 km / 2 hours = 50 km/h.

Answers to Assertion Reason Type Questions:

8. **(a)** Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
9. **(a)** Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.

Answer to Long Answer Question:

10. **(a) Sketch of Velocity-Time Graph:**

The velocity-time graph would consist of three distinct sections:

- **Section 1 (0-10 seconds):** A straight line starting from the origin (0 velocity at 0 time) and sloping upwards to represent uniform acceleration. Let's say the car reaches a velocity v at the end of 10 seconds.
- **Section 2 (10-20 seconds):** A horizontal straight line at the velocity v, representing motion with constant velocity.
- **Section 3 (20-25 seconds):** A straight line sloping downwards from velocity v at 20 seconds to zero velocity at 25 seconds, representing uniform deceleration (retardation).

The total distance traveled is the area under the velocity-time graph. We can divide the area into three parts:

Total Distance = Area 1 + Area 2 + Area 3 = $5v + 10v + 2.5v = 17.5v$ meters.

- v = initial velocity + (acceleration × time) = 0 + (2 m/s² × 10 s) = 20 m/s.

In this case, the total distance would be:

Total Distance = 17.5 × 20 m = 350 meters.

Worksheet – 3 (Motion)

TIME- 20 MINUTES **MAX MARKS- 16**

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Multiple Choice Questions (1 mark each)

1. A ball is dropped from a certain height. Its velocity just before hitting the ground is v. If the same ball is thrown vertically downwards from the same height with an initial velocity v, what will be its velocity just before hitting the ground (neglecting air resistance)?
   (a) v
   (b) $2v$
   (c) Greater than v but less than $2v$
   (d) Less than v
2. An object moves along a circular path with a constant speed. Which of the following statements best describes the nature of its motion?
   (a) It has constant velocity and zero acceleration.
   (b) It has constant velocity and non-zero acceleration.
   (c) It has varying velocity and zero acceleration.
   (d) It has varying velocity and non-zero acceleration.
3. The displacement-time graph of an object is a straight line inclined to the time axis. This indicates that the object is:
   (a) Moving with uniform acceleration. (b) Moving with uniform velocity.
   (c) Moving with variable velocity. (d) At rest.
4. A car starts from rest and accelerates uniformly to a speed of 30 m/s in 6 seconds. What is the magnitude of its acceleration?
   (a) 5 m/s² (b) 180 m/s² (c) 0.2 m/s² (d) 36 m/s²
5. Consider the following speed-time graph of a moving object:
   What does the slope of this graph represent?
   (a) Distance traveled
   (b) Displacement
   (c) Acceleration
   (d) Velocity

Short Answer Questions (2 marks each)

6. Define retardation. Is it a scalar or a vector quantity? Explain your answer.
7. A bus travels the first half of its journey at a speed of 40 km/h and the second half at a speed of 60 km/h. Calculate the average speed of the bus for the entire journey.

Assertion Reason Type Questions (1 mark each)

For each of the following questions, 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 of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

8. **Assertion:** The magnitude of displacement can be equal to or less than the distance traveled by an object.
   Reason: Displacement is the shortest path between the initial and final positions, while distance is the actual path length.
9. **Assertion:** Uniform motion is always accelerated motion.
   Reason: In uniform motion, the velocity of the object remains constant.

Long Answer Question (5 marks)

10. **Two** friends, A and B, start cycling from the same point at the same time. Friend A travels along a straight road at a constant speed of 15 km/h. Friend B travels along a different straight road that makes an angle of 90° with the road of friend A, at a constant speed of 20 km/h.

(a) How far will each friend be from the starting point after 2 hours? (2 marks)
(b) What will be the distance between the two friends after 2 hours? (3 marks)

Answer Key (Worksheet -3)

Answers to Multiple Choice Questions:

1. **(c)** Greater than v but less than $2v$
2. **(d)** It has varying velocity and non-zero acceleration.
3. **(b)** Moving with uniform velocity.
4. **(a)** 5 m/s²
5. **(c)** Acceleration

Answers to Short Answer Questions:

1. Retardation is the negative acceleration or the rate at which the velocity of an object decreases with time. It is a vector quantity because acceleration is a vector quantity, having both magnitude and direction (opposite to the direction of motion).
2. Average speed = Total distance / Total time. Let the total distance be $2d$. Time for first half = d/40 h. Time for second half = d/60 h. Total time = $d/40 + d/60 = (3d + 2d)/120 = 5d/120 = d/24$ h. Average speed = $2d / (d/24)$ = 48 km/h.

Answers to Assertion Reason Type Questions:

1. **(a)** Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
2. **(d)** Assertion is false, but Reason is true.

Answer to Long Answer Question:

(a)

- Distance of Friend A = speed × time = 15 km/h × 2 h = 30 km.
- Distance of Friend B = speed × time = 20 km/h × 2 h = 40 km.

(b) The paths of the two friends are perpendicular, forming a right-angled triangle with the starting point. The distance between them is the hypotenuse.

Using the Pythagorean theorem:

Distance² = (Distance of A)² + (Distance of B)²

Distance² = (30 km)² + (40 km)² = 900 km² + 1600 km² = 2500 km²

Distance = $\sqrt{2500}$ km² = 50 km.

FORCE AND LAWS OF MOTION
Graded worksheet -1

TIME- 20 MINUTES **MAX MARKS- 15**

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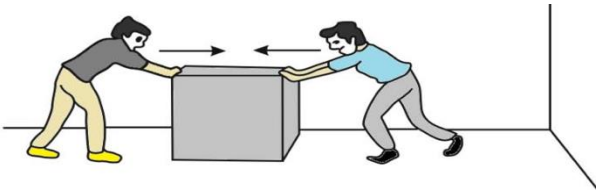
1. A truck and a car are moving with the same velocity. Which one will require more force to stop and why? Explain using Newton's Second Law of Motion. **2**
2. One applies 50 N and the other applies 30 N in the opposite direction. 2
   (a) What is the net force acting on the box?
   (b) In which direction will it move?
   (c) Which law of motion explains this situation?



3. Two objects, A and B, have masses in the ratio 1:3. If the same force is applied to both, what will be the ratio of their accelerations? 1
   A. 1:3 B. 3:1 C. 1:1 D.9:1

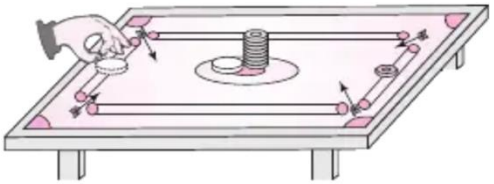
4. A truck and a bicycle both have the same momentum. Which will require more force to stop in the same time and why? 2

5. Two friends on roller-skates are standing 5 m apart facing each other. One of them throws a ball of 2 kg towards the other, who catches it, How will this activity affect the position of the two? Explain your answer.

   3

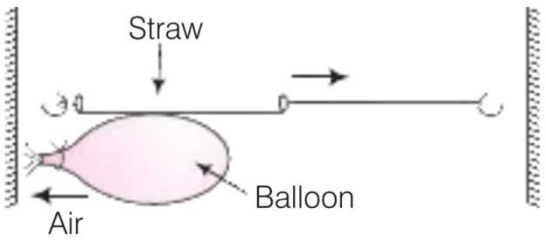
6. Answer the following questions showing when striker hits the pile of carom coin:- 3

A. What does the inertia of an object tends to cause?
B. What happens if the hit is weak?
C. On what factor does inertia of a body depend?



Carom coin at the bottom of a pile is removed when a fast moving carom coin

7. Which law of motion is depicted by given activity? Give two example based on this activity? 2



ANSWER KEY (Worksheet-1)

Answer 1:- According to Newton's Second Law of Motion,
$F = ma$, or more generally, $F = \Delta p / \Delta t$, where p = momentum = mass × velocity.
Greater mass (the truck) will have greater momentum. A greater force is needed to change the larger momentum of the truck.

Answer 2:- (a) Net Force = 50 N (right) – 30 N (left) = 20 N to the right
(b) The box will move in the direction of the net force, i.e., to the right
(c) Statement of Newton's Second Law of Motion

Answer 3: - B. 3:1

Answer 4 :- The truck has more mass. To stop in the same time, it needs a greater force ($F = \Delta p/\Delta t$), since both have same momentum but the truck's large mass implies smaller acceleration and thus requires more force.

Answer 5:- According to Newton's Third Law of Motion, the ball also exerts an equal and opposite force on the thrower. This causes the first friend to move backward (opposite to the direction of the throw), and when the second friend catches the ball, the ball applies a force on them in the forward direction (same as its motion), the second friend experiences a backward reaction force and also moves backward.

Answer 6:- (A)The inertia of an object tends to resist any change in its state of rest or motion.
(B) If the hit is weak, the upper carom coins may fall randomly with or without actual movement of the coin.
(C) Inertia of a body depends on the mass of the body.

Answer 7:- Third law of motion, Principle of jet planes and rocket are based on this activity.

FORCE AND LAWS OF MOTION
Graded worksheet -2

TIME- 20 MINUTES **MAX MARKS- 16**

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Multiple Choice Questions (1 mark each)

1. When a net force acts on an object, the object will be accelerated in the direction of the force. This acceleration is directly proportional to:
   (a) The mass of the object. (b) The inverse of the mass of the object.
   (c) The velocity of the object. (d) The inverse of the velocity of the object.
2. A boy pushes a heavy box with a force of 50 N, but the box does not move. This is because:
   (a) There is no force acting on the box.
   (b) The force applied by the boy is less than the inertia of the box.
   (c) There is an equal and opposite frictional force acting on the box.
   (d) The boy is not applying the force in the correct direction.
3. Consider a car moving at a constant velocity. According to Newton's First Law of Motion:
   (a) There must be a net external force acting on the car.
   (b) The net external force acting on the car must be zero.
   (c) The inertia of the car is constantly changing.
   (d) The momentum of the car is zero.
4. A rocket expels hot gases downwards with a large force. According to Newton's Third Law of Motion, the rocket moves upwards because:
   (a) The gases push against the ground.
   (b) The upward force on the rocket is greater than the downward force of the expelled gases.
   (c) There is an equal and opposite upward force exerted by the expelled gases on the rocket.
   (d) The rocket has a large mass.
5. The momentum of an object is a measure of its:
   (a) Inertia. (b) Force. (c) Quantity of motion. (d) Acceleration.

Short Answer Questions (2 marks each)

6. Define inertia. Explain why a heavier object has more inertia than a lighter object.
7. State Newton's Second Law of Motion in terms of momentum. How is this form more general than the form relating force to mass and acceleration?

Assertion Reason Type Questions (1 mark each)

For each of the following questions, 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 of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

8. **Assertion:** It is easier to push an empty cart than a loaded cart.
   Reason: The inertia of an object is directly proportional to its mass.
9. **Assertion:** When a horse pulls a cart, the force exerted by the horse on the cart is equal and opposite to the force exerted by the cart on the horse. Therefore, the cart does not move.
   Reason: Newton's Third Law states that for every action, there is an equal and opposite reaction.

Long Answer Question (5 marks)

10. A block of mass 2 kg is placed on a horizontal surface. A horizontal force of 10 N is applied to the block for 3 seconds. (Take $g = 10\ m/s^2$)

(a) Draw a diagram of the block, showing all the forces acting on it. (1 marks)
(b) Find the distance travelled by the block in 5 seconds (2)
(c) Calculate the velocity after 5 seconds. (1)
(c) Determine the acceleration of the block. (1 marks)

Answer Key: Exploring Force and Laws of Motion
Worksheet-2

Answers to Multiple Choice Questions:

1. **(b)** The inverse of the mass of the object.
2. **(c)** There is an equal and opposite frictional force acting on the box.
3. **(b)** The net external force acting on the car must be zero.
4. **(c)** There is an equal and opposite upward force exerted by the expelled gases on the rocket.
5. **(c)** Quantity of motion.

Answers to Short Answer Questions:

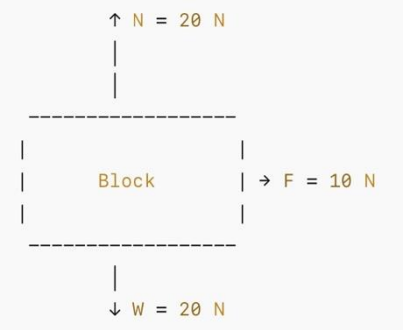
6. Inertia is the tendency of an object to resist any change in its state of rest or uniform motion. A heavier object has more inertia because it has more mass. Mass is the measure of inertia; a larger mass implies a greater resistance to changes in velocity. More force is required to accelerate or decelerate a heavier object compared to a lighter one for the same change in velocity.
7. Newton's Second Law of Motion in terms of momentum states that the rate of change of momentum of an object is directly proportional to the applied net force and takes place in the direction of the net force.

Answers to Assertion Reason Type Questions:

8. **(a)** Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
9. **(d)** Assertion is false, but Reason is true. (Uniform motion implies zero acceleration according to Newton's First Law).

Answer to Long Answer Question:

10. **(a) Force on the body Diagram**



(b) Distance in 5 s:

- First 3 s: s1=22.5 m, Next 2 s: s2=30
- **Total = 52.5 m**

(c) Velocity after 5 s: 15 m/s

(d) Acceleration: 5 m/s²

Chapter – Gravitation (Worksheet -1)

Worksheet: Exploring Pressure, Density, and Buoyancy

TIME- 20 MINUTES **MAX MARKS- 18**

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Multiple Choice Questions (1 mark each)

1. The pressure exerted by a liquid at a certain depth is:

(a) Directly proportional to the surface area of the container.
(b) Inversely proportional to the density of the liquid.
(c) Directly proportional to the depth of the liquid.
(d) Independent of the acceleration due to gravity.

2. The relative density of a substance is the ratio of its density to the density of:

(a) Air (b) Any other substance
(c) Water at 4°C (d) The densest substance known

3. According to Archimedes' principle, the buoyant force acting on an object submerged in a fluid is equal to:

(a) The weight of the object.
(b) The volume of the fluid displaced by the object.
(c) The mass of the fluid displaced by the object.
(d) The weight of the fluid displaced by the object.

4. If an object floats in a liquid, the buoyant force acting on it is:

(a) Greater than the weight of the object. (b) Less than the weight of the object.
(c) Equal to the weight of the object. (d) Zero.

5. A sharp knife cuts better than a blunt knife because, for the same applied force, the sharp knife has:

(a) A larger surface area, resulting in greater pressure.
(b) A smaller surface area, resulting in greater pressure.
(c) A larger surface area, resulting in less pressure.
(d) A smaller surface area, resulting in less pressure.

6. The density of a solid is twice the density of a liquid. If the solid is fully submerged in the liquid, the buoyant force acting on the solid will be:

(a) Equal to the weight of the solid.
(b) Half the weight of the solid.
(c) Twice the weight of the solid.
(d) Independent of the weight of the solid.

7. A hydrometer is an instrument used to determine:

(a) Atmospheric pressure.
(b) Density of liquids.
(c) Humidity of air.
(d) Depth of a submerged object.

Short Answer Questions (2 marks each)

8. Differentiate between density and relative density. State the SI unit for each.
9. Explain why a ship made of steel floats on water, even though steel is much denser than water.

Assertion Reason Type Questions (1 mark each)

For each of the following questions, 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 of Assertion.
(c) Assertion is true, but Reason is false.
(d) Assertion is false, but Reason is true.

10. **Assertion:** Diver’s experience greater pressure at the bottom of a deep sea than at the surface.
Reason: Pressure in a liquid increase with depth.
11. **Assertion:** An iron nail sinks in water, but an iron ship floats.
Reason: The buoyant force depends only on the density of the liquid.

Long Answer Question (5 marks)

12. A solid block has dimensions 2m × 0.5m × 0.2m and a mass of 200 kg

(a) Calculate the density of the block. (1 mark)

(b) If this block is completely submerged in water (density = 1000 kg/m³), calculate the buoyant force acting on it. (2 marks)

(c) What will be the apparent weight of the block when submerged in water? (2 marks)

Answer Key: Exploring Pressure, Density, and Buoyancy (Gravitation) (Worksheet-1)

Answers to Multiple Choice Questions:

1. **(c)** Directly proportional to the depth of the liquid.
2. **(c)** Water at 4°C
3. **(d)** The weight of the fluid displaced by the object.
4. **(c)** Equal to the weight of the object.
5. **(b)** A smaller surface area, resulting in greater pressure.
6. **(b)** Half the weight of the solid.
7. **(b)** Density of liquids.

Answers to Short Answer Questions:

1. **Density** is defined as the mass per unit volume of a substance (Density = Mass/Volume). Its SI unit is kilogram per cubic meter (kg/m³). **Relative density** is the ratio of the density of a substance to the density of a reference substance, usually water at 4°C. It is a dimensionless quantity and has no SI unit.
2. A ship made of steel floats because of its overall shape and the large volume of water it displaces. Although steel is denser than water, the ship is designed with a large hollow space inside. This increases the overall volume of the ship significantly, making its average density (total mass of the ship divided by its total volume) less than the density of water. According to Archimedes' principle, the buoyant force acting on the ship is equal to the weight of the water displaced. When the weight of the displaced water becomes equal to the total weight of the ship, the ship floats.

Answers to Assertion Reason Type Questions:

1. **(a)** Both Assertion and Reason are true, and Reason is the correct explanation of Assertion.
2. **(c)** Assertion is true, but Reason is false. (The buoyant force depends on the volume of the fluid displaced and hence the volume of the submerged object, as well as the density of the liquid).

Answer to Long Answer Question:

(a) Calculate the density of the block: Volume of the block = length × width × height = 2 m × 0.5 m × 0.2 m = 0.2 m³ Density of the block = Mass / Volume = 200 kg / 0.2 m³ = 1000 kg/m³.

(b) Calculate the buoyant force acting on it: When submerged, the volume of water displaced is equal to the volume of the block = 0.2 m³. Mass of water displaced = Density of water × Volume of water displaced = 1000 kg/m³ × 0.2 m³ = 200 kg. Buoyant force = Weight of water displaced = mass of water displaced × g = 200 kg × 10 m/s² = 2000 N.

(c) What will be the apparent weight of the block when submerged in water? Weight of the block in air = mass of block × g = 200 kg × 10 m/s² = 2000 N. Apparent weight = Weight in air - Buoyant force = 2000 N - 2000 N = 0 N. (Note: In this specific case, the density of the block is equal to the density of water, so it would be neutrally buoyant, and its apparent weight would be zero if fully submerged).

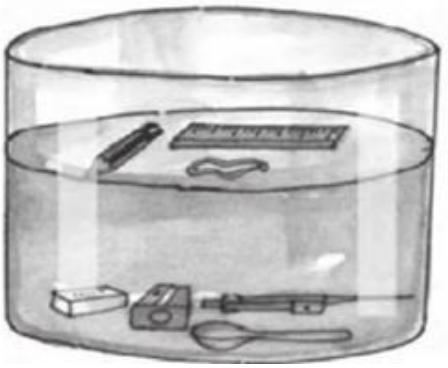
GRADED WORKSHEET -2
CLASS 9 CHAPTER - GRAVITATION
(Thrust, Pressure & Archimedes Principle)

TIME- 20 MINUTES **MAX MARKS- 13**

==========

Pallavi Mam was demonstrating an experiment in his class with the setup as shown in the figure below. She took an eraser, sharpener, steel spoon, plastic ruler, pencil, compass and rubber band and asked the students to place them on the surface of the water. Students observed that a few objects float on the surface of water while a few sinks in water.

Read the given passage carefully and give the answer of the following questions: **(1x5)**



Q1. An object floats in a liquid if the buoyant force is:

a. Zero b. greater than its weight
c. less than its weight d. equal to its weight

Q 2. An object sinks in a liquid if the buoyant force is:

a. Zero b. greater than its weight
c. less than its weight d. equal to its weight

Q 3. The buoyant force on an object immersed in a liquid act:

a. in the vertically upward direction
b. in the vertically downward direction
c. at an angle of 90^0 to the direction in which weight of the object acts.
d. at an angle of 45^0 to the direction in which the weight of the object acts.

Q 4. The magnitude of buoyant force depends on the:

a. density of liquid b. volume of liquid
c. weight of the object d. viscosity of liquid

Q 5. Magnitude of buoyant force is given by:

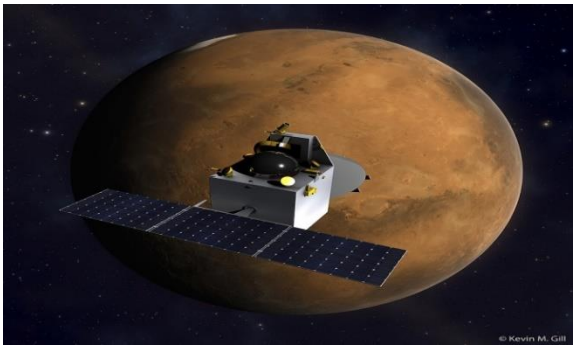
a. Newton's first law b. Archimedes' principle
c. Newton's second law d. None of these

Q6. If Gravitational force acts between all objects, why don't the two objects in a room move towards each other. **1**

Q7. When a body is thrown upward, its velocity becomes zero at the highest point. What will be its acceleration at this point? **1**

Q8. COMPETENCY BASED QUESTIONS **3x2**

(i) Compare and contrast the effects of gravity on objects on Earth and the Moon. How do these differences impact the design of spacecraft and equipment for lunar missions.



(ii) If an astronaut on the Moon throws a rock upwards with an initial velocity, how would the rock's trajectory differ from one on Earth? Explain the reasons behind these differences

Answer Key (Worksheet-2)

Q1 b. greater than its weight
Q2 c. less than its weight
Q3 a. in the vertically upward direction
Q4 a. density of liquid
Q5 b. Archimedes' principle
Q6. The two objects in a room do not move towards each other because of their small masses, the gravitational force of attraction between them is very, very small in comparison to the frictional force offered by surfaces in contact to opposite relative motion between surfaces.
Q7. The acceleration at this point is equal to the value of g in the downward direction.
Q8. Ans -Comparison of Gravity's Effect on Objects on Earth and the Moon-
1. Gravity's Presence: The Moon's gravity is about one-sixth of Earth's**.2**. Gravitational Pull:t A gravitational force on objects, affecting their motion and weight.**:3.** Gravity Strength: Earth's gravity is stronger (9.8 m/s^2) compared to the Moon's (1.62 m/s^2).**4**. Weight: Objects weigh more on Earth than on the Moon due to the difference in gravity.

Impact on Spacecraft and Equipment Design for Lunar Missions

1. Weight Reduction: Spacecraft and equipment are designed to be lighter to accommodate the Moon's lower gravity.
2. Structural Integrity: Equipment must withstand the harsh lunar environment, including extreme temperatures and radiation.
3. Mobility: Rovers and landers are designed to navigate the Moon's low-gravity, rocky terrain.
4. Gravity Compensation: Some equipment, like drills, may need adjustments to function effectively in the Moon's gravity.

CHAPTER : Gravitation
Worksheet – 3

TIME- 20 MINUTES **MAX MARKS- 18**

==========

Multiple Choice Questions (1 Mark Each)

1. Who formulated the law of universal gravitation?

A) Galileo Galilei B) Isaac Newton C) Albert Einstein D) Johannes Kepler

2. According to the law of universal gravitation, the force of gravity between two objects is:

A) Directly proportional to the product of their masses

B) Inversely proportional to the product of their masses

C) Directly proportional to the square of the distance between them

D) Inversely proportional to the square of the distance between them

3. What is the acceleration due to gravity on Earth?

A) 9.8 m/s² B) 10 m/s² C) 8.9 m/s² D) 11.2 m/s²

4. What happens to the weight of an object as it moves away from the center of the Earth?

A) It increases B) It decreases C) It remains the same D) It becomes zero

Assertion-Reason Questions (1 Mark Each)

A. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

B. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

C. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

D. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

E. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

5. Assertion: The value of acceleration due to gravity (g) is greater at the poles than at the equator.

Reason: The Earth is slightly flattened at the poles and bulging at the equator due to its rotation.

6. Assertion: Objects fall towards the ground due to the force of gravity.

Reason: The force of gravity acts between all objects in the universe, and its strength depends on the mass of the objects and the distance between them.

7. Assertion: The weight of an object on the Moon is less than its weight on the Earth.

Reason: The acceleration due to gravity on the Moon is less than the acceleration due to gravity on the Earth.

Short Answer Questions (2 Marks each)

8. What is acceleration due to gravity? Why is the acceleration due to gravity less at the equator than at the poles?

9. Mass of boy on earth is 40kg, what is the mass and weight on the moon?

10. Calculate the force of gravity between two objects of masses 10 kg and 20 kg separated by a distance of 5 m. ($G = 6.67 \times 10^{-11}$ N m² kg^{-2})

Long Answer Questions (5 Marks)

11. (a) Explain how the universal law of gravitation explains the following phenomena:

(i) The falling of objects towards the Earth

(ii) The motion of planets around the Sun

(b) A ball is thrown vertically upwards from the surface of the Earth with an initial velocity of 20 m/s. Assuming that air resistance is negligible and the acceleration due to gravity is 9.8 m/s², calculate:

1. The maximum height reached by the ball
2. The velocity of the ball when it returns to the surface of the Earth
3. The total time taken by the ball to return to the surface of the Earth

Answer Key (Worksheet -3)

Multiple Choice Questions

1. B) Isaac Newton
2. A) Directly proportional to the product of their masses
3. A) 9.8 m/s^2
4. B) It decreases

Assertion-Reason Questions

5. A. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
6. A. Both assertion and reason are true, and the reason is the correct explanation of the assertion.
7. A. Both assertion and reason are true, and the reason is the correct explanation of the assertion.

Short Answer Questions

8. Acceleration due to gravity is the acceleration gained by an object due to Earth's gravitational pull. 'g' is less at the equator due to Earth's equatorial bulge (larger radius) and rotational effect.
9. Mass on the moon: 40 kg; Weight on the moon: (approximately) 40 kg * 1.625 $m/s^2 \approx 65$ N.
10. Force = G * (m1 * m2) / $r^2 = (6.67 \times 10^{-11})$ * (10 * 20) / $5^2 = 5.336 \times 10^{-10}$ N.

Long Answer Questions

11. (a) (i) Earth's large mass exerts a gravitational force, pulling objects towards its center. (ii) The Sun's immense gravity attracts planets, causing them to orbit. (b) 1. Max height (h) = $u^2/2g = 20^2 / (2 * 9.8) \approx$ 20.41 m. 2. Velocity on return = -u = -20 m/s (same speed, opposite direction). 3. Total time (T) = 2u/g = (2 * 20) / 9.8 ≈ 4.08 s.

Worksheet – 4 (Gravitation)

TIME- 20 MINUTES **MAX MARKS- 15**

==========

Multiple Choice Questions (1 Mark Each)

1. The gravitational force between two objects is F. If the distance between them is doubled, the force becomes:
A) F/2 B) F/4 C) F/8 D) F/16

2. The weight of an object on the Moon is:
A) Greater than its weight on Earth
B) Less than its weight on Earth
C) Equal to its weight on Earth
D) Zero

3. The force of gravity acts:
A) Only on objects on the surface of the Earth
B) Only on objects in contact with each other
C) Between all objects in the universe
D) Only on objects that are moving

Short Answer Questions (2 marks)

4. How does the weight of an object change if the acceleration due to gravity changes?

5. How does the weight of an object change if the acceleration due to gravity changes? Mass of boy on earth is 40kg, what is the mass and weight on the moon?

6. State the universal law of gravitation, What is the significance of the universal law of gravitation?

7. A stone is dropped from a height of 20 m. Calculate its velocity when it hits the ground. ($g = 9.8\ m/s^2$)

Case Study-Based question (1+1+1+1)

8. Any object located in the field of the earth experiences a gravitational pull. Gravitational acceleration is described as the object receiving an acceleration due to the force of gravity acting on it. It is represented by 'g' and its unit is m/s2. Gravitational acceleration is a quantity of vector, that is it has both magnitude and direction. A rock is dropped from a height of 100 meters above the ground. Assume that air resistance is negligible.
A. What is free fall?
B. As the rock falls, its velocity:
i) Remains constant ii) Increases iii) Decreases iv) Becomes zero
C. What is the acceleration of the rock as it falls?
D. What force is responsible for the rock's motion towards the ground?

Answer Key (Worksheet -4)

Multiple Choice Questions

1. B) F/4
2. B) Less than its weight on Earth
3. C) Between all objects in the universe

Short Answer Questions

4. Weight is directly proportional to the acceleration due to gravity. If 'g' changes, the weight changes proportionally.
5. Weight is directly proportional to the acceleration due to gravity. If 'g' changes, the weight changes proportionally. Mass on the moon: 40 kg; Weight on the moon: approximately 65 N.
6. Universal Law: Every object in the universe attracts every other object with a force directly proportional to the product of their masses and inversely proportional [1] to the square of the distance between their centers. Significance: Explains the motion of celestial bodies, tides, and the falling of objects on Earth.
7. $v^2 = u^2 + 2as \Rightarrow v^2 = 0 + 2 * 9.8 * 20 \Rightarrow v = \sqrt{392} \approx 19.8$ m/s.

Case study based question

8. A. Motion under the influence of gravity alone.
   B. ii) Increases
   C. 9.8 m/s² (acceleration due to gravity)
   D. Gravitational force (or the force of gravity)

GRADED WORKSHEET -1
CLASS 9 CHAPTER – Work & Energy

TIME- 20 MINUTES **MAX MARKS- 20**

==========

Objective Type Questions (1 mark each)

1. Work is said to be done when:
   A. Force is applied
   B. There is displacement
   C. Force is applied and displacement occurs in any direction
   D. Force is applied and displacement occurs in the direction of force
2. The SI unit of work is:
   A. Joule
   B. Newton
   C. Watt
   D. Calorie
3. A porter lifts a load and walks on a level road. The work done by the porter on the load is:
   A. Positive
   B. Negative
   C. Zero
   D. Cannot be determined

Short Answer Questions (2 marks each)

4. Write the formula for kinetic energy. If the speed of an object is doubled, by what factor does its kinetic energy increase?
5. Write the condition for positive, negative and zero work.

Short Answer Questions (3 marks each)

6. Derive the expression for kinetic energy using the work-energy theorem.
7. An object of mass 2 kg is raised to a height of 5 m. Calculate its potential energy. ($g = 9.8\ m/s^2$)
8. A person does 150 J of work in 10 seconds. What is his power in watts and kilowatts?

Case-Based Question (4 marks)

9. Read the passage below and answer the following questions:

   A group of students designed a simple water lifting system using a motor in their school to lift water from a tank 10 meters below the ground level to the roof of the school building. The motor is rated 1 kW and operates for 20 minutes each day to lift 500 liters of water.

   a. What is the work done by the motor in lifting water each day?
   b. Calculate the power used in joules per second.
   c. Identify the energy transformation taking place in this system.
   d. Suggest one way to make the system more energy efficient.

Answer Key (work sheet – 1)

SECTION A: Objective Type Questions

1. D – Force is applied and displacement occurs in the direction of force
2. A – Joule
3. C – Zero

SECTION B: Very Short Answer Questions

4. KE = (1/2)mv². If speed is doubled, KE becomes 4 times (since KE ∝ v²).
5. Conditions for positive, negative and zero work on the basis of angle between force and displacement.

SECTION C: Short Answer Questions

6. Using Work-Energy Theorem: Work done = Change in kinetic energy
   KE = (1/2)mv²
7. PE = mgh = 2 × 9.8 × 5 = 98 J
8. Power = Work/time = 150 J / 10 s = 15 W = 0.015 kW

SECTION E: Case-Based Question

9.
   a. Work = mgh = 500 kg × 9.8 × 10 = 49,000 J
   b. Power = Work / time = 49,000 / (20 × 60) = 49,000 / 1200 = 40.83 W
   c. Electrical energy → Mechanical energy → Potential energy
   d. Use a solar-powered motor or ensure proper insulation to reduce energy loss

GRADED WORKSHEET FOR CLASS IX
CHAPTER 10- WORK AND ENERGY

TIME- 20 MINUTES **MAX MARKS- 15**

==========

MCQ's (1 MARK EACH)

1. If the angle between force and displacement is q , then for what value of q is work done zero?
   (i) 60° (ii) 45° (iii) 180◦ (iv) 90°

2. The kinetic energy acquired by a mass m is travelling a certain distance s , starting from rest, under the action of a constant force is……..
   i. directly proportional to m
   ii. directly proportional to √ m
   iii. directly proportional to 1/√ m
   iv. independent of m
3. A body is falling from a height of h. After it has fallen a height h/2, it will possess…….
   i. only potential energy
   ii. only kinetic energy
   iii. half potential and half kinetic energy
   iv. more kinetic energy less potential energy
4. Two object of same mass is moving with velocity of 3V and 2V respectively, the ratio of their kinetic energy would be
   i. 2:3
   ii. 3:2
   iii. 4:9
   iv. 9:4
5. Two army persons A and B each of weight of 500 N climb up a rope through a height of 10 m. A takes 20 s while B takes 40 s to achieve this task. What is ratio of the powers of person A and B?

   i. 1 : 2
   ii. 1 : 4
   iii. 2 : 1
   iv. 1 : 4

ASSERTION/REASON (1 MARK EACH)

Select appropriate option in questions as per below given choices.

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

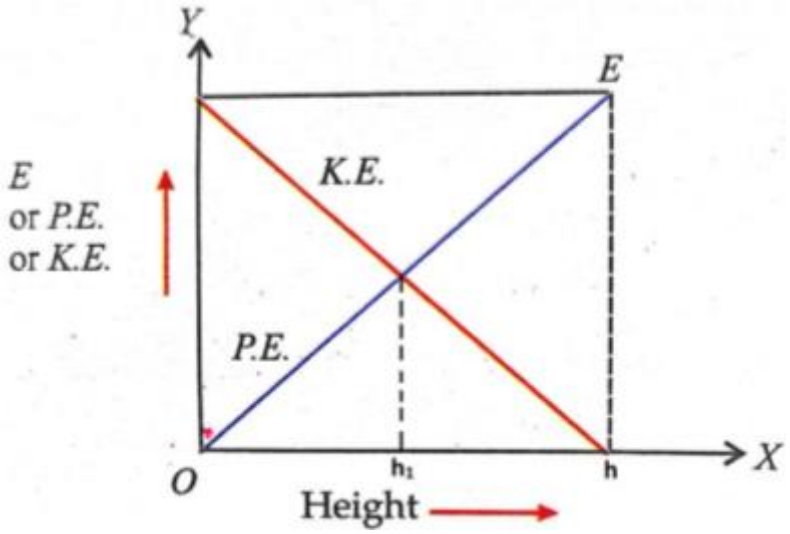
6. Assertion(A) – A body can be displaced in the absence of force acting on it.
   Reason(R) – No force is needed to move a body with constant velocity.
7. Assertion(A) – In the absence of any force acting on an object, the object can have displacement.
   Reason(R) – No force acts on a body moving with constant velocity.

Short Answer (2 MARKS EACH)

8. What are the factors on which the work done depends?
9. An object having mass 2 kg. thrown upward with the velocity of 20 m/s then calculate the potential energy at the end of 2 seconds. (g = 10m/s)

CASE BASED QUESTIONS (4 MARKS)

10. A body is dropped from a height h above the ground, which is shown in the graph comparing both kinetic energy and potential energy with height.



i. What will be the final height of the body?
ii. What will be the Kinetic Energy at height h?
iii. When the velocity will be maximum?
iv. What will be the total energy when the body is at a
a) height h b) height h1

ANSWERS

1. (iv) 90°
2. (iv)
3. (iii)
4. (iv)
5. (iii) 2:1
6. a
7. a
8. The work done by a force depends upon : (i) The magnitude of the force. (ii) The magnitude of the displacement. (iii) The angle between force and displacement.
9. $h = ut + ½ gt^2 = 20 \times 2 + 1/2 (-10) \times 2^2 = 40 – 20 = 20$ m

mgh = 2 x 10 x 20 = 400 J

10. (i) h (ii) Zero (iii) at height h (iv) a) mgh b) mgh

GRADED WORK SHEET: CLASS IX
SUBJECT : SCIENCE (086)
CHAPTER : SOUND
WORKSHEET :01

Marks : 16 **Time : 20 Min**

==========

Multiple Choice Questions (1 Mark Each)

1. The sound of a bell travels through air and reaches your ear. Which of the following statements best explains how this happens?
A. The sound travels in the form of light waves.
B. The particles of air travel from the bell to your ear.
C. The vibrations from the bell create compressions and rarefactions in air.
D. The sound is produced due to reflection of air.

2. Why do astronauts in space need radios to talk to each other?
A. Space amplifies sound waves.
B. Space is full of air that distorts sound.
C. There is no medium in space for sound to travel.
D. Sound waves travel faster in space.

3. A student performs an experiment to find the speed of sound in air. She claps near a wall and hears the echo after 0.8 seconds. If the wall is 136 m away, calculate the speed of sound in air.
A. 170 m/s
B. 272 m/s
C. 340 m/s
D. 204 m/s

Assertion Reason Type Questions (1 mark each)

Directions: In the following questions, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true

4. **Assertion :** Sound would travel faster on a hot summer day than on a cold winter day.
Reason : Velocity of sound is directly proportional to the square of its absolute temperature.

5. **Assertion :** Sound is a form of energy which produces a sensation of hearing in our ears.
Reason : When you clap, a sound is produced

Short Answer Questions (2 marks Each)

6. Give two practical applications of reflection of sound waves.

7. Distinguish between transverse and longitudinal waves

8. (a)The frequency of a source of sound is 100 Hz. How many times does it vibrate in a minute?
(b) Which of the following sound wavers we can hear: 10 Hz, 500 Hz, 1500 Hz, 12000 Hz, 25000 Hz ?

9. R**ead the following and answer any four questions from (i) to (iv) given below :**

Sound bounces off a solid or a liquid like a rubber ball bounce off a wall. Like the light, sound gets reflected at the surface of a solid or liquid and follows the same laws of reflection. The directions in which the sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence, and the three are in the same plane. If we clap near a suitable reflecting object such as a tall building or a mountain, we will hear the same sound again a little later. This sound that we hear is called an echo.

The sensation of sound persists in our brain for about 0.1 s. To hear a distinct echo the time interval between the original sound and the reflected one must be at least 0.1s. Hence, for hearing distinct echoes, the minimum distance of the obstacle from the source of sound must be 17.2 m. This distance will change with the temperature of air. Another phenomenon of reflection of sound is reverberation.

A sound created in a big hall will persist by repeated reflection from the walls until it is reduced to a value where it is no longer audible. The repeated reflection that results in this persistence of sound is called reverberation. Excessive reverberation is highly undesirable

i. **Which of the following is true related to the reflection of sound? (1)**

(a) Directions in which the sound is incident and is reflected make equal angles with the normal to the reflecting surface at the point of incidence.

(b) Incident wave reflected wave and normal lies in the same plane

(c) Both a and b are true.

(d) None of these

ii. **(ii) For hearing distinct echoes, the minimum distance of the obstacle from the source of sound must be (1)**

(a) 10m

(b) 20m

(c) 17.2m

(d) None of these

iii. **(iii) Excessive reverberation is (1)**

(a) Desirable phenomenon

(b) Undesirable phenomenon

(c) Does not exist

(d) None of these

iv. **Why are the ceilings of concert halls curved? (2)**

Worksheet 1
ANSWER KEY

1. **C. The vibrations from the bell create compressions and rarefactions in air.**
2. **C. There is no medium in space for sound to travel.**
3. C. 340 m/s
4. (c) Assertion (A) is true but reason (R) is false.
5. (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
6. Write any two applications
7. **Transverse waves**
   Particles the medium vibrate at right angles, Alt. crests and troughs formed.e.g., water waves
   Longitudinal waves
   Particles vibrate parallel to the direction of waves,Alt. compressions, rarefaction formed, Ex Sound Waves
8. (a)No. of vibrations produced in 1 s = 100
   No. of vibrations produced in 60 (sec) = (1 min) = 100 x 60 = 6000.
   (b) 500 Hz, 1500 Hz, 12000
9. (i) (c) Both a and b are true.
   (ii) (c) 17.2m
   (iii) (b) Undesirable phenomenon
   (iv) he ceilings of concert halls are curved because sound after reflection from it reaches all the corners of the hall and is audible to each person in the hall.

GRADED WORK SHEET: CLASS IX
SUBJECT : SCIENCE (086)
CHAPTER : SOUND
WORKSHEET : 02

Marks : 15 **Time : 20 Min**

==========

Multiple Choice Questions (1 Mark Each)

1. Sound can travel in
   a) Solid b) Liquid c) Gas d) Vaccum
   Choose the correct answer
   1) a and b (2) a,b and c 3) a and c 4) b,c and d
2. Compression is a reason of
   a) High Pressure b) Medium Pressure
   c) Low Pressure d) None Of the above
3. The loudness or the softness of the sound is determined by
   a) Wave length b) Amplitude c) Pitch

Assertion Reason Type Questions (1 Mark Each)

4. **Assertion :** Nocturnal animals like bat can freely move at night .
   Reason : Bats send ultra sound by moving .
5. **Assertion :** Sound of aeroplane is not heard during landing and taking off .
   Reason : Sound is produced by vibration .
6. Why do we not hear the sound of explosions taking place on the moon? 1
7. A sound wave travels through two different media A and B. The wavelength of the sound is larger in medium A than in medium B, but the frequency is the same. Which medium has a higher speed of sound and why? 2
8. A school bell is ringing and a student is sitting in a classroom.
   (a) What type of wave is produced by the bell? 1
   (b) How does this sound reach the student's ears? 2
   (c) If the frequency of the bell is 1000 Hz and the wavelength of the sound is 0.34 m, calculate the speed of sound in air 2
9. A person is listening to a tone of 500 Hz, sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source? 2

WORKSHEET :02

ANSWER KEY

1. **2) a , b and c**
2. A) High Pressure
3. **Amplitude**
4. (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
5. (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
6. he moon has **no atmosphere**
7. Speed of sound $v=\lambda \times f$
   Since frequency f is the same and $\lambda A > \lambda B$
   $vA > vB$
   So, **medium A has a higher speed of sound** because it allows sound to travel with a longer wavelength at the same frequency.
8. **(a)** The bell produces **mechanical longitudinal sound waves**.

(b) The sound travels in the form of **compressions and rarefactions** through the air (medium) and reaches the student's ears by the **vibration of air particles**.

(c) We use the formula: Speed of sound (v)=Frequency (f)×Wavelength(λ)

9. It can be calculated as follows: T= 1/F
   T= 1/500
   T = 0.002 s

GRADED WORK SHEET: CLASS IX
CLASS : IX
Chapter - Sound
WORKSHEET :03

TIME : 20 MIN **MAX. MARKS : 15**

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Multiple Choice Questions (1 Mark Each)

1. **Children under the age of 5 can hear upto**
   a. 25 Hz b. 25k Hz c. 20 Hz d. 25 kHz
2. **A tuning fork produces a sound wave of frequency 250 Hz. What will happen if its frequency is doubled?**
   a) Pitch decreases b) Loudness increases c) Pitch increases d) Speed doubles
3. **If the frequency of a sound wave is 500 Hz and its wavelength is 0.66 m, what is the speed of sound?**
   a) 330 m/s b) 660 m/s c) 250 m/s d) 132 m/s

Assertion Reason Type Questions (1 mark each)

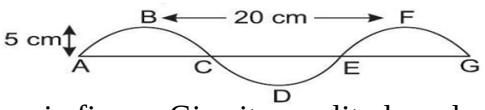
Directions: In each of the following questions, a statement of Assertion is given, and a corresponding statement of Reason is given just below it. Of the statements, given below, mark the correct answer as:
(a) Both assertion and reason are true, and reason is the correct explanation of assertion.
(b) Both assertion and reason are true, but reason is not the correct explanation of assertion.
(c) Assertion is true, but reason is false.
(d) Assertion is false, but reason is true

4. **Assertion (A):** Infrasonic sounds are inaudible to humans. **Reason (R):** Human ears can detect frequencies between 20 Hz and 20,000 Hz.
5. **Assertion (A):** Echo is heard when the reflected sound reaches the listener after 0.1 seconds. **Reason (R):** The minimum distance for an echo to be heard is 17.2 m at room temperature.
6. Why can you hear the sound of a train approaching through the rails earlier than through air? 2
7. **A) What is SONAR?** **1.5**
   B) Find the frequency of a wave whose time period is 0.002 second **1.5**

8. Read the given passage carefully and give the answer of the following questions: (1x5)

Two friends Shefali and Anuj make a toy telephone by joining two plastic cups through a long string. They both stand apart. Anuj speaks softly into one cup and Shefali hears by putting her ear in the other cup. Now, Shefali speaks and Anuj listens.

Q A. What type of waves are produced by voice of Anuj and Shefali in the air inside the plastic cup?
Q B. What type of waves are produced in the string?
Q C. Give one difference between these types of waves.
Q D. Why is sound wave called a longitudinal wave?



Q E. Waves of frequency 100 Hz are produced in a string as shown in figure. Give its amplitude and wavelength.

WORKSHEET : 03
ANSWER KEY

1. c. 20 Hz
2. c) Pitch increases
3. a) 330 m/s *(Speed = Frequency × Wavelength = 500 × 0.66)*
4. **Explanation:** Both are true and the reason correctly explains why infrasonic (below 20 Hz) sounds are inaudible.
5. **Explanation:** Both are true, and the reason explains the assertion using the formula:
   Distance = Speed × Time = 343 m/s × 0.1 s / 2 = 17.15 m (rounded to 17.2 m)
6. Sound travels faster in solids than in gases
7. A) SONAR is—Sound Navigation and Ranging.
   B) Frequency = 1/ Time period Frequency = 1/0.002 = 500 Hz
8. A) Longitudinal waves
   B)Transverse waves
   C)In longitudinal wave, particles vibrate parallel to the direction of wave propagation. In transverse wave, particles vibrate perpendicular to the direction of wave propagation.
   D)The sound wave is called a longitudinal wave because in a sound wave, the particles of the medium move in a direction parallel to the direction of propagation of the disturbance.
   E)Amplitude = 5 cm (maximum displacement from mean position)
   Wavelength = 20 cm (Distance between two crests or troughs)

WORK SHEET 1

Chapter - Improvement of food resources

TIME : 20 MIN **MAX. MARKS : 15**

==========

Multiple Choice Questions (1 Mark Each)

1. What is the process of growing two or more crops in a definite pattern?
a. Crop rotation b. Inter-cropping c. Mixed cropping d. Organic cropping

2. Groundnut crop exposed to different temperature conditions. The of the crop sown with respective temperature conditions. Temperature conditions
A 26-30°C B 5-10°C C 15-17°C D 11-40°C

At which temperature would the groundnut crops grow most effectively?
a) Temperature A. b) Temperature B. c) Temperature C. d) Temperature D

3. 4. Find out the wrong statement from the following
a. White revolution is meant for increase in milk production.
b. Blue revolution is meant for increase in fish
c. Increasing food production without compromising with environmental quality is called as sustainable agriculture.
d. None of the above.

Assertion- Reason based Questions (1 Mark Each)

Answer these questions selecting the appropriate option given below:
(A) Both Assertion and Reason are True and Reason is the correct explanation of the Assertion.
(B) Both Assertion and Reason are True but Reason is not the Correct explanation of the Assertion.
(C) Assertion is True but the Reason is False.
(D) Assertion is false but Reason is true.

4. **Assertion (A)** – Cattle are fed with roughage and concentrates
Reason (R) – Roughage provides fibres while concentrates provide proteins and other nutrients

5. **Assertion** – Drip & sprinkler systems are the best methods of irrigation.
Reason(R) - River valley system does not require any irrigation.

Very Short Answers(2×2=4)

6. Mention any one method of incorporating desirable character in crop variety.
7. Write one advantage of biological pest control over chemical pest

Short Answers (3 marks)

8. Differentiate between inter cropping, mixed cropping and crop rotation by giving suitable examples.

Case based Questions (1x4 marks)

9. To solve the food problem of the country , all of decided to grow a plant during summer. He decided to grow peas. So he went to the market and bought the best quality seeds, sand and fertilizers, planted the seed. Started taking good care of it. But as day passed he began to realise that the seeds he planted are getting worse. The plant was unhealthy and very poor in quality. He tried everything but was unable to figure out the solution.

(i) Rabi crops are grown in which period?
(ii) Which system is used for irrigation?
(iii) Why were crops grown unhealthy?
(iv) Sugguest methods to solve food problems in our county.

Work sheet 1 (Answer Key) Improvement of food resources

1. b) Inter cropping
2. a) location A
3. d) None of the above
4. a)
5. b)
6. Hybridization and genetic modification
7. Biological pest control do not cause of any type of pollution.

8. Intercropping: Two or more crops are grown together at the same time in a structured row pattern to optimize resource use and potentially increase yields. For example, growing maize and beans in alternating rows.

Mixed Cropping: Multiple crops are sown and grown together on the same land at the same time without a specific row arrangement. This can be done by mixing seeds before sowing or by planting crops in a haphazard way.

Crop Rotation: Different crops are grown on the same land in a planned succession, usually over multiple seasons, to maintain soil health and fertility. For instance, a farmer might plant wheat in one season, followed by a legume like soybeans in the next to replenish nitrogen

9. (A) Rabi crops grown in month of November to December (in winter season) Which is suitable for crop.
(B) Sprinkle system or any traditional method.
(c) Due unfavorable weather and time.
(D) Use advanced technology in agriculture and awareness among people to save food.

WORK SHEET- 2
IMPROVEMENT OF FOOD RESOURCE

TIME : 20 MIN **MAX. MARKS : 15**

==========

Multiple Choice Questions (1 Mark Each)

1. Cattle husbandry is done for following reasons
   a. Honey production
   b. Meat production
   c. Agriculture work
   d. Egg production

2. Poultry farming is undertaken to raise following
   a. Feather collection
   b. Egg production
   c. Meat production
   d. Egg and meat production

3. Animal husbandry is the scientific management of
   a. Animal livestock
   b. Animal breeding
   c. Rearing of animals
   d. All of these

4. The main sugar present in honey is
   a. Glucose
   b. Fructose
   c. A& B both
   d. Starch

Assertion Reason Type Questions (1 mark each)

Answer these questions selecting the appropriate option given below:
(A) Both Assertion and Reason are True and Reason is the correct explanation of the Assertion.
(B) Both Assertion and Reason are True, but Reason is not the Correct explanation of the Assertion.
(C) Assertion is True, but the Reason is False.
(D) Assertion is false, but Reason is true.

5. **Assertion** - Green gram is a Rabi crop.
Reason- Green gram completely grown in the month of September to October.

6. **Assertion**-Different type of crops required different photoperiods.
Reason- Growth of plants and flowering are important functions which always depending on sunlight.

Short Answer Type Questions (2×2= 4)

7. Nitrogen is an essential nutrient for plant growth. But farmers who cultivate pulse crops like green gram, Bengal gram, black gram, etc. do not apply nitrogenous fertilizers during cultivation. Why?

8. Arrange these statements in correct sequence of preparation of green manure.
(i) Green plants are decomposed in soil.
(ii) Green plants are cultivated for preparing manure.
(iii) Plants are ploughed and mixed into soil.
(iv) After decomposition it becomes change in green manure.

Long Answer (5 marks)

9. (A) Anand brings vegetables from market and informed to the family members, these vegetables are free from chemicals.
   i. Which type of farming done by farmers ,Identify and name it.
   ii. Write two advantages this type of farming.
   iii. Why government and people support this type of farming.
(B) Rahul wants to start a business related to collection and sales of honey.

i. Name the culture of this process.
ii. Which bees used for this process. Write any 2 names

Answer Key (Work Sheet -2) IMPROVEMENT OF FOOD RESOURCE

1. C Agriculture work
2. D Egg & meat production
3. D All of these
4. C A& B both
5. C assertion is true & reason is false
6. A
7. Legumes family plant collect nitrogen from atmosphere by nitrogen fixing process.
8. Order is 2,3,1 & 4

Q9s (A) (i) Organic farming
(ii) This type of crop free from fertilizers and chemicals.
(iii) It is healthy for health, control biomagnification and pollution.

(B) (i) Apiculture
(ii) Apis mallifera & Apis cerana

Student Support Material

Graded Worksheets
Class – X

Science

2024-25

28 April 2025 – 02 May 2025
Experiential Learning and Presentation (for PGT- Science) Batch-1 @ ZIET Gwalior

Prepared at
Zonal Institute of Education & Training, Gwalior

CHAPTER - 1
CHEMICAL REACTIONS AND EQUATIONS

WORKSHEET 1

TIME:20min **MM:18**

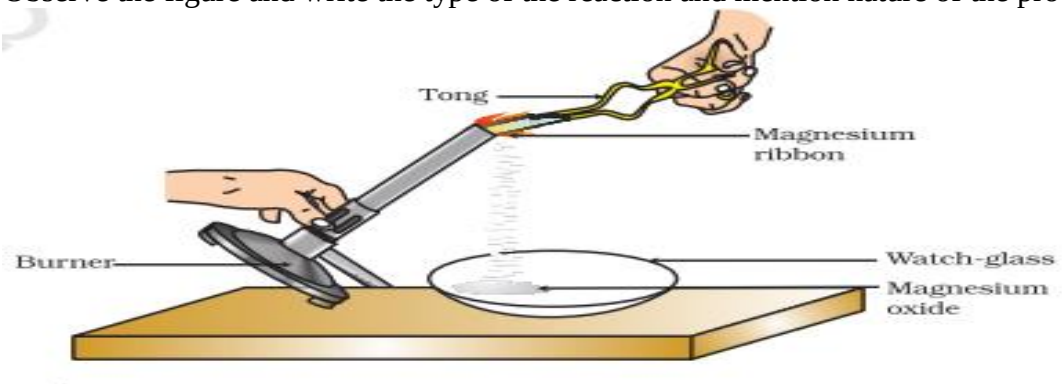
Multiple choice questions (1*4=4)

1. What type of reaction is represented by the following equation? $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 + O_2$
   A) Combination reaction
   B) Displacement reaction
   C) Decomposition reaction
   D) Double displacement
2. Rancidity is caused due to:
   A) Fermentation
   B) Oxidation of fats and oils
   C) Dehydration D) Reduction of fats

3. Which of the following is an exothermic process?
   a) Photosynthesis
   b) Melting of ice
   c) Burning of natural gas
   d) Electrolysis of water
4. Assertion (A) White silver chloride turns grey in sunlight.
   Reason (R) : Copper reacts with zinc sulphate to form copper sulphate and zinc is deposited.
   Following question 4 have two statements – Assertion (A) and Reason (R).
   Answer these questions by 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.

Very short answer type questions (2*3=6)

5. Why is more hydrogen gas collected than oxygen in the electrolysis of water
6. Observe the figure and write the type of the reaction and mention nature of the product.



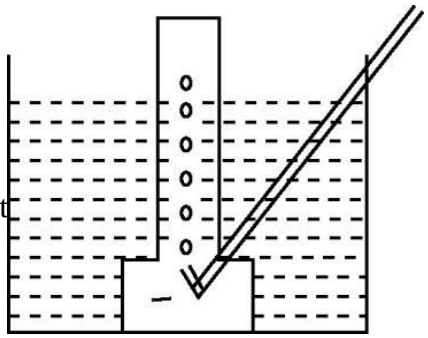
7. How is a double displacement reaction different from a single displacement reaction?

Long answers type Questions (2*4=08)

8. A school installed a new iron gate. After a few months, especially during the rainy season, students observed a reddish-brown layer forming on the surface of the gate. The science teacher explained this as an example of corrosion and discussed its effects and

prevention methods in class.
Questions:
a. What is corrosion?
b. What is Galvanization?
c. State whether corrosion is a physical or chemical change.
d. Mention any two methods to prevent rusting of iron.

9. A metal is treated with dil **H_2SO_4**, the gas evolved is collected by the method shown in the figure.



Answer the following:
(i) Name the gas.
(ii) Give chemical reaction for the experiment
(iii) Is the gas soluble or insoluble in water?
(iv) Is the gas lighter or heavier than air?

CHAPTER 01, CHEMICAL REACTIONS AND EQUATIONS
ANSWER KEY OF WORKSHEET 1

1. C) Decomposition reaction

2. B) Oxidation of fats and oils

3.C) Burning of natural gas

4. (c) A is true but R is false.

5. Because each water molecule (H_2O) produces 2 molecules of hydrogen gas (H_2) and 1 molecule of oxygen gas (O_2). So, hydrogen is produced in double the volume of oxygen.

6. $2Mg + O_2$----------→ $2MgO$ + Heat

Combination/Exothermic reaction
Nature of MgO is basic.

7. ● **Single displacement:** One element replaces another in a compound. Example: $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$
● **Double displacement:** Ions are exchanged between two compounds. Example: $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

8. a. Corrosion is the gradual destruction of metals due to chemical reactions with air, water, or other substances.
b. It is the process of coating iron or steel with a layer of zinc to prevent rusting.
c. Chemical change
d. ● Painting or coating with grease ● Galvanization

9. (i) Name the gas :- Hydrogen
(ii) Chemical reaction : $Zn + H_2SO_4$----------→ $ZnSO_4 + H_2$
(iii) The gas (H_2) is insoluble.
(iv) The gas is (H_2) lighter than air.

CHAPTER 01 (CHEMICAL REACTIONS AND EQUATIONS)
WORKSHEET 2

TIME:20min **MM:17**

Multiple choice questions (1*6=6)

1. What is formed at the cathode during the electrolysis of water?
A) Oxygen
B) Hydrogen
C) Water
D) Hydroxide ions

2. In a double displacement reaction, the exchange of which of the following takes place?
A) Atoms
B) Ions
C) Electrons
D) Molecules

3. What type of reaction is: $AgNO_3 + NaCl \rightarrow AgCl\downarrow + NaNO_3$
A) Decomposition
B) Combination
C) Displacement
D) Double displacement

4. Assertion (A): Magnesium ribbon burns with a dazzling white flame in air.
Reason (R): Magnesium reacts with oxygen to form magnesium oxide.
Following questions 4 have 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

5.Balance following equation.: H_2O □ H_2+0_2

6. In the reaction:
$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$
Identify the oxidising agent and reducing agent.

7.Define the term 'rancidity'. How can it be prevented?

8. Write a balanced chemical equation for each of the following and mention the type of reaction:
(a) Iron reacts with steam
(b) Decomposition of lead nitrate
(c) Reaction of sodium with water

9. When silver chloride is exposed to sunlight, it turns grey. Identify the type of reaction, write a balanced chemical equation for the reaction and give one use of this reaction.

Long answers type questions (1*5=5)

10. Ravi observed that when iron nails are dipped in copper sulfate solution, a brown layer gets deposited on the nails, and the blue color of the solution fades.

Questions:
a) What type of chemical reaction is occurring here?
b) Write the balanced chemical equation for this reaction.
c) Why does the color of the solution change?
d) Name the element that is more reactive in this reaction.
e) Identify the oxidizing and reducing agents.

ANSWER KEY OF WORKSHEET 2

Q1. B) Hydrogen
Q2. B) Ions
Q3. D) Double displacement
Q4.a) Both A and R are true and R is the correct explanation of A
Q5. **2** H20 □2 H2+02
Q6 ● **Oxidizing agent:** MnO_2 ● **Reducing agent:** HCl (Cl^-)
Q7.
● **Definition:** Oxidation of fats and oils when exposed to air, making food smell and taste bad
● **Prevention:**
- ○ Store in airtight containers
- ○ Use antioxidants
- ○ Refrigerate
- ○ Pack food in nitrogen

Q8. (a) Iron reacts with steam
Equation: $3Fe + 4H_2O$ (steam) → $Fe_3O_4 + 4H_2$
Type: Combination + Displacement reaction
(b) Decomposition of lead nitrate
Equation: $2Pb(NO_3)_2 \rightarrow 2PbO + 4NO_2 +$ O_2 **Type:** Thermal decomposition reaction
(c) Reaction of sodium with water
Equation: $2Na + 2H_2O \rightarrow 2NaOH + H_2$
Type: Exothermic, displacement reaction

Q9.● Type of reaction: Photochemical decomposition
● **Equation:** $2AgCl \rightarrow 2Ag + Cl_2$ (in presence of sunlight)
● **Use:** Photography (black-and-white films)

Q10.a) **Type of reaction:** Displacement reaction
b) **Balanced equation:** $Fe + CuSO_4 \rightarrow FeSO_4 + Cu$
c) **Color change reason:** Iron displaces copper, forming $FeSO_4$ (greenish), and copper gets deposited as a brown coating
d) **More reactive element:** Iron
e) **Oxidizing agent:** Cu^{2+} (from $CuSO_4$), **Reducing agent:** Fe

CHAPTER 02, ACIDS, BASES AND SALTS

WORKSHEET 1

TIME:20min **MM:14**

Multiple choice questions (1*4=4)

1. Which of the following is a strong acid?
A. Acetic acid
B. Citric acid
C. Hydrochloric acid
D. Carbonic acid
2. Which of the following is used to test whether a solution is acidic or basic?
A. Sodium carbonate
B. Litmus paper
C. Baking soda
D. Sodium hydroxide
3. Which of the following gives a salt and water on reaction with an acid?
A. Base
B. Metal oxide
C. Metal carbonate
D. All of the above
4. Which gas is evolved when an acid reacts with a metal?
A. Oxygen
B. Hydrogen
C. Nitrogen
D. Carbon dioxide

Short answers type questions (2*3=6)

Q 5. Why does an aqueous solution of an acid conduct electricity? What happens to an acid or base in a water solution?

Q 6. Identify the acid and base in the following reactions and give balanced equations:

i) $HCl + NaOH \rightarrow NaCl + H_2O$

ii) $H_2SO_4 + 2KOH \rightarrow K_2SO_4 + 2H_2O$

Long answer type questions (1*4=4)

Q.7. A chemical factory releases its waste water into a nearby pond. The pH of the pond water dropped to 4, affecting aquatic life. The local authorities added a certain compound to neutralize the acidic water.

Answer the following questions:

a) What does the pH value of 4 indicate about the pond water?
b) Name one compound that can be added to neutralize the acidic water.
c) Why is it important to maintain a neutral pH in natural water bodies?
d) What would be the effect of acidic water on aquatic organisms?
e) Write one reaction where a base neutralizes an acid.

CHAPTER 02, ACIDS, BASES AND SALTS
ANSWER KEY OF WORKSHEET 1

1) Hydrochloric acid

2) Litmus paper

3) All of the above

4) Hydrogen

5. Acids and bases ionize in water to produce ions. These free ions help conduct electricity. For example: $HCl \rightarrow H^+ + Cl^-$ in water.

6. Acid: HCl, Base: NaOH Acid: H_2SO_4, Base: KOH

7.

A. It indicates that the water is strongly acidic.
B. Calcium hydroxide ($Ca(OH)_2$) or slaked lime.
C. A neutral pH is essential for the survival of aquatic life and to maintain ecological balance.
D. It can harm or kill aquatic organisms, disturb biological processes, and damage shells or bones.
E. $NaOH + HCl \rightarrow NaCl + H_2O$

CHAPTER 02, ACIDS, BASES AND SALTS
WORKSHEET 2

TIME:20MIN **MM=16**

Very short answers type questions (2*3=6)

Q.1 Write the name of acids present in tomato,tamarind,curd,lemon
Q.2. Why does dry HCl gas not change the color of dry litmus paper?
Q 3. A milkman adds a small amount of baking soda to fresh milk. Why does this milk take a long time to set as curd?

Short answers type questions (3*2=6)

Q.6. A student dropped a few pieces of marble in dilute hydrochloric acid in a test tube. He observed brisk effervescence.
a) Name the gas evolved.
b) How will you test the gas?
c) Write a balanced chemical equation for the reaction.

Q.7. A white powder is used by doctors for supporting fractured bones.
a) Identify the substance.
b) Write the chemical name and formula.
c) How is it prepared from gypsum? Give the equation.

Long answers type questions (1*4=4)

Q.8. Case Study Question: Antacids and Neutralization
Read the passage carefully and answer the following questions:

Our stomach produces hydrochloric acid which helps in digestion. Sometimes, excess acid is produced which causes indigestion. To get relief, people use antacids – mild bases like magnesium hydroxide. Antacids neutralize excess acid in the stomach. Similarly, farmers use quick lime or slaked lime to neutralize acidic soil. Also, factory waste is often acidic and needs to be neutralized before disposal.

a) What is the chemical name and formula of an antacid commonly used?
b) Write the word equation for the reaction between hydrochloric acid and magnesium hydroxide.
c) How does the use of lime help in treating acidic soil?
d) Why is it important to neutralize factory waste before disposal?
e) Which type of chemical reaction takes place when an acid reacts with a base?

ANSWER KEY OF WORKSHEET 2

1. Tomato-oxalic acid,tamarind-tartric acid,curd-lactic acid,lemon-ascorbic acid

2. Dry HCl does not ionize and release H^+ ions in the absence of water. Litmus shows a color change only in the presence of ions, so there is no effect on dry litmus paper.

3. Baking soda is a base that neutralizes the acid produced by bacteria. As a result, the pH remains high and the milk takes longer to curdle.

4.
A) Carbon dioxide (CO_2)
B) Pass the gas through lime water. It will turn milky.
C) Balanced equation:
$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2\uparrow$

5.
A) Plaster of Paris
B) Calcium sulphate hemihydrate ($CaSO_4 \cdot \frac{1}{2}H_2O$)
C) Preparation from gypsum:
$CaSO_4 \cdot 2H_2O$ (Gypsum) $\rightarrow CaSO_4 \cdot \frac{1}{2}H_2O + 1\frac{1}{2}H_2O$ (on heating)

6.
a) Magnesium hydroxide, $Mg(OH)_2$
b) Hydrochloric acid + Magnesium hydroxide → Magnesium chloride + Water
c) Lime helps neutralize acidic soil by reacting with acids and increasing the pH, making it suitable for crops.
d) Neutralizing factory waste prevents harm to aquatic life and protects the environment from acid pollution.
e) Type of reaction: Neutralization reaction

CHAPTER – 3 METALS AND NON-METALS

WORKSHEET 1

TIME:20MIN **MM=14**

Multiple choice questions (1*4=4)

Q. 1 Which of the following metals is present in the anode mud during the electrolytic refining of copper?
(a) Sodium
(b) Aluminum
(c) Gold
(d) Iron

Q.2 Which of the given properties is generally not shown by metals?
(a) Electrical conduction
(b) Sonorous in nature
(c) Dullness
(d) Ductility

Q.3 An element reacts with oxygen to give a compound with a high melting point. The compound is soluble in water. The element is likely to be
(a) calcium
(b) carbon
(c) iron
(d) silicon

Following question no. 4 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.

Q.4. Assertion (A) : Hydrogen gas is not evolved when a metal reacts with nitric acid. Reason (R) : Nitric acid is a strong oxidising agent.

Short answer type questions (2*3=6)

Q.5. During extraction of metals, electrolytic refining is used to obtain pure metal.
(i) Which material will be used as anode and cathode for refining of silver metal by this process?
(ii) Suggest a suitable electrolyte also.
(iii) In the electrolytic cell where is pure silver deposited after passing electric current?

Q.6. Compare the chemical properties of metals and non-metals.

Long answer type question (1*4=4)

Q.7. Non-metals are the elements which forms negatively charged ions by accepting electrons. They usually have 4,5,6 or 7 valence electrons in their outermost shell. They lack lustre and are poor conductors of heat and electricity. They are good insulators and are mostly gases, few solid and one liquid at room temperature.

i) Chlorides of non-metals are covalent because:
a) sharing electrons
b) as they donate electrons to chlorine
c) they can’t share electrons with chlorine
d) they donate electrons to chlorine to form chloride ion.

ii) Which is lustrous non-metal:
a) Oxygen
b) Sulphur
c) Iodine
d) Nitrogen

iii) Which of the non-metals is liquid at room temperature:
a) Helium
b) Carbon
c)Mercury
d)Bromin

iv) Which among the following contain non-metal as its constituent:
a) Brass
b) Amalgam
c) Gunmeta
l d)Steel

CHAPTER 03, METALS AND NON METALS

ANSWER KEY OF WORKSHEET 1

1 (d) Iron
2 (c) Dullness
3.(c) iron
4.(a) Both A and R are true and R is the correct explanation of A
5.(i) Anode – Impure silver. Cathode -- pure silver.
(ii) Electrolyte – Silver salt such as AgNO3, AgCl etc.
(iii) We get pure silver at cathode.
6 Chemical properties of metal and non metal(any three)
7.
i- a,
ii- c,
iii- d,
iv- d,

CHAPTER 03, METALS AND NON METALS
WORKSHEET 2

TIME:20MIN **MM=16**

Very short answer answer type questions (2*3=6)

Q1.Which element is most abundant metal in earth crust?

Q2. Why the item made of silver turn black when exposed to air?

Q3. Give reasons: (a) Platinum, gold and silver are used to make jewellery.

(b) Sodium, potassium are stored under oil.

short answer answer type questions (3*2=6)

Q. 4(a) What is meant by corrosion? Name any two methods used for the prevention of corrosion.

Q. 5 State reasons for the following:

(a) Electric wires are covered with rubber like material.

(b) From dilute hydrochloric acid, zinc can liberate hydrogen gas but copper cannot.

(c) Sulphide ore of a metal is first converted to its oxide to extract the metal from it.

Long answer type question (1*4=4)

Q.6 A metal 'X' combines with a non-metal 'Y' by the transfer of electrons to form a compound Z.

(i) Write metal and non metal element.

(ii) State the type of bond in compound Z.

(iii) What can you say about the melting point and boiling point of compound Z?

(iv) Will this compound dissolve in kerosene or petrol?

(v) Will this compound be a good conductor of electricity?

ANSWER KEY OF WORKSHEET 2

1. .Aluminium

2.. The items made up of silver turn black this is because it reacts with hydrogen sulphide gas in the air to form coating silver sulphide.

3..(a) Platinum, gold and silver are used to make jewellery because these are malleable and ductile. These are highly resistant to corrosion.
(b) Sodium, potassium are very reactive and catch fire when exposed to air. This is due to their low ignition temperature and high reactivity.

4.Corrosion is a process in which metal reacts with substances present in the environment to form surface compounds.
Prevention: (i) Galvanization is a process to prevent corrosion of iron.
(ii)Electroplating is also used to prevent corrosion.

5.: (a) It is because rubber is an insulator and does not allow current to flow through it.
(b) Zinc is more reactive than hydrogen. Therefore, it can displace hydrogen from dilute HCl whereas copper cannot, because, it is less reactive than hydrogen.
(c) It is because it is easier to reduce oxide ore as compared to sulphide ore

6..(i)X being a metal loses electrons and Y being a non-metal gains electrons to form Z.

(ii) The chemical bond formed by the transfer of electrons from one atom to another is Known as an ionic bond. Hence, Z is an ionic compound.

(iii) Compound Z is an ionic compound thus, it has high melting and boiling points.

(iv) Ionic compounds are insoluble in non-polar solvents such as kerosene or petrol.

(v) As Z is an ionic compound, it does not conduct electricity in the solid state because movement of ions in the solid is not possible due to their rigid structure. But it conducts electricity in the molten state or in aqueous solution due to the movement of ions freely.

CHAPTER – 4 CARBON AND ITS COMPOUNDS

WORKSHEET 1

TIME:20MIN **MM=16**

Multiple Choice Questions (1*4=4)

Q1. Which of the following is a saturated hydrocarbon?
A) Ethene
B) Ethyne
C) Ethane
D) Propene

Q2. Which process converts unsaturated hydrocarbons into saturated hydrocarbons?
A) Fermentation
B) Saponification
C) Hydrogenation
D) Substitution

Assertion and Reason :

Choose:
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 of Assertion.
C) Assertion is true, but Reason is false.
D) Assertion is false, but Reason is true.

Q3.Assertion (A): Carbon forms a large number of compounds.
Reason (R): Carbon atoms form four strong covalent bonds and can catenate.

Q4.Assertion (A): Soaps are more effective in hard water than detergents. Reason (R): Soaps form scum with hard water, reducing their effectiveness.

Short answer question (1*4=4)

Q5. Write the molecular formula of the first member of the homologous series of alkanes. Q6. Name the process by which ethanol is converted to ethanoic acid

Case Study Based Question (1*4=4)

Q7.Read the passage and answer the questions below:
A student is preparing soap in the lab by heating castor oil with sodium hydroxide. On cooling and adding salt, solid soap separates out. The teacher explains that this is a process called saponification. She also shows how soap does not lather well with hard water, while detergent works fine.
1. Name the type of reaction used in soap preparation.
2. Why is salt added after the reaction?
3. Write one difference between soap and detergent.
4. What type of water (hard or soft) is best for using soap?

Long answer type questions (4*1=4)

Q8. Write the chemical equations for the following reactions of:
(a) Ethanol with sodium
(b) Ethanol with alkaline $KMnO_4$
(c) Ethanoic acid with sodium carbonate
(d) Ethanoic acid with ethanol
(e) Hydrogenation of vegetable oils

ANSWER KEY OF WORKSHEET 1

Multiple Choice Questions
Ans1. C) Ethane
Ans2. C) Hydrogenation

Assertion and Reason Questions
Ans3. A
Ans4. D

Case Study Based
Question Ans5. CH_4
(Methane) Ans6.
Oxidation

Ans7.1. Saponification
2. Salt helps soap to precipitate out.
3. Soap is biodegradable and less effective in hard water; detergent is synthetic and effective in hard water.
4. Soft water

Long Answer Questions
Ans8. Carbon is versatile because:
Catenation: Carbon atoms can form long chains, branched chains, and rings (e.g., hexane, benzene).

Tetravalency: Carbon has four valence electrons and can form four covalent bonds with other atoms like H, O, N, and Cl (e.g., CH_4).
These properties allow carbon to form millions of organic compounds.

CHAPTER 5 LIFE PROCESS

WORKSHEET 1

TIME:20MIN **MM=18**

Multiple Choice Questions (1*3=3)

Q1 In which part of the alimentary canal is bile poured for digestion?
A) Stomach B) Small intestine
C) Large intestine D) Oesophagus

Q2. Which blood vessel carries oxygenated blood from the lungs to the heart?
A) Pulmonary artery B) Aorta
C) Pulmonary vein D) Vena cava

Q3. What is the primary mode of nutrition in Amoeba?
a) Autotrophic b) Holozoic
c) Saprotrophic d) Parasitic

Very short answer type questions 2(M) × 2(Q) = 4 (Marks)

Q4 Which part of the human brain controls involuntary actions such as heartbeat and breathing?

Q5 What is the function of the diaphragm in the human respiratory system?

Short answer type questions 3(M) × 2(Q) = 6 (marks)

Q6. What would happen if the kidneys fail to filter waste products from the blood? Q7. Explain why low hemoglobin level cause fatigue?

Long answer type questions 5(M) × 1(Q) = 5 (marks)

Q8. Describe the process of human digestion.
Name the organs involved and mention the role of enzymes.

Answer key

Ans1. B) Small intestine
Ans2. C) Pulmonary vein
Ans3. b) Holozoic
Ans4. Medulla oblongata

Ans5. The diaphragm contracts and relaxes to facilitate breathing by expanding and reducing the chest cavity.

Ans6. If the kidneys fail to filter waste products, they can accumulate in the blood and cause harm to the body.

Ans7. Low hemoglobin reduces oxygen supply to cells, causing fatigue.

Ans8. The process of digestion involves breaking down food into simpler forms so that it can be absorbed and used by the body.
Mouth: Mechanical breakdown and salivary amylase digests starch.
Stomach: Proteins are digested by pepsin; hydrochloric acid creates acidic medium.
Small Intestine: Bile from the liver emulsifies fats; pancreatic juices digest carbohydrates, proteins, and fats.
Large Intestine: Absorption of water.
Enzymes involved include amylase, pepsin, trypsin, and lipase.

CHAPTER 05, LIFE PROCESS
WORKSHEET 02

TIME:20MIN **MM=14**

Assertion reasoning 1(M) × 2(Q) = 2(Marks)

Directions: For each question below, choose:
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 of Assertion.
C) Assertion is true, but Reason is false.
D) Assertion is false, but Reason is true.

Q1. Assertion (A): Hemoglobin is present in red blood cells.
Reason (R): Hemoglobin helps in the transport of oxygen.

Q2. Assertion: The human heart is a muscular organ that pumps blood throughout the body.
Reason: The heart has four chambers that ensure efficient blood circulation.

Case based 4(M) × 2(Q) = 8(M)

Read the passage and answer the questions below:
Ravi recently experienced fatigue and shortness of breath even after climbing a few stairs. Upon medical examination, it was found that his hemoglobin levels were significantly low. His doctor explained that the body cells were not getting enough oxygen due to this condition.

Q3.1. What is the primary function of hemoglobin in our blood?
2. Why does low hemoglobin level cause fatigue?
3. Which part of the circulatory system is responsible for transporting oxygen-rich blood to all parts of the body?
4. Suggest one dietary change Ravi can make to improve hemoglobin levels.

Q4 - Read the following passage and answer the questions that follow:
A person with kidney failure undergoes dialysis treatment. During dialysis, the patient's blood is filtered to remove waste products and excess fluids.
1. What is the primary function of the kidneys in the human body?
2. Why is dialysis necessary for patients with kidney failure?
3. What would happen if the kidneys fail to filter waste products from the blood?
4. Name one other organ that helps in filtration and purification of blood.

CHAPTER 05, LIFE PROCESS
WORKSHEET 02
ANSWER SHEET

Ans1. A

Ans2. a) Both A and R are true, and R is the correct explanation of A.

Ans5.1. Hemoglobin transports oxygen from lungs to body tissues.

2. Low hemoglobin reduces oxygen supply to cells, causing fatigue.
3. Arteries, especially the aorta.
4. Include iron-rich foods like spinach, beetroot, or red meat.

5.Hemoglobin transports oxygen from lungs to body tissues.

Ans6

1. The primary function of the kidneys is to filter waste products and excess fluids from the blood.
2. Dialysis is necessary to remove waste products and excess fluids from the blood when the kidneys fail.
3. If the kidneys fail to filter waste products, they can accumulate in the blood and cause harm to the body.
4. Liver

==========

CHAPTER 6 (CONTROL AND COORDINATION)
Graded Worksheet – 1

TIME: 20 MINUTES **MAX MARKS: 14**

MCQ **1(M) × 5(Q) = 5 (Marks)**

1. Which of the following hormones is responsible for phototropism in plants?
   A. Cytokinin B. Auxin C. Gibberellin D. Abscisic acid
2. The part of the brain responsible for maintaining posture and balance of the body is:
   A. Cerebrum B. Medulla C. Cerebellum D. Thalamus
3. Which part of the brain controls balance and coordination?
   a) Cerebrum
   b) Cerebellum
   c) Medulla Oblongata
   d) Hypothalamus
4. What is the primary function of auxins in plants?
   a) Cell division
   b) Cell elongation
   c) Root initiation
   d) Fruit ripening
5. Which type of action is shown when Ravi pulls his hand back?
   A. Voluntary
   B. Involuntary
   C. Reflex
   D. Coordinated

VERY SHORT ANSWER **2(M) × 2(Q) = 4 (Marks)**

6. What is the function of the neuron in the human body?
7. Name one plant hormone that promotes fruit ripening.

LONG ANSWER **5(M) × 1(Q) = 5 (marks)**

8. Describe the structure and function of a neuron. Explain how neurons transmit signals.

Answers Key
Worksheet - 1

1(M) × 5(Q) = 5 (Marks) MCQ

1. B. Auxin
2. C. Cerebellum
3. b) Cerebellum
4. b) Cell elongation
5. C. Reflex

2(M) × 2(Q) = 4 (Marks) V.S.A

6. The neuron is a specialized cell that transmits and processes information through electrical and chemical signals.
7. Ethylene

5(M) × 1(Q) = 5 (marks) L.A

8. A neuron consists of a cell body, dendrites, and an axon. It transmits signals through electrical impulses and chemical synapses.

CHAPTER 6 (CONTROL AND COORDINATION)
Graded Worksheet – 2

TIME: 20 MINUTES **MAX MARKS: 14**

Assertion reasoning **1(M) × 2(Q) = 2(M)**

1. Assertion (A): Reflex actions occur without conscious control.
   Reason (R): Reflex arcs are formed by the brain.
2. Assertion: The cerebellum is responsible for maintaining posture and balance.
   Reason: The cerebellum coordinates muscle movements.

Case based **4(M) × 2(Q) = 8(M)**

3. Case Study: Ravi accidentally touched a hot iron and immediately pulled his hand back. Later, he realized what happened and noticed his heartbeat was faster.

Q1: Which type of action is shown when Ravi pulls his hand back?
A. Voluntary B. Involuntary C. Reflex D. Coordinated
Q2: Which part of the nervous system is involved in such immediate responses?
A. Brain B. Spinal cord C. Cerebellum D. Medulla
Q3: What role does adrenaline play in this situation?
A. Decreases blood pressure B. Stimulates digestion
C. Prepares the body for 'fight or flight' D. Induces sleep
Q4: Which sense organ detected the stimulus?
A. Eyes B. Nose C. Skin D. Tongue
Q5: What is the primary benefit of a reflex arc in such scenarios?
A. Slows down response B. Avoids decision making
C. Saves time to prevent injury D. Involves learning

4. Case-Based Study: **1(M) × 4(Q) = 4(M)**

Read the following passage and answer the questions that follow:

A student conducted an experiment to study the effect of light on plant growth. She placed two identical plants, A and B, in different conditions. Plant A was kept in sunlight, while Plant B was kept in darkness. After a few days, she observed that Plant A grew towards the light source, while Plant B did not show any directional growth.

* What type of plant response is exhibited by Plant A?
* Which plant hormone is responsible for this response?
* What would happen if Plant A is placed in darkness?
* Name one practical application of this plant response.

Worksheet - 2 ANSWERS

1(M) × 2(Q) = 2(Marks) Assertion reasoning

1. C) A is true, but R is false.
2. a) Both A and R are true, and R is the correct explanation of A.

4(M) × 2(Q) = 8(M)

3. Case based

* Q1: C. Reflex
  Q2: B. Spinal cord
  Q3: C. Prepares the body for 'fight or flight'
  Q4: C. Skin
  Q5: C. Saves time to prevent injury

4.

* Phototropism
* Auxin
* Plant A would not exhibit directional growth towards light.
* One practical application is in agriculture, where understanding phototropism can help optimize crop growth and yield.

CHAPTER 7 (How Do Organisms Reproduce)
Graded Worksheet – 1

TIME: 20 MINUTES **MAX MARKS: 14**

MULTIPLE CHOICE QUESTIONS **1(m) × 5(q) = 5 (marks)**

1. Which gland in males produces a fluid that nourishes and protects sperm?
   A. Pancreas.
   B. Pituitary gland
   C. Prostate gland.
   D. Adrenal gland
2. Choose the correct statements:
   I. Prostate gland secretes a fluid that helps sperm survive in the female body.
   II. The secretion of the prostate gland is acidic in nature.
   III. Epididymis is located above the prostate gland.
   Only I C.I, II
   II, III. D.I, II, III
3. The examples of unisexual flowers are
   I. Watermelon. II. Papaya
   III. Mustard. IV. Hibiscus
   I, II, III. C. I, III
   I, II. D. Only IV
4. Which of the following is a correct feature of the germ cell which stores food and large in size.
   A. motile, Female Gamete,
   B. Non-motile, female gamete
   C. Motile, male gamete
   D. Non motile, male gamete.
5. The thread like structure that develops on a moist slide of bread in Rhizopus is
   A. Sporangia. B. Hyphae C. Filament. D. Rhizoids

VERY SHORT ANSWER QUESTIONS **2(M) × 2(Q) = 4 (Marks)**

6. Offspring's formed as a result of sexual reproduction produce more variations. Give reason.
7. A couple wants a long-term but reversible method of contraception. Suggest one and explain how it works.

LONG ANSWER **5(M) × 1(Q) = 5 (marks)**

8. Given below is the male reproductive system.
   Identify all the labeled parts.
   i.What is the role of (Iv) in the male reproductive system.
   ii. What will be the secondary sexual characters which will develop under the influence of male hormones.
   iii. Give the function of (I).

ANSWERS-Worksheet - 1

1(M) × 5(Q) = 5 (Marks) MCQ

1. C 2. A 3. B 4. B 5. B

2(M) × 2(Q) = 4 (Marks) V.S.A

6. They inherit genetic material from two parents, resulting in a mix of traits not present in either parent. This mixing of genetic information increases variation.

7.* Intra Uterine devices.

Example: Cu-T.

It helps to make the uterus an inhospitable environment for implantation.

3(M) × 2(Q) = 6 (marks) S.A

5(M) × 1(Q) = 5 (marks) L.A

8.A. Prostate gland, Penis, Urethra, Testes.

B. Produces male hormone named testosterone

C. Development of facial and body hairs, muscle mass increases etc.

D. Nourishes and protects sperms

CHAPTER 7 (How Do Organisms Reproduce)
Graded Worksheet – 2

TIME: 20 MINUTES **MAX MARKS: 20**

MULTIPLE CHOICE QUESTIONS **1(m) × 5(q) = 5 (marks)**

1. Binary fission occurs in

A. Amoeba only B. Amoeba and paramecium

C. Leishmania only D. Amoeba, paramecium and Leishmania

2. Anjali placed a bread piece in a moist box.
After a few days, she noticed white cottony growth on it.
Which method of reproduction is responsible for this growth?
A. Budding. B. Binary fission C. Spore formation. D. Fragmentation

3. Farmers prefer to grow bananas using vegetative propagation because:
A. Banana plants do not produce seeds B. It increases genetic diversity
C. It reduces water use D. Banana flowers are not pollinated

4. During a lab activity, a student cuts the anthers of a flower.
Which function will now be disrupted?
A. Fertilization. B. Pollination C. Seed germination. D. Fruit formation

5. Assertion: The testes are located outside the abdominal cavity in the scrotum.
Reason: Sperm formation requires a temperature slightly lower than body temperature.
A. Both A and R are true, and R is the correct explanation of A.
B. Both A and R are true, and R is not the correct explanation of A.
C. A is true and B is false
D. A is false and B is true

VERY SHORT ANSWER **2(M) × 2(Q) = 4 (Marks)**

6. Why is the lining of the uterus richly supplied with blood vessels? What happens to this lining if fertilization does not occur?

7. Name two sexually transmitted infections and state one method to prevent them.

SHORT ANSWER **3(M) × 2(Q) = 6 (marks)**

8. Given below is a diagram of a germination of a seed. Label the parts.
A. Name and Label the part which stores food.
B. Name and label the part which give rise to shoot
C. Name and label the part which give rise to root.

9. There are three tiny organisms A, B, C, The organism A is a parasitic protozoan which causes a disease known as kala-azar.
The organism B is microscopic single-called animal which causes malaria disease in human beings.
The organism C is also a unicellular animal which slipper-shaped having a large number of tiny hair all around its body.
A. Name the organisms A, B, and C.
B. Name the insect which carries organism B and transmits if from one person to another
C. What name is given to the asexual method of reproduction of (i) organism A, and (ii) organism B

LONG ANSWER **5(M) × 1(Q) = 5 (marks)** 10. Given below is the diagram of the female reproductive system.
A. Identify and label the part where implantation occurs.
B. Identify and label the part which produces female hormones.
C. Name the female hormones.
D. What happens if egg doesn't meet with sperm?

ANSWERS-Worksheet - 2

1(M) × 5(Q) = 5 (marks) MCQ

1. D
2. C
3. A
4. B
5. A

2(M) × 2(Q) = 4 (Marks) V.S.A

6. to provide nutrients to the developing embryo.
   If fertilization does not occur, this lining breaks down and is shed during menstruation.
7. HIV, Syphilis, Gonorrhea, Genital herpes (Any two).
   Using Contraceptive devices like condoms.

3(M) × 2(Q) = 6 (marks) S.A

8. A. Cotyledon B. Plumule C. Radicle
9. A. Leishmania, Plasmodium, Paramecium
   B. Female Anopheles
   C. Binary fission, multiple fission

5(M) × 1(Q) = 5 (marks) L.A

10. A. The part C named uterus
    B. The part B ovary
    C. Estrogen and progesterone
    D. If egg doesn't meet

CHAPTER 8 (HEREDITY AND EVOLUTION)
Graded Worksheet – 1

TIME: 20 MINUTES **MAX MARKS: 14**

MCQ **1 (m) × 5(q) = 5 (marks)**

1. The tallness of a pea plant is a:
   A. Acquired trait
   B. Dominant trait
   C. Recessive trait
   D. Mutation
2. A zygote with XY chromosomes will develop into a:
   A. Male child
   B. Female child
   C. Both
   D. Can't be determined
3. In Mendel's experiments, the trait that disappeared in the F1 generation was:
   A. Dominant trait
   B. Recessive trait
   C. Codominant trait
   D. Incomplete dominant trait
4. Which of the following is responsible for the sex determination in humans?
   A. Autosomes
   B. Environment
   C. Hormones
   D. Sex chromosomes
5. What will be the phenotypic ratio in F2 generation of a monohybrid cross?
   A. 1:1
   B. 2:1
   C. 3:1
   D. 1:2:1

V.S.A **2(M) × 2(Q) = 4 (Marks)**

6. Differentiate between dominant and recessive traits with one example each.
7. Why is variation important in organisms? Explain with an example.

L.A **5(M) × 1(Q) = 5 (marks)**

8. Draw a cross to show the inheritance of a trait where both parents are heterozygous for tallness (Tt).
   Show the genotype and phenotype ratio of the offspring.
   What is the probability of getting a dwarf plant?

ANSWERS Worksheet - 1

1(M) × 5(Q) = 5 (marks) MCQ

1. B) Dominant trait 2. A) Male child 3. B) Recessive trait
4. D) Sex chromosomes 5. C) 3:1

2(M) × 2(Q) = 4 (Marks) V.S.A

6. Dominant trait: Expressed in presence of one or both alleles (e.g., Tallness in pea plant – T).
   Recessive trait: Expressed only when both alleles are recessive (e.g., Dwarfness in pea plant – t).
7. Variation increases the chance of survival of a species in changing environments.
   Example: Bacteria developing resistance to antibiotics due to genetic variation.

3(M) × 2(Q) = 6 (marks) S.A

5(M) × 1(Q) = 5 (marks) L.A

8. Cross: Tt × Tt Genotypic Ratio: 1 TT : 2 Tt : 1 tt
   Phenotypic Ratio: 3 Tall : 1 Dwarf Probability of dwarf plant = ¼ or 25%

CHAPTER 8 (HEREDITY AND EVOLUTION)
Graded Worksheet – 2

TIME: 20 MINUTES **MAX MARKS: 15**

MCQ **1(M) × 5(Q) = 5 (marks)** 1. Which of the following is NOT a Mendelian trait?

a) Attached ear lobes b) ABO blood group c) Height d) Widow's peak

2. Mendel conducted his famous breeding experiments by working on:

(a) Drosophila (b) Escherichia coli (c) Pisumsativum (d) All of these

3. What is the genotype of a homozygous recessive individual?

a) AA b) Aa c) aa d) AaBb

4. What is the name of the structure that carries genetic information?

a) Ribosome b) Chromosome c) Mitochondria d) Golgi body

5. Which section of DNA provides information for one protein?

(a) Nucleus (b) Chromosome (c) Trait (d) Gene

Assertion reasoning **1(M) × 2(Q) = 2(Marks)**

6. Assertion (A): Acquired traits are not inherited.
Reason (R): Acquired traits are not caused by changes in genes.

7. Assertion (A): Mendel's work was rediscovered in the early 20th century.
Reason (R): Mendel's work was initially not widely recognized or understood

Case based **4(M) × 2(Q) = 8(M)**

8. A farmer is trying to improve the yield of his wheat crop.
He observes that some wheat plants in his field are taller and produce more grains than others.
He selects the seeds from these taller, high-yielding plants and plants them in the next season.
Over several generations, he continues this process, selecting only the seeds from the tallest and highest-yielding plants.

A) What is the farmer practicing?
b) Explain how this process leads to an increase in the yield of wheat over time.
c) What evolutionary principle is the farmer utilizing?

9. Case Study: Time with Us:
Two students, Reena and Arjun, were discussing heredity.
Reena stated that acquired traits such as muscle building in gym-goers are inherited, while Arjun believed only inherited traits are passed to the next generation.
Their teacher explained that acquired traits do not change the DNA of germ cells, hence they are not inherited.
Later, they discussed Mendel's experiments with pea plants and how tallness was dominant over dwarfness.
Answer the following questions:

9.1 Who was correct in the debate—Reena or Arjun?
Give a reason. (1 mark)

9.2 What do we mean by inherited traits?
Give one example. (2 marks)

9.3 How did Mendel's experiment prove that traits are inherited independently?
Explain using the concept of dominant and recessive traits. (2 marks

Remaining Questions

10. Assertion (A): A geneticist crossed two pea plants and got 50% tall and 50% dwarf in the progeny.
Reason (R): One plant was heterozygous tall and the other was dwarf.

11. Assertion (A): Mendel selected the pea plant for his experiments.
Reason (R): Pea plant is cross-pollinating and has unisexual flowers.

12. Briefly explain the difference between genotype and phenotype. Give an example.

13. What will be the sex of a baby if a sperm carrying the X chromosome fertilizes the egg in humans? Why?

14. Explain why Mendel obtained no medium height plants when he crossed a tall pea plant with a dwarf pea plant in the F1 generation.

Worksheet - 2 ANSWERS

1(M) × 5(Q) = 5 (marks) MCQ

1. c) Height
2. c) Pisumsativum
3. c) aa
4. b) Chromosome
5. d) gene

1(M) × 2(Q) = 2(Marks) Assertion reasoning

6. a) Both A and R are true and R is the correct explanation of A.
7. a) Both A and R are true and R is the correct explanation of A.

4(M) × 2(Q) = 8(M) Case based

8. A) What is the farmer practicing?

The farmer is practicing artificial selection (or selective breeding).

b) Explain how this process leads to an increase in the yield of wheat over time.

By repeatedly selecting and planting seeds from the tallest, highest-yielding plants, the farmer is increasing the frequency of the alleles responsible for these desirable traits in the next generation.

Over several generations, this leads to a gradual increase in the average height and yield of the wheat crop.

This is because plants with these alleles are more likely to survive and reproduce, passing their genes on to their offspring.

c) What evolutionary principle is the farmer utilizing?

The farmer is utilizing the principle of inheritance and applying artificial selection, a human-directed form of natural selection.

He's mimicking the process of natural selection but controlling which traits are selected for.

Remaining Question Answers

9. * 9.1 Arjun was correct.

Acquired traits are not inherited as they do not affect germ cell DNA.

9.2 Inherited traits are those passed from parents to offspring through genes, e.g., eye color.

9.3 Mendel's monohybrid cross showed that dominant traits mask recessive ones in F1, but recessive traits reappear in F2, proving that traits are inherited independently and not blended.

10. a) Both A and R are true and R is the correct explanation of A.
11. b) Both A and R are true and R is not the correct explanation of A.
12. Genotype refers to the genetic makeup of an organism (the combination of alleles it possesses for a particular trait).

Phenotype refers to the observable characteristics or traits of an organism, which are determined by both its genotype and the environment.

For example, an individual might have the genotype "TT" (homozygous dominant) for tallness, resulting in a tall phenotype.

Another individual with genotype "Tt" (heterozygous) might also have a tall phenotype, although their genotype is different.

13. The baby will be female (XX), because the egg always carries X and the sperm carries X in this case.
14. No medium height plants appeared because tall is dominant; all F1 plants were heterozygous (Tt) and showed the tall trait.

CHAPTER-9 : REFLECTION AND REFRACTION OF LIGHT
Worksheet 1: Reflection of Light (SUBJECT- SCIENCE)

M.M. : 25 **TIME 1 HOUR**

****

A. Short Answer Questions: **(2X5=10)**

1. Define reflection of light. What are the two laws of reflection?
2. What is the difference between a real image and a virtual image?
3. What is the angle of incidence? How is it related to the angle of reflection?
4. A concave mirror forms a real image. Where is the image formed if the object is placed between the focus and the mirror?
5. Draw a ray diagram showing the formation of an image by a concave mirror when the object is placed beyond the center of curvature.

B. Fill in the Blanks: **(1X5=5)**

1. The image formed by a plane mirror is always _____.
2. The angle of incidence is equal to the angle of _____.
3. A convex mirror always forms a _____ image, regardless of the position of the object.
4. A concave mirror can form both real and _____ images.
5. The distance between the object and the mirror is called _____.

C. Numerical Problems: **(5X2=10)**

1. An object is placed 20 cm in front of a concave mirror. If the focal length of the mirror is 10 cm, calculate the position of the image formed.
2. A plane mirror is used to view an object. If the object is at a distance of 5 m from the mirror, what is the distance of the image from the mirror?

CHAPTER-9 : REFLECTION AND REFRACTION OF LIGHT

CLASS-10 SUBJECT- SCIENCE Worksheet 2: Refraction of Light

M.M. : 25

TIME 1 HOUR

****

A. Short Answer Questions: (2X5=10)

1. Define refraction of light. Why does light bend when it passes from one medium to another?
2. State Snell's Law of Refraction and explain its significance.
3. What is the refractive index? How is it related to the speed of light in different media?
4. What happens to the speed of light when it travels from air to water? Why does this happen?
5. A ray of light passes from air into water at an angle of 30°. If the refractive index of water is 1.33, calculate the angle of refraction.

B. Fill in the Blanks: (1X5=5)

1. When light passes from a rarer medium to a denser medium, it bends _____ the normal.
2. The refractive index of a medium is the ratio of the speed of light in _____ to the speed of light in that medium.
3. A light ray passing from glass to air will bend _____ the normal.
4. The refractive index of water is _____ than that of air.
5. A denser medium is one in which light travels _____.

C. Numerical Problems: (5X2=10)

1. A ray of light strikes the surface of water at an angle of 45°. If the refractive index of water is 1.5, calculate the angle of refraction.
2. An object is placed 25 cm in front of a concave lens of focal length 10 cm. Calculate the position of the image formed.

CHAPTER-9 : REFLECTION AND REFRACTION OF LIGHT

CLASS-10 SUBJECT- SCIENCE Worksheet 3: Lenses and Their Applications

M.M. : 25 TIME 1 HOUR

****

A. Short Answer Questions: (2X5=10)

1. What is the difference between a converging lens and a diverging lens? Give an example of each.
2. State the lens formula and explain the significance of each term.
3. Define magnification. How is it related to the image and object distances?
4. What is the focal length of a lens? How does it affect the formation of an image?
5. Draw a ray diagram showing the image formation by a convex lens when the object is placed beyond 2F.

B. Fill in the Blanks: (1X5=5)

1. A convex lens is also known as a _____ lens.
2. A concave lens is also known as a _____ lens.
3. The image formed by a concave lens is always _____ and virtual.
4. The focal length of a lens is the distance from the _____ to the focal point. 5. The magnification produced by a lens is the ratio of the _____ height to the _____ height.

C. Numerical Problems: (5X2=10)

1. An object is placed 30 cm in front of a convex lens of focal length 15 cm. Find the position of the image and determine whether it is real or virtual.
2. A diverging lens of focal length 20 cm is used to form an image of an object placed 40 cm in front of the lens. Calculate the image position and magnification.

CHAPTER 11 (ELECTRICITY)
Graded Worksheet – 1

TIME: 20 MINUTES **MAX MARKS: 30**

Section A: Multiple Choice Questions (1 mark each) (5x1=5)

1. Which of the following is the SI unit of electric charge?
a) Volt b) Ampere c) Coulomb d) Ohm
2. In a conductor, the current flows due to:
a) Protons b) Neutrons c) Electrons d) Ions
3. Which instrument is used to measure potential difference?
a) Ammeter b) Voltmeter c) Rheostat d) Galvanometer
4. Assertion (A): Current remains same throughout a series circuit. Reason (R): In a series circuit, charge has only one path to flow.
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.
5. Assertion (A): A voltmeter is always connected in parallel in a circuit. Reason (R): A voltmeter has low resistance. (Options same as above)

Section B: Short Answer Questions (2 marks each) (5x2=10)

6. Define Ohm's law. Give its mathematical expression.
7. A current of 3 A flows through a conductor for 2 minutes. How much charge passes through the wire?
8. State two factors on which the resistance of a conductor depends.
9. Differentiate between series and parallel combination of resistors.
10. An electric bulb draws a current of 0.5 A for 10 minutes. Calculate the total charge.

Section C: Competency-Based Questions (3 marks each) (5x3=15)

11. Derive the formula for the equivalent resistance of two resistors in series.
12. Find the resistance of an electric heater if 5 A current flows when 230 V is applied.
13. Draw a labeled circuit diagram to verify Ohm's law.
14. Why do electricians wear rubber gloves while working with electrical appliances?
15. Three resistors of 3Ω, 6Ω and 9Ω are connected in parallel. Calculate the total resistance.

ANSWER KEY

Worksheet 1

1. c 2. c 3. b 4. a 5. c
6. Ohm's Law: $V = IR$
7. $Q = I \times t = 3 \times 120 = 360$ C
8. Length, cross-sectional area, material, temperature
9. Series: same current, Parallel: same voltage
10. $Q = I \times t = 0.5 \times 600 = 300$ C
11. $Req = R1 + R2$
12. $R = V/I = 230/5 = 46\Omega$
13. Circuit with battery, resistor, ammeter in series and voltmeter in parallel
14. Rubber is an insulator; prevents electric shock
15. $1/R = 1/3 + 1/6 + 1/9 = 0.611 \rightarrow R \approx 1.64\Omega$

CHAPTER 11 (ELECTRICITY)
Graded Worksheet – 2

TIME: 20 MINUTES **MAX MARKS: 35**

Section A: Multiple Choice Questions (1 mark each) **(5x1=5)**

1. Which of these materials is a good conductor of electricity?
a) Plastic b) Copper c) Rubber d) Glass
2. What happens to current if resistance is doubled and voltage remains constant?
a) Doubled b) Tripled c) Halved d) Remains same
3. The commercial unit of energy is:
a) Joule b) Calorie c) Kilowatt-hour d) Watt
4. Assertion (A): Fuse wire has high resistance and low melting point. Reason (R): A fuse is used to protect the circuit from overcurrent.
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.
5. Assertion (A): Electric energy is measured in kilowatt-hour. Reason (R): 1 kWh = 3.6×10^6 joules. (Options same as above)

Section B: Short Answer Questions (2 marks each) **(5x2=10)**

6. What is meant by electric potential difference?
7. Calculate the resistance of a conductor if 2 A of current flows when 10 V is applied.
8. Why is tungsten used in electric bulbs?
9. What is the function of a fuse in an electric circuit?
10. List two characteristics of a series circuit.

Section C: Competency-Based Questions (3 marks each) **(5x3=15)**

11. Calculate the energy consumed by a 100 W bulb in 5 hours.
12. Two resistors of 5Ω and 10Ω are connected in parallel. Find the equivalent resistance.
13. Explain with a diagram how to connect a voltmeter and ammeter in a circuit.
14. An electric geyser of 2 kW is used for 2 hours daily. Find the energy consumed in 10 days.
15. Define electric power and write two formulas to calculate it.

Section D: Activity-Based Question (5 marks) **(1x5=5)**

16. Plan an experiment to determine the resistance of a given wire using voltmeter and ammeter. Include procedure, diagram, and precautions.

ANSWER KEY Worksheet 2

1. b 2. c 3. c 4. a
5. Work done per unit charge; $V = W/Q$
6. $R = V/I = 10/2 = 5\Omega$
7. High melting point, doesn't oxidize easily
8. Breaks circuit during overcurrent, prevents damage
9. Same current, lower brightness of bulbs
10. $E = P \times t = 100 \times 5 = 500$ Wh = 0.5 kWh
11. $1/R = 1/5 + 1/10 = 3/10 \rightarrow R = 3.33\Omega$
12. Voltmeter in parallel, ammeter in series
13. $E = 2 \times 2 \times 10 = 40$ kWh
14. Power = $V \times I$ or Power = $I^2 \times R$
15. Measure V and I, plot graph, find R from slope; precautions: dry hands, correct connections

CHAPTER 12 (MAGNETIC EFFECT OF ELECTRIC CURRENT)
Graded Worksheet – 1

TIME: 20 MINUTES **MAX MARKS: 21**

Section A: Multiple Choice Questions **(1 mark each × 7= 7 marks)**

1.The magnetic field lines inside a solenoid are:
a) Circular b) Parallel and straight c) Radial d) Irregular

2.What type of current is used in household wiring in India?
a) DC only b) AC only c) Both AC and DC d) High voltage DC

3.A strong magnetic field can be produced using:
a) A coil of thick wire b) A straight wire c) A solenoid with soft iron core d) A bar magnet

4.Which of the following correctly shows the field pattern of a bar magnet?
a) Lines from south to north b) Straight lines
c) Lines from north to south outside the magnet d) Circular loops

5.The direction of magnetic field around a current-carrying conductor is given by:
a) Right-hand thumb rule b) Left-hand rule c) Ampere's rule d) Fleming's rule

Options:
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

6**. Assertion (A):** A current-carrying conductor produces a magnetic field around it.
- **Reason (R):** Moving electric charges produce a magnetic field.

7. **Assertion (A):** The magnetic field lines inside a solenoid are parallel and equally spaced.
Reason (R): A solenoid produces a uniform magnetic field inside it

Section B: Short Answer Questions (2 marks each × 2 = 4 marks) Answer each in not more than 30 words.

8. What is a magnetic field? What is the shape of magnetic field lines around a straight current-carrying conductor?

9. What happens to the magnetic field inside a solenoid when the current is increased?State two properties of magnetic field lines.

Section C: Medium Answer Questions (3 marks each × 2 = 6 marks)Answer each in not more than 50 words.

10.Draw a neat diagram of magnetic field lines due to a current-carrying circular loop. Explain the pattern briefly.

11.What happens when a current-carrying conductor is placed in a magnetic field? State the rule used.

Section D Case-Based Question (4 × 1 = 4 marks) Case Study

Ravi set up an experiment with a solenoid connected to a battery. He placed a compass inside and outside the solenoid. He also connected a bulb and used both AC and DC power supplies to observe changes. He noted the deflection of the compass and the lighting of the bulb.

12(a)What did the compass needle show when placed inside the solenoid?
(b)Why was the magnetic field inside the solenoid stronger than outside?
(c) What would happen to the magnetic field if the battery is replaced with an AC source?
(d).Why does the bulb glow when the current flows through conductor?

ANSWERS

CHAPTER 12 (MAGNETIC EFFECT OF ELECTRIC CURRENT)

Graded Worksheet – 1

1.(b) Parallel and straight 2(b) AC only 3.(c) A solenoid with soft iron core

4.(c) Lines from north to south outside the magnet. 5.(a) Right-hand thumb rule

6.A 7.A

8.A magnetic field is the region around a magnet where magnetic force can be experienced by another magnet or magnetic material. The field lines form concentric circles around the conductor in a plane perpendicular to the wire.

9.The field lines form concentric circles around the conductor in a plane perpendicular to the wire.

- They do not intersect.
- They emerge from the north pole and enter the south pole.

10.(Diagram of circular loop with concentric circles at the center and straight lines at the ends)

The magnetic field lines are circular near the wire and become straight and concentrated at the center of the loop, indicating a strong field.

11The conductor experiences a force (motor effect). The direction of the force is given by Fleming's Left-Hand Rule. It depends on the direction of the field and the current.

12 (a)It showed deflection, indicating a magnetic field inside the solenoid.

(b).Inside the solenoid, magnetic field lines are closer and uniform, producing a stronger field.

(c)The magnetic field will change direction periodically.

(d)The current generates heat and energy, causing the filament in the bulb to glow.