CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Science

Subject Code: 086 | Class X

Question Bank – Set 4

Questions in this Booklet

Ch.	Chapter	MCQs	A-R	VSA	SA	LA	CS	All
1	Chemical Reactions and Equations	5	2	2	2	1	1	**13**
2	Acids, Bases and Salts	5	2	3	2	1	1	**14**
3	Metals and Non-metals	5	2	2	2	1	1	**13**
4	Carbon and its Compounds	5	2	3	2	1	1	**14**
5	Life Processes	5	2	4	2	1	1	**15**
6	Control and Coordination	5	2	2	2	1	1	**13**
7	How do Organisms Reproduce?	5	2	3	2	1	1	**14**
8	Heredity	5	2	3	2	1	1	**14**
9	Light – Reflection and Refraction	5	2	4	2	1	1	**15**
10	The Human Eye and the Colourful World	5	2	3	2	1	1	**14**
11	Electricity	5	2	3	2	1	1	**14**
12	Magnetic Effects of Electric Current	5	2	2	2	1	1	**13**
13	Our Environment	5	2	3	2	1	1	**14**
	Total	**65**	**26**	**37**	**26**	**13**	**13**	**180**

MCQs = Multiple Choice; A-R = Assertion–Reason; VSA = Very Short Answer; SA = Short Answer; LA = Long Answer; CS = Case Study / Source-based.

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Answer Key (MCQs and Assertion–Reason) **27**

1. Chemical Reactions and Equations

Multiple Choice Questions (MCQs)

Q1. To balance the following chemical equation, the values of the coefficients x, y and z must be respectively: $x\,Zn(NO_3)_2 \longrightarrow y\,ZnO + z\,NO_2 + O_2$ [Board 2024 (31/5/1) Q1] **[1]**

(a) 4, 2, 2 (b) 4, 4, 2 (c) 2, 2, 4 (d) 2, 4, 2

Q2. In the following equation $x\,KI + H_2O_2 \rightarrow I_2 + y\,KOH$, the values of x and y respectively are: [Board 2026 (31/3/1) Q19] **[1]**

(a) 2, 2 (b) 1, 2 (c) 2, 1 (d) 1, 1

Q3. When 50 g of lead powder is added to 300 mL of blue copper sulphate solution, after a few hours the solution becomes colourless. This is an example of: [SQP 2024-25 Q5] **[1]**

(a) Combination reaction (b) Decomposition reaction
(c) Displacement reaction (d) Double displacement reaction

Q4. A metal ribbon X burns in oxygen with a dazzling white flame forming a white ash Y. The correct description of X, Y and the type of reaction is: [Board 2023 (31/4/1) Q3] **[1]**

(a) X = Ca; Y = CaO; type of reaction = decomposition
(b) X = Mg; Y = MgO; type of reaction = combination
(c) X = Al; Y = Al_2O_3; type of reaction = thermal decomposition
(d) X = Zn; Y = ZnO; type of reaction = endothermic

Q5. Which of the following correctly represents a balanced chemical equation? [SQP 2021-22 (Term 1) Q4] **[1]**

(a) $Fe(s) + 4\,H_2O(g) \longrightarrow Fe_3O_4(s) + 4\,H_2(g)$
(b) $3\,Fe(s) + 4\,H_2O(g) \longrightarrow Fe_3O_4(s) + 4\,H_2(g)$
(c) $3\,Fe(s) + H_2O(g) \longrightarrow Fe_3O_4(s) + H_2(g)$
(d) $3\,Fe(s) + 4\,H_2O(g) \longrightarrow Fe_3O_4(s) + H_2(g)$

Assertion–Reason

Q6. **Assertion (A):** Decomposition of vegetable matter into compost is an endothermic reaction.
Reason (R): Decomposition reaction involves breakdown of a single reactant into simpler products. [SQP 2021-22 (Term 1) Q32] **[1]**

(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.

Q7. **Assertion (A):** Calcium carbonate decomposes on heating to give calcium oxide and carbon dioxide.
Reason (R): Heat is released as the bonds of calcium carbonate break, so the reaction is exothermic. [CBSE-style] **[1]**

(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.

Very Short Answer (VSA)

Q8. Identify the type of each of the following reactions and state the reason for your answer. A. $Fe_2O_3 + 2\,Al \longrightarrow Al_2O_3 + 2\,Fe$ + heat B. $Pb(NO_3)_2 + 2\,KI \longrightarrow PbI_2\downarrow + 2\,KNO_3$ [SQP 2024-25 Q21] **[2]**

Q9. Magnesium ribbon burns in air with a dazzling white flame. Write the balanced chemical equation and name the type of reaction. [CBSE-style] **[2]**

Short Answer (SA)

Q10. Copper powder is heated in a china dish and then hydrogen gas is passed over the heated substance. What changes will be observed on heating, and what visible change will be seen when hydrogen is passed? Give the chemical equations involved, along with the names and colours of the products. [Board 2026 (31/2/1) Q27] **[3]**

Q11. Give reasons for the following.
(a) Milkiness disappears when excess carbon dioxide is passed through lime water, and the balanced equation for the change.
(b) An iron bridge near the sea rusts much faster than an iron bridge located in a dry hilly region. [SQP 2026-27 Q27 (parts B and C; part A dropped)] **[3]**

Long Answer (LA)

Q12. (I) Define rancidity and name the chemical process that causes it. Explain why packets of chips are flushed with nitrogen before sealing.
(II) Write a balanced equation for the rusting of iron and identify the substance oxidised.
(III) Name two methods of preventing rusting of iron. [CBSE-style] **[5]**

Case Study

Case Study: Instant hot and cold packs Some instant packs are used for first aid. A cold pack contains solid ammonium nitrate and water in separate compartments. When the inner pouch is broken, the salt dissolves in water and the pack becomes cold. A hot pack contains iron powder, salt and activated charcoal in a sealed bag. When the bag is opened and exposed to air, the iron is oxidised and the pack becomes warm. Hot packs must therefore be kept sealed until use.

Q13. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) Is the dissolving of ammonium nitrate in water exothermic or endothermic? Justify. [1]

(ii) Write the balanced equation for the reaction of iron with oxygen and water in the hot pack, and name the type of reaction. [1]

(iii) Explain why the hot pack becomes warm and why it must be sealed until use. [2]

OR

(iii) Give one example each of an exothermic reaction and an endothermic reaction from daily life. [2]

2. Acids, Bases and Salts

Multiple Choice Questions (MCQs)

Q1. Hydronium ions are formed by the reaction between: [Board 2023 (31/5/1) Q6] **[1]**

(a) Sodium hydroxide and water
(b) Calcium chloride and water
(c) Hydrogen chloride gas and water
(d) Ethanol and water

Q2. To a small amount of copper oxide in a beaker, when dilute hydrochloric acid is added slowly with stirring, the change in colour of the solution is due to the formation of: [Board 2026 (31/3/1) Q18] **[1]**
(a) Copper(II) oxide, which is black in colour
(b) Copper(I) chloride, which is blue in colour
(c) Copper(II) chloride, which is blue-green in colour
(d) Copper(I) oxide, which is black in colour

Q3. Rishita summarises the chlor-alkali process. The table reads as follows. I. Hydrogen - formed at cathode - used as a fuel. II. Chlorine - formed at anode - used to make margarines. III. Sodium hydroxide - formed near cathode - used to make soap. IV. Sodium hydroxide - formed near anode - used to make bleaching powder. Identify the options that are correctly matched. [SQP 2026-27 Q18] **[1]**

(a) I, II and III (b) I and III
(c) II and IV (d) I, II, III and IV

Q4. An aqueous solution of sodium chloride is prepared in distilled water. The pH of this solution is: [Board 2024 (31/5/1) Q4] **[1]**

(a) 6 (b) 8 (c) 7 (d) 3

Q5. Vinay observed that the stain of curry on a white shirt becomes reddish-brown when soap is scrubbed on it, but turns yellow again when the shirt is washed with plenty of water. What might be the reason? (i) Soap is acidic in nature (ii) Soap is basic in nature (iii) Turmeric is a natural indicator which gives a reddish tinge in bases (iv) Turmeric is a natural indicator which gives a reddish tinge in acids [SQP 2021-22 Term 1 Q29] **[1]**

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

Assertion–Reason

Q6. **Assertion (A):** Sodium hydrogen carbonate is used to relieve acidity in the stomach.
Reason (R): It is a mild base which neutralises excess hydrochloric acid. [CBSE-style] **[1]**
(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.

Q7. **Assertion (A):** A solution of sodium chloride turns red litmus blue.
Reason (R): Sodium chloride is a salt of a strong acid and a strong base. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. A student takes a small amount of copper oxide in a conical flask and adds dilute hydrochloric acid to it with constant stirring. (a) Name the compound formed and state its colour. (b) Write a balanced chemical equation for the reaction. [Board 2023 (31/4/1) Q21(a)] **[2]**

Q9. A clear solution of slaked lime is left exposed to air and slowly becomes milky due to a faint white precipitate. Explain why, with a chemical equation. [Adapted from SQP 2022-23 Q21] **[2]**

Q10. Why does dry hydrogen chloride gas not show acidic properties, although its aqueous solution does? Explain. [CBSE-style] **[2]**

Short Answer (SA)

Q11. Attempt either (a) or (b). (a) Give reasons: (i) For dilution of an acid, acid is added into water and not water into acid. (ii) Dry HCl gas does not turn blue litmus red, whereas dilute hydrochloric acid does. (iii) Blue colour of copper(II) sulphate crystals turns white on heating. OR (b) Write the preparation of the following compounds with balanced chemical equations: (i) NaOH by the chlor-alkali process, (ii) baking soda, (iii) Plaster of Paris. [Board 2026 (31/3/1) Q27] **[3]**

Q12. Milk of magnesia relieves acidity. (i) Explain how it works. (ii) Write the balanced equation for its reaction with hydrochloric acid. (iii) Name the type of reaction involved. [CBSE-style] **[3]**

Long Answer (LA)

Q13. A student titrates dilute sodium hydroxide with dilute hydrochloric acid, using phenolphthalein as indicator. (i) Write the balanced equation for the reaction. (ii) Describe the colour change of the indicator. (iii) How does the pH of the solution change as acid is added? (iv) What is the nature of the salt formed? (v) Why is

the pH of the salt solution 7? [CBSE-style] **[5]**

Case Study

Case Study: Neutralisation with phenolphthalein Sara took 2 mL of dilute NaOH solution in a test tube and added two drops of phenolphthalein. The solution turned pink. She then added dilute H2SO4 drop by drop until the solution became colourless. In her trials, 2 mL, 3 mL and 4 mL of dilute NaOH required 20, 30 and 40 drops of dilute H2SO4 respectively. A drop of NaOH added to the colourless mixture turned it pink again. Sara also used concentrated H2SO4 for comparison.

Q14. Answer the following questions based on the above. [Adapted from SQP 2025-26 Q28] **[4]**

(i) If Sara had used concentrated H2SO4 in place of dilute H2SO4, would the number of drops needed be 40, less than 40, or more than 40? Justify. [1]

(ii) Sara measured 20 drops of dilute H2SO4 and found its volume to be 1 mL. If she used 3 mL of this acid to produce the colour change, how many mL of NaOH did she add initially? [1]

(iii) Write a balanced chemical equation for the reaction. Which of these is true: (a) neutralisation and double displacement, (b) neutralisation and precipitation, (c) precipitation and double displacement, (d) all three? Justify. [2]

OR

(iii) Sara takes 10 drops of dilute H2SO4 with two drops of phenolphthalein and adds NaOH dropwise. What colour change would she see after adding 20 drops of NaOH, and why? [2]

3. Metals and Non-metals

Multiple Choice Questions (MCQs)

Q1. Which of the following metals does NOT evolve hydrogen gas when treated with dilute hydrochloric acid? [Adapted from SQP 2021-22 Term 1] **[1]**

(a) Copper (b) Iron (c) Magnesium (d) Zinc

Q2. Match Column I with Column II. Column I: a. a metal that forms amphoteric oxides; b. a metal which melts when kept on our palm; c. a metal that reacts with nitric acid; d. a metal which cannot displace hydrogen from acids. Column II: (i) Ga; (ii) Au; (iii) Al; (iv) Mn. Select the correct option. [SQP 2024-25] **[1]**

(a) a - (ii), b - (i), c - (iii), d - (iv)
(b) a - (iii), b - (i), c - (iv), d - (ii)
(c) a - (iv), b - (ii), c - (iii), d - (i)
(d) a - (iii), b - (ii), c - (i), d - (iv)

Q3. The number of electrons in the outermost shell of the atom of a non-metal can be: [Board 2023 (31/2/1)] **[1]**

(a) 1, 2 or 3 (b) 3, 4 or 5 (c) 5, 6 or 7 (d) 5, 6 or 8

Q4. When Mg metal is treated with hot water, it starts floating on the surface of the water. The reason for its different behaviour is: [Board 2026 (31/2/1)] **[1]**

(a) Mg is a lighter element than water.
(b) Mg reacts with water to produce H_2 gas which helps in floating.
(c) Mg reacts with water to produce N_2 gas which helps in floating.
(d) Mg reacts with water to form CO_2 gas which helps in floating.

Q5. Which of the following statements about ionic compounds is correct? [CBSE-style] **[1]**

(a) They conduct electricity in the solid state.
(b) They have low melting and boiling points.
(c) They conduct electricity when molten or dissolved in water.
(d) They are formed by sharing of electron pairs.

Assertion–Reason

Q6. **Assertion (A):** The metals high up in the reactivity series cannot be obtained from their compounds by heating with carbon.
Reason (R): Displacement reactions can also be used to obtain metal. [Board 2025 (31/2/1)] **[1]**
(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.

Q7. **Assertion (A):** Copper is used for making electric wires.
Reason (R): Copper is a good conductor of electricity. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. Arrange the metals iron, magnesium, zinc and copper in increasing order of their reactivity. State the observation made when iron filings are added to copper sulphate solution. [Adapted from SQP 2018-19 (Q22 OR)] **[2]**

Q9. Sodium metal is obtained by electrolysis of molten sodium chloride. Write the reactions taking place at (a) the cathode and (b) the anode. [CBSE-style] **[2]**

Short Answer (SA)

Q10. With the help of an activity, explain the conditions under which iron articles get rusted. [Board 2025 (31/1/1)] **[3]**

Q11. An element X is stored in kerosene and cannot be extracted from its ore by using a reducing agent such as carbon. X forms an ionic compound with chlorine. (i) Can X be stored in water? Give a reason.
(ii) Identify X, name the process used for its extraction and write the equation for the extraction. [SQP 2025-26 (Q26)] **[3]**

Long Answer (LA)

Q12. (a) Describe an experiment to show that metals are good conductors of heat.
(b) Describe the extraction of mercury from its ore cinnabar (HgS). [Adapted from SQP 2018-19 (Q16)] **[5]**

Case Study

Case Study: Metallurgy Metals are obtained from their ores. The extraction involves three steps: concentration of the ore, extraction of the metal from the concentrated ore, and refining of the metal. Mercury is obtained from its ore cinnabar. Zinc carbonate is heated in a limited supply of air to change it into an oxide. A metal A reacts with ferric oxide in a highly exothermic reaction, and this reaction is used to join railway tracks.

Q13. Answer the following questions based on the above. [Board 2023 (31/5/1)] **[4]**

(i) (a) Name an ore of mercury and state the form in which mercury is present in it. [1]

(ii) (b) What happens when zinc carbonate is heated strongly in a limited supply of air? [1]

(iii) (c) (i) Identify metal A and name the reaction. (ii) Write the chemical equation of the reaction of metal A with Fe_2O_3. [2]

OR

(iii) We cannot use carbon to obtain sodium from sodium oxide. Why? State the reactions at the cathode

and the anode during electrolytic reduction of molten sodium chloride. [2]

4. Carbon and its Compounds

Multiple Choice Questions (MCQs)

Q1. The functional group present in propanone is: [CBSE-style] **[1]**

(a) $-CHO$ (b) $-CO-$ (c) $-COOH$ (d) $-OH$

Q2. On heating ethanol at 443 K with excess concentrated sulphuric acid, the major product is: [CBSE-style] **[1]**

(a) Ethane (b) Ethene (c) Ethanoic acid (d) Ethoxyethane

Q3. A compound C_3H_6O contains a carbonyl ($C=O$) group not attached to a terminal carbon. Its IUPAC name is: [CBSE-style] **[1]**

(a) Propanal (b) Propanone (c) Propan-1-ol (d) Propionic acid

Q4. The self-linking property of carbon atoms through covalent bonds to form long chains, branched chains and rings is called: [Adapted from SQP 2019-20 (Q1)] **[1]**

(a) Catenation (b) Tetravalency (c) Isomerism (d) Hydrogenation

Q5. While doing a lab activity, four students recorded their observations on burning carbon compounds in air: (i) Ethanol burns with a clean blue flame. (ii) Camphor burns with a sooty flame leaving black deposits. (iii) CH_4 burns with a pale blue flame giving CO_2 and H_2O. (iv) Naphthalene on burning gives a clear, non-luminous flame. The correct observations are: [CBSE-style] **[1]**

(a) (i) and (iii) (b) (ii) and (iv)
(c) (i), (ii) and (iii) (d) All of these

Assertion–Reason

Q6. **Assertion (A):** A mixture of ethyne and oxygen gives a cleaner flame for welding than a mixture of ethyne and air.
Reason (R): Air supplies less oxygen than is needed for complete combustion of ethyne, producing a sooty flame. [CBSE-style] **[1]**
(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.

Q7. **Assertion (A):** Covalent compounds are generally poor conductors of electricity.
Reason (R): Covalent compounds do not contain free ions. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. The melting and boiling points of carbon compounds are generally low and they are largely non-conductors of electricity. State two conclusions based on these two properties. [Board 2024 (31/5/1)] **[2]**

Q9. Riya performs two experiments: Set I - 10 mL distilled water + liquid soap, shaken vigorously; Set II - 10 mL distilled water + liquid soap + half a spoonful of $CaSO_4$, shaken vigorously. Write the expected observations with reason. [SQP 2017-18] **[2]**

Q10. Give one example (with equation) each of an addition reaction and a substitution reaction of carbon com-

pounds. [CBSE-style] **[2]**

Short Answer (SA)

Q11. Distinguish between esterification and saponification with one example each (write chemical equations). [CBSE-style] **[3]**

Q12. (a) How many isomers are possible for the compound with the molecular formula C_4H_8? Draw the electron dot structure of the branched-chain isomer.
(b) How will you prove that C_4H_8 and C_5H_{10} are homologues? [SQP 2021-22 Term 2 (Q9)] **[3]**

Long Answer (LA)

Q13. A carbon compound X (C_2H_6O) on reacting with acidified $K_2Cr_2O_7$ gives a compound Y, which on reaction with X in the presence of conc. H_2SO_4 gives a sweet-smelling compound Z. (a) Identify X, Y and Z.
(b) Write the chemical equations for (i) X to Y and (ii) X to Z.
(c) State the role of (i) acidified $K_2Cr_2O_7$, (ii) conc. H_2SO_4.
(d) Name the reaction that occurs when Z reacts with an alkali. [Board 2023 (31/5/1)] **[5]**

Case Study

Case Study: The versatile element Carbon is a versatile element that forms the basis of all living organisms and many of the things we use. A large variety of compounds is formed because of its tetravalency. Compounds of carbon are formed with oxygen, hydrogen, nitrogen, sulphur, chlorine and many other elements.

Q14. Answer the following questions based on the above. [Board 2024 (31/5/1) (Q37)] **[4]**

(i) What are hydrocarbons? [1]

(ii) List two properties by virtue of which carbon can form a large number of compounds. [1]

(iii) Write the formula of the functional group present in (i) aldehydes and (ii) ketones. Write the chemical equation for the reaction between ethanoic acid and ethanol in the presence of a catalyst. [2]

OR

(iii) What are structural isomers? Write the structures of two isomers of butane (C_4H_{10}). [2]

5. Life Processes

Multiple Choice Questions (MCQs)

Q1. During vigorous exercise, the occurrence of cramps in the outer muscles of an athlete is due to the conversion of pyruvate to: [Board 2023 (31/2/1)] **[1]**

(a) Glucose (b) Ethanol (c) Lactic acid (d) Lactose

Q2. During urine formation, tubular reabsorption and secretion take place in the kidneys. Which of the following sets correctly indicates both the substances that are reabsorbed in the kidneys? [SQP 2026-27] **[1]**

(a) Glucose and salts (b) Glucose and starch
(c) Glycogen and salts (d) Glycogen and starch

Q3. Which of the following adaptations in herbivores helps in digestion of cellulose? [SQP 2024-25] **[1]**

(a) Longer large intestine (b) Smaller large intestine
(c) Smaller small intestine (d) Longer small intestine

Q4. Identify the option that gives the correct enzymes secreted in the mouth cavity, stomach and small intestine of a human being, respectively. [Adapted from SQP 2021-22 Term 1 Q12] **[1]**

(a) lipase, trypsin, pepsin (b) amylase, pepsin, trypsin
(c) trypsin, amylase, carboxylase (d) permease, carboxylase, oxidase

Q5. In which of the following groups of organisms is food material broken down outside the body and then absorbed? [SQP 2021-22 Term 1] **[1]**

(a) Mushroom, green plants, amoeba
(b) Yeast, mushroom, bread mould
(c) Paramecium, amoeba, cuscuta
(d) Cuscuta, lice, tapeworm

Assertion–Reason

Q6. **Assertion (A):** Animals will not get energy if they eat coal as food.
Reason (R): Specific enzymes are needed for the breakdown of a particular food. [Board 2025 (31/2/1)] **[1]**
(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.

Q7. **Assertion (A):** The lungs of humans contain a large number of alveoli.
Reason (R): Alveoli increase the surface area available for exchange of gases. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. Unlike animals, plants do not have any excretory products as they do not eat food. Comment upon this statement with justification. [SQP 2025-26] **[2]**

Q9. What is the purpose of making urine in the human body? Name the organs that store and release the urine. [SQP 2023-24] **[2]**

Q10. (a) Why is it important to prevent oxygenated and deoxygenated blood from mixing in birds and mammals? (b) Which animals can tolerate some mixing of oxygenated and deoxygenated blood? On what factor does the body temperature of these animals depend? [Board 2023 (31/2/1)] **[2]**

Q11. (a) Besides minimising the loss of blood, why is it essential to plug any leak in a blood vessel? Name the component of blood which helps in this process and state how it performs this function. [Board 2025 (31/1/1)] **[2]**

Short Answer (SA)

Q12. Explain where and how urine is produced. [SQP 2020-21] **[3]**

Q13. Describe the mechanism of inhalation in humans. Explain how the structure of the lungs maximises the area for exchange of gases. [CBSE-style] **[3]**

Long Answer (LA)

Q14. (a) (i) "The length of the small intestine in various animals depends on the food they eat." Justify the statement. (ii) Discuss the role of the pancreas and bile juice in the digestion of food in human beings. (iii) How is the small intestine designed to absorb digested food? [Board 2025 (31/2/1)] **[5]**

Case Study

Case Study: Photosynthesis in desert plants Not all plants carry out photosynthesis by the same mechanism. In most plants, photosynthesis depends directly on gaseous carbon dioxide that diffuses into the leaf. Some plants store carbon dioxide in the vacuole of the leaf cells as part of a complex carbon compound. This compound is transported to the chloroplast and releases carbon dioxide when required. This mechanism has evolved in plants that keep their stomata closed during the day to conserve water in desert conditions.

Q15. Answer the following questions based on the above. [Board 2026 (31/3/1)] **[4]**

(i) Which process in these plants is minimised to help them survive in dry conditions? [1]

(ii) Which part of the leaf is responsible for the exchange of gases during photosynthesis? [1]

(iii) List any two events that occur during photosynthesis. [2]

OR

(iii) When do such desert plants take in carbon dioxide from the environment, unlike other plants, and why? [2]

6. Control and Coordination

Multiple Choice Questions (MCQs)

Q1. Walking in a straight line and riding a bicycle are activities which are possible due to coordination of which part of the brain? [Board 2026 (31/3/1)] **[1]**

(a) Fore-Brain - Cerebrum (b) Mid-Brain - Cerebellum
(c) Hind-Brain - Cerebellum (d) Hind-Brain - Medulla

Q2. Which part of the brain is the seat of thinking, memory and intelligence? [CBSE-style] **[1]**

(a) Cerebrum (b) Cerebellum
(c) Medulla oblongata (d) Pons

Q3. Identify the type of tropic movement that is responsible for the movement of the pollen tube towards an ovule. [Board 2026 (31/2/1)] **[1]**

(a) Hydrotropism (b) Geotropism (c) Chemotropism (d) Phototropism

Q4. Which plant hormone promotes the closure of stomata and induces dormancy in seeds? [CBSE-style] **[1]**

(a) Auxin (b) Cytokinin (c) Abscisic acid (d) Gibberellin

Q5. Which gland is called the master gland because it controls the functioning of several other endocrine glands? [CBSE-style] **[1]**

(a) Thyroid (b) Pituitary (c) Adrenal (d) Pancreas

Assertion–Reason

Q6. **Assertion (A):** Blood glucose level is reduced by the action of insulin.
Reason (R): Insulin is secreted by the beta cells of the islets of Langerhans in the pancreas. [CBSE-style] **[1]**
(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.

Q7. **Assertion (A):** The cerebellum coordinates voluntary movements.
Reason (R): The cerebellum is situated in the fore-brain. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. (a) Name the plant hormone that promotes seed germination and stem elongation.
(b) Name the plant hormone that promotes closure of stomata during water stress. [CBSE-style] **[2]**

Q9. Adapted from the printed question. How is the mode of action in beating of the heart different from reflex actions? Give two examples of reflex actions. [SQP 2022-23; adapted for text-only answer] **[2]**

Short Answer (SA)

Q10. How do muscles move at the cellular level and respond when processed messages are received from the brain? [SQP 2026-27] **[3]**

Q11. Taking the example of any two animal hormones along with their gland of secretion, explain how these hormones help (i) in growth and development and (ii) regulate metabolism in the body. [Board 2024 (31/5/1)] **[3]**

Long Answer (LA)

Q12. Explain how the following hormones act. For each: name the gland, state one function and one disorder that results from its deficiency. (a) Insulin; (b) Adrenaline; (c) Thyroxine. [CBSE-style] **[5]**

Case Study

Case Study: A gardener and the bean seedling A gardener placed a potted bean seedling near a window. After three days, the shoot had bent towards the light, while the root had grown straight downwards into the soil. When the pot was turned on its side, the root gradually changed direction and grew downwards again, and the shoot grew upwards. The gardener also noticed that a climbing plant's tendril had coiled tightly around a nearby wire support.

Q13. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) Identify the tropic movement shown by (i) the shoot bending towards light and (ii) the root growing downwards. [1]

(ii) Name the plant hormone responsible for these responses and state where it accumulates in the shoot when light falls from one side. [1]

(iii) Explain why the shoot grows upwards after the pot is turned on its side. Also name the movement shown by the tendril. [2]

OR

(iii) Explain why the shoot grows upwards after the pot is turned on its side, using the role of auxin. [2]

7. How do Organisms Reproduce?

Multiple Choice Questions (MCQs)

Q1. Menstruation occurs when: [CBSE-style] **[1]**

(a) The egg is fertilised and the zygote is implanted in the uterus.
(b) The thickened uterine lining breaks down and is shed because the egg is not fertilised.
(c) Sperms are released into the vagina.
(d) The cervix opens to release the egg into the vagina.

Q2. The number of chromosomes in a cell division is halved. This kind of cell division is observed in: [Board 2025 (31/2/1)] **[1]**

(a) Only testis
(b) Only ovary
(c) Ovary and testis both
(d) All cells of the body

Q3. In a controlled experiment, the anthers of a mustard plant's flowers were carefully removed in the bud stage before they matured. The bud was covered with a paper bag. What will be the most likely result for these flowers? [SQP 2026-27] **[1]**

(a) They will still produce seeds and fruit through self-pollination.
(b) They will attract more insects and produce larger flowers but no fruit.
(c) They will not produce any seeds or fruits.
(d) They will produce seeds and fruits that are genetically identical to the parent.

Q4. Select the conditions responsible for the rapid spread of bread mould on a slice of bread: (i) Formation of large number of spores (ii) Presence of moisture and nutrients in bread (iii) Low temperature (iv) Presence of hyphae [Adapted from Board 2024 (31/5/1)] **[1]**

(a) i, ii and iv (b) ii and iii (c) i and iii (d) i, iii and iv

Q5. In a flower, the part that develops into the fruit after fertilisation is the: [CBSE-style] **[1]**

(a) Ovule (b) Ovary (c) Stigma (d) Anther

Assertion–Reason

Q6. **Assertion (A):** When a bacterium divides into two, and the resultant two bacteria divide again, the four bacteria produced would be almost similar.
Reason (R): DNA copying involves small inaccuracies in the reproduction process. [Board 2023 (31/2/1)] **[1]**
(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.

Q7. **Assertion (A):** The placenta is essential for the growth of the human embryo.
Reason (R): The placenta has villi that provide a large surface area for the exchange of glucose and oxygen from the maternal blood. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. A student observed a permanent slide showing asexual reproduction in yeast. Name the process and describe the stages he would have seen on the slide. [SQP 2017-18] **[2]**

Q9. Describe the stages of budding in Hydra. [Adapted from Board 2025 (31/1/1)] **[2]**

Q10. What changes are observed in the uterus after the implantation of the young embryo in a human female? [SQP 2026-27] **[2]**

Short Answer (SA)

Q11. Differentiate between asexual and sexual reproduction. Give one example of each. [CBSE-style] **[3]**

Q12. Describe the path of sperms from the testis to the outside of the body in a human male, and state the role of the prostate gland and seminal vesicle. [CBSE-style] **[3]**

Long Answer (LA)

Q13. (a) Why is it not possible to reconstruct the whole organism from a fragment in complex multicellular organisms? (2 marks)
(b) Sexual maturation of reproductive tissues and organs is a necessary link for reproduction. Elucidate. (3 marks) [SQP 2022-23] **[5]**

Case Study

Case Study: Banana plant suckers A banana plant is growing with the help of suckers. Suckers are small plant stem outgrowths which can be separated from the main plant and planted separately; they grow into new plants. The farmer wants plants with the same features as the parent plant. The banana plant produces male flowers, and the new plants are not absolutely identical to the parent because of small variations.

Q14. Answer the following questions based on the above. [SQP 2024-25] **[4]**

(i) (i) Give the name and type of reproduction shown by the banana plant with suckers. [1]

(ii) (ii) Why is the offspring of this banana plant not absolutely identical to its parent? Give one reason. [1]

(iii) (iii) List two advantages the farmer gets by using this method, and explain how the male-flowered plant takes part in pollination. [2]

OR

(iii) (iii) The plant produces male flowers only. Explain how pollen from its male flowers can take part in pollination of another banana plant. [2]

8. Heredity

Multiple Choice Questions (MCQs)

Q1. Mendel selected the pea plant for his experiments mainly because: [CBSE-style] **[1]**
(a) it has many contrasting, easily observed traits and a short life cycle
(b) its flowers are very large and it has no seeds
(c) it takes many years to produce its first flower
(d) it can only reproduce asexually

Q2. In a dihybrid cross between a pure round yellow plant (RRYY) and a pure wrinkled green plant (rryy), the phenotypic ratio obtained in the F_2 generation is: [CBSE-style] **[1]**
(a) 9 : 3 : 3 : 1 (b) 3 : 1 (c) 1 : 2 : 1 (d) 1 : 1 : 1 : 1

Q3. Mendel's law of segregation states that: [CBSE-style] **[1]**
(a) the two alleles of a gene separate during gamete formation, so each gamete receives only one allele
(b) alleles of different genes are always inherited together
(c) the dominant allele is always lost in heterozygotes
(d) all traits are controlled by the environment only

Q4. Height of a plant is regulated by: [SQP 2023-24] **[1]**
(a) DNA which is directly influenced by growth hormone.
(b) Genes which regulate the proteins directly.
(c) Growth hormones under the influence of the enzymes coded by a gene.
(d) Growth hormones directly under the influence of a gene.

Q5. Alternative forms of the same gene, present at the same place on homologous chromosomes, are called: [CBSE-style] **[1]**
(a) alleles (b) genotypes (c) phenotypes (d) hybrids

Assertion–Reason

Q6. **Assertion (A):** A test cross is used to find out whether a plant with a dominant trait is homozygous or heterozygous.
Reason (R): Crossing with a homozygous recessive plant shows the genotype from the ratio of the progeny. [CBSE-style] **[1]**

(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.

Q7. **Assertion (A):** A mango seed will germinate to form a mango tree.
Reason (R): Heredity determines the process by which traits and characteristics are reliably inherited from parents to offspring. [Board 2025 (31/2/1)] **[1]**
(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.

Very Short Answer (VSA)

Q8. (a) Define the terms dominant trait and recessive trait.
(b) Give one example of each from pea plants. [CBSE-style] **[2]**

Q9. Write the genotypes and the phenotypes of the F_2 plants obtained when two F_1 plants (Tt) are self-pollinated. [CBSE-style] **[2]**

Q10. Explain how a gene controls the expression of a trait, using an example. [CBSE-style] **[2]**

Short Answer (SA)

Q11. Show the cross and the observations made by Mendel when he crossed a pure tall pea plant with a pure short pea plant to get the F_1 progeny. [Board 2026 (31/3/1)] **[3]**

Q12. Two pea plants, one with round yellow seeds (RRYY) and another with wrinkled green seeds (rryy), produce F_1 progeny with round yellow (RrYy) seeds. When the F_1 plants are self-pollinated, which new combination of characters is expected in the F_2 progeny? How many seeds with these new combinations will be produced when a total of 160 seeds are produced in the F_2 generation? Explain with reason. [SQP 2021-22 (Term 2)] **[3]**

Long Answer (LA)

Q13. A student crossed pea plants that differed in one pair of contrasting characters. The F_2 generation gave the following counts: tall 1200 and short 390 (total 1590). Analyse the data and draw conclusions about the inheritance of the character. [CBSE-style] **[5]**

Case Study

Case Study: Mendelian experiments with pea plants In order to study patterns of inheritance, Neha performed typical Mendelian experiments with pea plants in the field. In experiment one, she crossed a pea plant with white flowers (vv) with a pea plant bearing violet flowers (VV). In experiment two, she also studied the height of the plant: she crossed a pea plant with violet flowers and tall height (VVTT) with a pea plant having white flowers and short height (vvtt). Violet flower colour and tall height are dominant traits.

Q14. Answer the following questions based on the above. [SQP 2026-27] **[4]**

(i) (A) What percentage of plants is expected to have violet flowers in the F_1 and F_2 generations of experiment one? [1]

(ii) (B) What percentage of plants in the F_2 generation of experiment two are expected to be tall with white flowers? [1]

(iii) (C) What percentage of medium-height plants with light violet flowers is expected in the F_1 and F_2 generations of experiment two? Give a reason. [2]

OR

(iii) (D) What percentage of short plants with white flowers is expected in the F_1 and F_2 generations of experiment two? [2]

9. Light – Reflection and Refraction

Multiple Choice Questions (MCQs)

Q1. Rays from the Sun converge at a point 15 cm in front of a concave mirror. Where should an object be placed so that its image is of the same size as the object? [SQP 2021-22 Term 1 Q40] **[1]**
(a) 30 cm in front of the mirror
(b) 15 cm in front of the mirror
(c) Between 15 cm and 30 cm in front of the mirror
(d) More than 30 cm in front of the mirror

Q2. An object is placed at a distance of 30 cm from the pole of a concave mirror. If its real and inverted image is formed at 60 cm in front of the mirror, the focal length of the mirror is: [Board 2025 (31/2/1)] **[1]**
(a) -15 cm (b) -20 cm (c) -30 cm (d) -60 cm

Q3. A concave mirror forms a real, inverted image that is larger than the object. Where is the object placed? [SQP 2020-21 Q6] **[1]**
(a) Between the pole and the focus
(b) At the focus
(c) Between the focus and the centre of curvature
(d) Beyond the centre of curvature

Q4. A 3 cm high object is placed at the centre of curvature of a concave mirror of focal length 6 cm. The magnification of the image is: [Adapted from SQP 2021-22 Term 1 Q22 (VI alternative)] **[1]**
(a) $+1.5$ (b) -1 (c) $+1$ (d) -1.5

Q5. In the following cases, a ray is incident on a concave mirror. In which case is the angle of incidence equal to zero? [SQP 2024-25 Q13] **[1]**
(a) A ray parallel to the principal axis
(b) A ray passing through the centre of curvature and incident obliquely
(c) A ray passing through the principal focus and incident obliquely
(d) A ray incident obliquely to the principal axis, at the pole of the mirror

Assertion–Reason

Q6. **Assertion (A):** A concave mirror is used as a shaving mirror.
Reason (R): When the face is placed within the focus of a concave mirror, an erect and magnified image is formed. [CBSE-style] **[1]**
(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.

Q7. **Assertion (A):** A plane mirror forms a virtual image of the same size as the object.
Reason (R): The image formed by a plane mirror is laterally inverted. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. The heat produced at a point due to concentration of sunlight by a convex lens burns a paper. (a) Explain why this happens. (b) Name the point, in the context of the lens used, at which the paper starts burning. What does the bright spot represent? [Board 2024 (31/5/1) Q25; SQP 2025-26 Q33 (B)] **[2]**

Q9. (a) A ray of light enters benzene from air. If the refractive index of benzene is 1.50, by what percent does the speed of light reduce on entering benzene? (b) For the same angle of incidence in media A, B and C, the angles of refraction are 20°, 30° and 40° respectively. In which medium is the speed of light maximum? Give reason. [SQP 2018-19 Q5] **[2]**

Q10. A convex lens of focal length 10 cm forms the image of an object of height 2 mm placed 5 cm from its optical centre. Find the height of the image. [SQP 2021-22 Term 1 Q47] **[2]**

Q11. (a) Under what condition can a convex lens form a virtual image? (b) What is the nature of the image formed by a convex lens when the object is placed between F and 2F? [SQP 2025-26 Q33 (A, B; adapted)] **[2]**

Short Answer (SA)

Q12. It is desired to obtain an erect image of an object using a concave mirror of focal length 12 cm. (i) What should be the range of the object distance? (ii) Will the image be smaller or larger than the object? Draw a ray diagram. (iii) Where will the image be if the object is placed 24 cm in front of the mirror? [SQP 2019-20 Q22] **[3]**

Q13. The power of a lens is +4 D. Find its focal length. An object is placed 50 cm from the optical centre of this lens. State the nature and magnification of the image formed, and draw a ray diagram to justify your answer. [Board 2023 (31/4/1) Q31] **[3]**

Long Answer (LA)

Q14. A convex lens can form (i) a real, inverted and magnified image and (ii) a virtual, erect and magnified image of an object. If the focal length of the lens is 10 cm, what should be the range of object distance in each case? Draw ray diagrams to justify your answer. [Board 2023 (31/5/1) Q30(b)] **[5]**

Case Study

Case Study: Observation table for a convex lens The table gives the image distance v for different object distances u for a convex lens, using the New Cartesian Sign Convention (distances in cm): u = -150, v = +30; u = -75, v = +37.5; u = -50, v = +50; u = -37.5, v = +75; u = -30, v = +150; u = -15, v = +37.5.

Q15. Answer the following questions based on the above. [Board 2026 (31/3/1) Q38] **[4]**

(i) (a) Without calculation, find the focal length of the lens. Justify your answer. [1]

(ii) (b) Which observation in the table is not correct? Give reason. [1]

(iii) (c)(i) Find the magnification for u = -30 cm and state the nature of the image formed. [2]

OR

(iii) (c)(ii) Analyse the data and draw a labelled ray diagram for u = -30 cm and v = +150 cm. [2]

10. The Human Eye and the Colourful World

Multiple Choice Questions (MCQs)

Q1. The far point of a normal human eye is [CBSE-style] **[1]**

(a) 25 cm from the eye (b) infinity

(c) 2.5 cm from the eye (d) the blind spot

Q2. The colour of light that travels slowest in glass is [CBSE-style] **[1]**

(a) red (b) green (c) yellow (d) violet

Q3. If a beam of red light and a beam of violet light are incident at the same angle on the inclined surface of a prism from air and produce angles of refraction r and v respectively, which of the following is correct? [SQP 2021-22 Term 1] **[1]**

(a) $r = v$ (b) $r > v$ (c) $r = 1/v$ (d) $r < v$

Q4. A thin beam of white light falls obliquely on a face of a glass prism and a spectrum is obtained on a screen placed beyond the prism, with red at the top. Which of the following options is the correct sequence of colours from top to bottom on the screen? [Board 2026 (31/2/1)] **[1]**

(a) Red, Green, Yellow, Violet, Blue (b) Red, Yellow, Green, Blue, Violet
(c) Violet, Blue, Green, Yellow, Red (d) Violet, Red, Green, Yellow, Blue

Q5. Stars appear to twinkle but planets do not twinkle because [CBSE-style] **[1]**

(a) stars are much bigger than planets
(b) planets emit their own light while stars reflect sunlight
(c) stars are point sources of light and the atmospheric refraction of their light varies continuously, while planets are extended sources whose variations average out
(d) the light of planets is not refracted by the atmosphere

Assertion–Reason

Q6. **Assertion (A):** A concave lens of suitable power is used to correct myopia.
Reason (R): A concave lens first diverges the rays from distant objects so that the eye lens can focus them on the retina. [CBSE-style] **[1]**

(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.

Q7. **Assertion (A):** White light passing through two identical prisms placed with their refracting angles in opposite directions emerges as white light.
Reason (R): The dispersion produced by the first prism is cancelled by the second prism, which recombines the colours. [CBSE-style] **[1]**

(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.

Very Short Answer (VSA)

Q8. How does the focal length of the eye lens change as the distance of the object from the eyes is altered? Explain. [Board 2026 (31/2/1)] **[2]**

Q9. A student observes the splitting of white light into its component colours as it passes through a glass prism, and notes the positions of the red and violet bands. Name the phenomenon and state why the violet light bends more than the red light. [SQP 2020-21] **[2]**

[Figure: a narrow beam of white light entering one face of a triangular glass prism and emerging from the other face as a fan of colours, with red deviated the least and violet the most.]

Q10. A beam of light passes through a glass prism and the angle of deviation is measured for red light and for violet light separately. State which deviation is larger and give the reason. [CBSE-style] **[2]**

Short Answer (SA)

Q11. (a) A diagram shows an eye defect in which rays from a distant object meet in front of the retina. (i) Name the defect and the part of the eye mainly responsible for this condition. (ii) List two causes of this defect. (iii)

Name the type of lens used to correct it and state its role in this case. [Board 2024 (31/5/1)] **[3]**

[Figure: schematic eye; parallel rays from a distant object converge before the retina (image in front of retina), indicating myopia.]

Q12. (a) Explain how the human eye adjusts itself to focus on (i) distant objects and (ii) nearby objects. (b) A student sitting on the back bench of a classroom finds the writing on the board blurred, but can read her book held at 25 cm. Identify her defect and the lens used to correct it, and state one cause of the defect. [CBSE-style] **[3]**

Long Answer (LA)

Q13. (i) What is meant by hypermetropia (long-sightedness)? (ii) What is the far point of a normal human eye and what does it signify? (iii) Name the type of lens used to correct hypermetropia. (iv) Explain why a hypermetropic eye is unable to focus nearby objects on the retina. [SQP 2026-27] **[5]**

Case Study

Case Study: Lights of the night sky A group of students spent an evening on the school terrace studying the night sky with their science teacher. They noticed that the stars seemed to flicker and change brightness, while the planet Venus shone steadily. The teacher explained that starlight passes through layers of air whose refractive index keeps changing because of moving air of varying temperature, while the light of planets, being extended sources, does not show this effect. Later, the students read that because of the same bending of light near the horizon, the Sun becomes visible to us about two minutes before it actually rises, and about two minutes after it actually sets.

Q14. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) Name the phenomenon that makes stars twinkle. [1]

(ii) Why does Venus, a planet, not twinkle noticeably? [1]

(iii) (i) Explain why the Sun is visible before actual sunrise. (ii) The students also noticed that the stars appear slightly higher in the sky than their actual positions. Explain this observation. [2]

OR

(iii) (i) State what would happen to the twinkling of stars if the Earth had no atmosphere. (ii) The teacher noted that distant stars look stable in photographs taken from space: give the reason. [2]

11. Electricity

Multiple Choice Questions (MCQs)

Q1. In a resistive circuit, if the current is increased to two times, the percentage change in the amount of heat dissipated in the circuit would be: [Board 2023 (31/2/1)] **[1]**

(a) 400% (b) 300% (c) 200% (d) 100%

Q2. Unit of electric power may also be expressed as: [SQP 2019-20 (Q7)] **[1]**

(a) volt-ampere (b) kilowatt-hour (c) watt-second (d) joule-second

Q3. The SI unit of resistivity is: [CBSE-style] **[1]**

(a) Ω/m (b) $\Omega\,\text{m}$ (c) Ω/m^2 (d) $\Omega\,\text{m}^2$

Q4. The energy equivalent of 1 kWh is: [CBSE-style] **[1]**

(a) 3.6×10^3 J (b) 3.6×10^5 J (c) 3.6×10^6 J (d) 3.6×10^9 J

Q5. One volt is equal to: [CBSE-style] **[1]**

(a) 1 J/C (b) 1 C/s (c) 1 A/V (d) 1 N/C

Assertion–Reason

Q6. **Assertion (A):** Nichrome is used for making the heating coils of electric irons and toasters.
Reason (R): Nichrome has high resistivity and a high melting point. [CBSE-style] **[1]**
(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.

Q7. **Assertion (A):** A voltmeter must have a very high resistance.
Reason (R): A voltmeter is connected in parallel across a component and must not draw an appreciable current from the circuit. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. An electric kettle is rated 750 W, 220 V. Can this kettle be used in a circuit which has a fuse of current rating 3 A? Give reason for your answer. [Board 2025 (31/2/1) Q26] **[2]**

Q9. (A) Find the following in the electric circuit:
(i) the effective resistance of the two $8\,\Omega$ resistors in the combination.
(ii) the current flowing through the $4\,\Omega$ resistor. [SQP 2025-26 (Q34)] **[2]**
[Figure: An 8 V cell is connected in series with a 4 Ω resistor and ammeter A1. Two 8 Ω resistors are connected in parallel between junctions C and D, and ammeter A2 is in the return path to the cell. For option B: a 6 V cell with two 24 Ω resistors in parallel, followed by ammeter A1 and a 12 Ω resistor in series, with ammeter A2 in the return path.]

Q10. A conductor of resistance $0.5\,\Omega$ has length $1\,\text{m}$ and cross-sectional area $1\,\text{mm}^2$. Find its resistivity. [CBSE-style] **[2]**

Short Answer (SA)

Q11. (A) State the relationship between the resistance R of a wire and its length l and cross-sectional area A. Use the mathematical symbols to arrive at the final formula. [SQP 2024-25 (Q32)] **[3]**

Q12. A copper wire has a diameter of $0.2\,\text{mm}$ and resistivity $1.6 \times 10^{-8}\,\Omega\,\text{m}$. (I) What length of this wire will make its resistance $14\,\Omega$?
(II) How much does the resistance change if the diameter of the wire is doubled? [Board 2024 (31/5/1) Q36(b)(ii)] **[3]**

Long Answer (LA)

Q13. A $12\,\text{V}$ battery is connected to a $4\,\Omega$ and a $12\,\Omega$ resistor in parallel, and this combination is in series with a $1\,\Omega$ resistor. Calculate (i) the total resistance and the current from the battery, (ii) the current through the $4\,\Omega$ and the $12\,\Omega$ resistors, and (iii) the power dissipated in the $1\,\Omega$ resistor. [CBSE-style] **[5]**

Case Study

Case Study: Choosing a bulb A household uses a 10 W LED bulb, which gives the same light as a 60 W incandescent bulb. Both bulbs are used for 5 hours each day for 30 days. Electricity costs Rs 8 per kWh.

Q14. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) (i) Calculate the energy consumed per day by the LED bulb, in kWh. [1]

(ii) (ii) Calculate the monthly cost of using the LED bulb. [1]

(iii) (iii) Calculate the monthly saving in rupees if the incandescent bulb is replaced by the LED bulb. [2]

OR

(iii) (iii) (b) Give two reasons why an LED bulb is preferred to an incandescent bulb. [2]

12. Magnetic Effects of Electric Current

Multiple Choice Questions (MCQs)

Q1. A horizontal straight wire lies flat on a table and carries a steady current from east to west. At which point is the magnetic field directed from north to south? [Board 2023 (31/5/1)] **[1]**
(a) Directly above the wire
(b) Directly below the wire
(c) Level with the wire on its north side
(d) Level with the wire on its south side

Q2. A horizontal wire runs north-south and carries current from south to north. At a point directly below the wire, the magnetic field is directed: [CBSE-style] **[1]**
(a) Towards the east (b) Towards the west
(c) Towards the north (d) Vertically upwards

Q3. Which one of the following is a characteristic of direct current (DC)? [CBSE-style] **[1]**
(a) Its direction changes periodically
(b) Its magnitude and direction remain constant with time
(c) It is the type of supply obtained from the mains at 50 Hz
(d) It can be stepped up by a transformer

Q4. When the live wire and the neutral wire of a household circuit touch each other directly, the current in the circuit: [CBSE-style] **[1]**
(a) Becomes zero
(b) Becomes very large because the resistance of the path becomes very small
(c) Remains unchanged
(d) Becomes steady at 1 A

Q5. Which change would increase the magnetic field produced by a solenoid? [CBSE-style] **[1]**
(a) Decreasing the number of turns
(b) Decreasing the current through it
(c) Inserting a soft iron core inside it
(d) Reversing the direction of the current

Assertion–Reason

Q6. **Assertion (A):** A compass needle, kept in an external magnetic field, always aligns itself in the North-South direction of the Earth.
Reason (R): The behaviour of the needle of a compass is similar to the behaviour of a freely suspended bar magnet. [Board 2026 (31/3/1)] **[1]**
(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.

Q7. **Assertion (A):** A compass needle placed near a current-carrying wire gets deflected.
Reason (R): A current-carrying conductor produces a magnetic field around it. [CBSE-style] **[1]**
(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.

Very Short Answer (VSA)

Q8. (i) What is the function of the earth wire in electrical appliances? (ii) Explain what is meant by short circuiting of an electric supply. [Adapted from SQP 2017-18] **[2]**

Q9. State Fleming left-hand rule and explain how it is used to find the direction of force on a current-carrying conductor. [CBSE-style] **[2]**

Short Answer (SA)

Q10. (a) State the right-hand thumb rule and describe how it helps determine the direction of the magnetic field around a current-carrying conductor. (b) Explain how the magnetic field changes with distance from the conductor. [SQP 2026-27] **[3]**

Q11. In a two-room house, the living room needs one electric bulb, one electric fan, a refrigerator and a plug point for appliances of power up to 2 kW. Draw a circuit diagram (a description in words is acceptable) showing an electric fuse and earthing as safety devices. [SQP 2019-20] **[3]**

Long Answer (LA)

Q12. With the help of a labelled circuit diagram, describe an activity to illustrate the pattern of magnetic field lines around a straight current-carrying long conducting wire. (i) Name the rule used to find the direction of the magnetic field associated with the conductor. (ii) Is a similar magnetic field produced around a thin beam of moving (a) alpha particles and (b) neutrons? Justify your answer. [SQP 2017-18] **[5]**

Case Study

Case Study: Electromagnetic scrap crane A scrap-yard crane lifts iron scrap with a large electromagnet. The electromagnet is made by winding many turns of insulated copper wire around a soft iron core. When the current is switched on, the electromagnet attracts iron scrap; when the current is switched off, the scrap drops. A permanent magnet is not used because its magnetism cannot be switched off.

Q13. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) Why is soft iron used as the core of the electromagnet rather than steel? [1]

(ii) State one way to increase the strength of the electromagnet. [1]

(iii) Explain why the electromagnet is more suitable than a permanent magnet for this crane. [2]

OR

(iii) Explain how the magnetic poles of the electromagnet can be found using the right-hand thumb rule. [2]

13. Our Environment

Multiple Choice Questions (MCQs)

Q1. A fish living in a pond ecosystem feeds on small aquatic insects (larvae). These insect larvae, in turn, feed on green algae and small photosynthetic bacteria. In this specific food chain, what is the trophic level classification of fish? [SQP 2026-27] **[1]**

(a) Producer (b) Primary consumer
(c) Secondary consumer (d) Tertiary consumer

Q2. Which of the following substances is mainly responsible for the depletion of the ozone layer? [CBSE-style] **[1]**

(a) Carbon dioxide (b) Nitrogen
(c) Oxygen (d) Chlorofluorocarbons (CFCs)

Q3. Which of the following human activities has resulted in an increase of non-biodegradable substances? [SQP 2025-26] **[1]**

(a) Organic farming
(b) Increase in tree plantation
(c) Use of plastic as packaging material
(d) Composting of kitchen waste

Q4. In accumulation of toxic substances at higher trophic levels of an ecosystem through the food chain, which of the following organisms is affected the most? [Board 2026 (31/3/1)] **[1]**

(a) Small aquatic plants
(b) Human beings
(c) Small fish
(d) Large fish

Q5. A non-biodegradable pesticide enters a food chain and gets accumulated. At which level is its concentration highest? [CBSE-style] **[1]**

(a) Top carnivores
(b) Producers
(c) Primary consumers
(d) Secondary consumers

Assertion–Reason

Q6. **Assertion (A):** Food chain is responsible for the entry of harmful chemicals in our bodies.
Reason (R): The length and complexity of food chains vary greatly. [SQP 2020-21] **[1]**
(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.

Q7. **Assertion (A):** Ozone layer protects the surface of the Earth from harmful UV radiations.
Reason (R): Chlorofluorocarbons (CFCs) are responsible for depletion of ozone layer. [Board 2024 (31/5/1)] **[1]**
(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.

Very Short Answer (VSA)

Q8. In the following food chain, if 50 J of energy was available to the hawk, how much energy would have been present at the first and third trophic levels? Justify your answer. Grass → Grasshopper → Frog → Snake → Hawk. [Board 2023 (31/5/1)] **[2]**

Q9. Use of several pesticides which results in excessive accumulation of pesticides in rivers or ponds, is a matter of deep concern. Justify this statement. [Board 2023 (31/4/1)] **[2]**

Q10. Why are decomposers called nature's recyclers? Name any two decomposers. [CBSE-style] **[2]**

Short Answer (SA)

Q11. Study the food chain: Phytoplankton → Zooplankton → Small fishes → Large fish.
(a) If the amount of energy available at the fourth trophic level is 10 kJ, what will be the energy available at the producer level?
(b) Is it possible to have three more trophic levels in the above food chain? Justify.
(c) Which trophic level will have the maximum amount of pesticide, if it had washed down into the water body from agricultural fields? Why? [SQP 2026-27] **[3]**

Q12. Write the essential function performed by ozone at the higher levels of the atmosphere. How is it formed in the upper atmosphere? Write the name of the group of chemicals mainly responsible for the depletion of ozone layer. [Board 2025 (31/2/1)] **[3]**

Long Answer (LA)

Q13. A pesticide DDT was sprayed in a lake. (a) Explain the process of biological magnification.
(b) Which organism in the lake food chain (algae → small fish → large fish → fish-eating bird) will have the

highest concentration of DDT? Why?

(c) Suggest one measure to reduce such contamination. [CBSE-style] **[5]**

Case Study

Case Study: Waste segregation in a colony A housing colony has provided two bins. A green bin is for kitchen waste and garden waste, and a blue bin is for plastic bottles, polythene bags and metal cans. Residents are asked to put only the correct waste in each bin. The municipal workers compost the green-bin waste, while the blue-bin waste is sent for recycling.

Q14. Answer the following questions based on the above. [CBSE-style] **[4]**

(i) Name the type of waste collected in the green bin. [1]

(ii) Give two examples of non-biodegradable waste collected in the blue bin. [1]

(iii) Why is segregation of waste useful? Explain the benefit of composting the green-bin waste. [2]

OR

(iii) Mention two harmful effects of non-biodegradable waste if it is dumped in the soil. [2]

Answer Key (MCQs and Assertion–Reason)

Ch. 1: Q1-(c), Q2-(a), Q3-(c), Q4-(b), Q5-(b), Q6-(d), Q7-(c)

Ch. 2: Q1-(c), Q2-(c), Q3-(b), Q4-(c), Q5-(b), Q6-(a), Q7-(d)

Ch. 3: Q1-(a), Q2-(b), Q3-(c), Q4-(b), Q5-(c), Q6-(b), Q7-(a)

Ch. 4: Q1-(b), Q2-(b), Q3-(b), Q4-(a), Q5-(c), Q6-(a), Q7-(a)

Ch. 5: Q1-(c), Q2-(a), Q3-(d), Q4-(b), Q5-(b), Q6-(a), Q7-(a)

Ch. 6: Q1-(c), Q2-(a), Q3-(c), Q4-(c), Q5-(b), Q6-(b), Q7-(c)

Ch. 7: Q1-(b), Q2-(c), Q3-(c), Q4-(a), Q5-(b), Q6-(b), Q7-(a)

Ch. 8: Q1-(a), Q2-(a), Q3-(a), Q4-(c), Q5-(a), Q6-(a), Q7-(a)

Ch. 9: Q1-(a), Q2-(b), Q3-(c), Q4-(b), Q5-(b), Q6-(a), Q7-(b)

Ch. 10: Q1-(b), Q2-(d), Q3-(b), Q4-(b), Q5-(c), Q6-(a), Q7-(a)

Ch. 11: Q1-(b), Q2-(a), Q3-(b), Q4-(c), Q5-(a), Q6-(a), Q7-(a)

Ch. 12: Q1-(b), Q2-(b), Q3-(b), Q4-(b), Q5-(c), Q6-(d), Q7-(a)

Ch. 13: Q1-(c), Q2-(d), Q3-(c), Q4-(b), Q5-(a), Q6-(b), Q7-(a)