CENTRAL BOARD OF SECONDARY EDUCATION

CBSE 2026-27

Science

Subject Code: 086 | Class X

Question Bank – Set 2

Questions in this Booklet

Ch.	Chapter	MCQs	A-R	VSA	SA	LA	CS	All
1	Chemical Reactions and Equations	5	2	3	2	1	1	**14**
2	Acids, Bases and Salts	5	2	3	2	1	1	**14**
3	Metals and Non-metals	5	2	3	2	1	1	**14**
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	3	2	1	1	**14**
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	3	2	1	1	**14**
13	Our Environment	5	2	3	2	1	1	**14**
	Total	**65**	**26**	**41**	**26**	**13**	**13**	**184**

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) **28**

1. Chemical Reactions and Equations

Multiple Choice Questions (MCQs)

Q1. When aqueous solutions of potassium iodide and lead nitrate are mixed, an insoluble substance separates out. The chemical equation for the reaction involved is: [Board 2023 (31/4/1) Q2] **[1]**

(a) $KI + PbNO_3 \longrightarrow PbI + KNO_3$ (b) $2\,KI + Pb(NO_3)_2 \longrightarrow PbI_2 + 2\,KNO_3$
(c) $KI + Pb(NO_3)_2 \longrightarrow PbI + KNO_3$ (d) $KI + PbNO_3 \longrightarrow PbI_2 + KNO_3$

Q2. Which of the following are combination reactions? (i) $2\,KClO_3 \xrightarrow{\Delta} 2\,KCl + 3\,O_2$ (ii) $MgO + H_2O \longrightarrow Mg(OH)_2$ (iii) $4\,Al + 3\,O_2 \longrightarrow 2\,Al_2O_3$ (iv) $Zn + FeSO_4 \longrightarrow ZnSO_4 + Fe$ [Board 2026 (31/2/1) Q17] **[1]**

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

Q3. In the reaction of iron with copper sulphate solution, $CuSO_4 + Fe \longrightarrow Cu + FeSO_4$, which option correctly gives the substance oxidised and the reducing agent? [SQP 2021-22 (Term 1) Q6] **[1]**

(a) Substance oxidised: Fe; reducing agent: Fe
(b) Substance oxidised: Fe; reducing agent: FeSO4
(c) Substance oxidised: Cu; reducing agent: Fe
(d) Substance oxidised: CuSO4; reducing agent: Fe

Q4. In the reaction of aqueous barium chloride with aqueous sodium sulphate, the aqueous solution formed will be: [SQP 2025-26 Q23] **[1]**

(a) $BaCl_2$ (b) $BaSO_4$ (c) Na_2SO_4 (d) NaCl

Q5. Which of the following is a redox reaction, but not a combination reaction? [Board 2024 (31/5/1) Q2] **[1]**

(a) $C + O_2 \longrightarrow CO_2$ (b) $2\,H_2 + O_2 \longrightarrow 2\,H_2O$
(c) $2\,Mg + O_2 \longrightarrow 2\,MgO$ (d) $Fe_2O_3 + 3\,CO \longrightarrow 2\,Fe + 3\,CO_2$

Assertion–Reason

Q6. **Assertion (A):** A skeletal chemical equation is balanced by changing the coefficients, not the chemical formulae.
Reason (R): Changing a subscript changes the identity of the substance, whereas changing a coefficient only changes the number of molecules. [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):** Rusting of iron is endothermic in nature.
Reason (R): As the reaction is slow, the release of heat is barely evident. [SQP 2023-24 Q17] **[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. Silver is recovered from silver nitrate solution by using copper metal. Name the type of reaction that takes place and give the chemical equation of the reaction involved. [Board 2025 (31/2/1) Q21] **[2]**

Q9. Copper powder is taken in a china dish and heated over a burner. Name the product formed, state its colour and write the chemical equation for the reaction involved. [Board 2024 (31/5/1) Q21] **[2]**

Q10. What is rancidity? Suggest one method to prevent it. [CBSE-style] **[2]**

Short Answer (SA)

Q11. An iron nail is placed in copper sulphate solution. Write the chemical equation for the reaction, name and define the type of reaction, and list two other metals which can be used in place of iron to show the same reaction with copper sulphate solution. [Board 2024 (31/5/1) Q27] **[3]**

Q12. (i) Write two observations when lead nitrate is heated in a test tube.
(ii) Name the type of reaction.
(iii) Write a balanced chemical equation to represent the above reaction. [SQP 2019-20 Q15] **[3]**

Long Answer (LA)

Q13. (I) Define oxidation and reduction in terms of oxygen and in terms of electrons.
(II) For the reaction $CuO + H_2 \longrightarrow Cu + H_2O$, identify the oxidising agent, the reducing agent, the substance oxidised and the substance reduced.
(III) Name the process in which iron articles get covered with a layer of rust when left in moist air, and write its balanced equation. [CBSE-style] **[5]**

Case Study

Case Study: Iron nails in metal salt solutions A student put an iron nail into a blue copper sulphate solution in the first test tube. After twenty minutes, the nail was covered with a reddish-brown deposit and the blue colour of the solution had faded to pale green. In the second test tube, an iron nail was placed in zinc sulphate solution, and no change was seen after the same time. The student recorded these observations to compare the reactivity of the metals.

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

(i) Write the balanced chemical equation for the reaction in the first test tube. [1]

(ii) Name the type of reaction in the first test tube, and give the reason why no change is seen in the second test tube. [1]

(iii) What do the observations tell about the reactivity of iron, copper and zinc? Explain. [2]

OR

(iii) Would copper displace iron from ferrous sulphate solution? Justify. [2]

2. Acids, Bases and Salts

Multiple Choice Questions (MCQs)

Q1. The name of the salt used to remove permanent hardness of water is: [Board 2023 (31/4/1) Q6] **[1]**
(a) $NaHCO_3$, sodium hydrogen carbonate
(b) NaCl, sodium chloride
(c) $Na_2CO_3 \cdot 10\,H_2O$, sodium carbonate decahydrate
(d) Calcium sulphate hemihydrate (Plaster of Paris)

Q2. The pH of the gastric juices released during digestion is: [Board 2026 (31/2/1) Q21] **[1]**
(a) Less than 7 (b) More than 7 (c) Equal to 7 (d) Equal to 0

Q3. How will you protect yourself from the heat generated while diluting a concentrated acid? [SQP 2021-22 Term 1 Q9] **[1]**
(a) By adding acid to water with constant stirring
(b) By adding water to acid with constant stirring
(c) By adding water to acid followed by base
(d) By adding base to acid with constant stirring

Q4. Select a pair of olfactory indicators from the following: [Board 2023 (31/5/1) Q1] **[1]**

(a) Clove oil and vanilla essence (b) Onion and turmeric
(c) Clove oil and litmus solution (d) Vanilla and methyl orange

Q5. Identify the basic salt from the following salts: [SQP 2019-20 Q11] **[1]**

(a) Na_2CO_3 (b) NH_4Cl (c) $NaNO_3$ (d) KCl

Assertion–Reason

Q6. **Assertion (A):** Dry hydrogen chloride gas does not change the colour of dry blue litmus paper.
Reason (R): Hydrogen ions are produced only in the presence of water, so dry HCl gas has no free H+ 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.

Q7. **Assertion (A):** Plaster of Paris should be stored in a moisture-proof container.
Reason (R): Plaster of Paris is a strong base which absorbs moisture from the air. [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. Sometimes the pH of our mouth falls below 5.5. Why does this happen, and why is it harmful to teeth? [Adapted from Board 2023 (31/5/1) Q28(a)] **[2]**

Q9. When sodium hydrogen carbonate is added to acetic acid in a test tube, a gas is liberated with brisk effervescence. (a) Name the gas. (b) Describe the laboratory test for this gas. [SQP 2016-17 Q34] **[2]**

Q10. An ant sting injects methanoic acid. Explain why rubbing baking soda on the sting gives relief, and write the balanced equation for the reaction. [CBSE-style] **[2]**

Short Answer (SA)

Q11. Identify the calcium compound used for plastering fractured bones. Show with a chemical equation how it is prepared from gypsum, and state the precaution that should be taken during the preparation. [SQP 2018-19 Q7; Board 2024 (31/5/1) Q34(a)(iv)] **[3]**

Q12. Baking soda is manufactured from common salt. (i) Write the equation for its preparation. (ii) What happens when baking soda is heated strongly? Write the equation. (iii) Give one use of baking soda. [CBSE-style] **[3]**

Long Answer (LA)

Q13. Chlorine gas is prepared by electrolysis of brine. (i) Write the chemical equation for the change. (ii) Identify the other products formed in the process. (iii) Give one application of each of the products. OR (iv) Explain how baking soda is prepared from common salt (Solvay process) and give two uses. [Adapted from SQP 2023-24 Q34(b)] **[5]**

Case Study

Case Study: The pH scale Acid-base indicators can be used to distinguish between an acid and a base. Universal indicator, a mixture of several indicators, shows different colours at different concentrations of acids and bases, which indicates their pH on the scale of 0 to 14. The pH of a solution is measured using pH paper, which is paper impregnated with universal indicator. Stomach fluid and lemon juice are acidic, while sodium

hydroxide and lime water are basic.

Q14. Answer the following questions based on the above. [Adapted from Board 2025 (31/2/1) Q37] **[4]**

(i) Solution P is a strong acid and solution Q is a strong base. On the pH scale, where would you place P and Q? [1]

(ii) A solution has a pH of 7. Name a compound you would use to (i) increase its pH and (ii) decrease its pH. [1]

(iii) (i) When the pH of a solution decreases from 4 to 2, what happens to the hydronium ion concentration? State the colour change shown by the pH paper. [2]

OR

(iii) A person has pain and irritation in the stomach due to indigestion. What is the nature of the fluid in the stomach? Give the common name of the medicine used, and the chemical name of milk of magnesia. [2]

3. Metals and Non-metals

Multiple Choice Questions (MCQs)

Q1. The colour of the solution observed after 30 minutes of placing zinc metal in copper sulphate solution is: [SQP 2023-24] **[1]**

(a) Blue (b) Colourless (c) Dirty green (d) Reddish brown

Q2. Four substances A, B, C and D are tested. A: melting point 295 K; conducts electricity well as a solid and also in molten or aqueous state. B: melting point 1210 K; poor conductor as a solid but good conductor in molten or aqueous state. C: melting point 1890 K; poor conductor as a solid but good conductor in molten or aqueous state. D: melting point 1160 K; poor conductor in both states. Which of the substances are ionic compounds? [Adapted from SQP 2021-22 Term 1] **[1]**

(a) A and B (b) B and C (c) A, B and D (d) A, C and D

Q3. Four statements about the reactions of oxides with dilute hydrochloric acid and aqueous sodium hydroxide are given. I. Aluminium oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide. II. Calcium oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide. III. Zinc oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide. IV. Sulphur dioxide reacts with neither dilute hydrochloric acid nor aqueous sodium hydroxide. Which statements are correct? [SQP 2025-26] **[1]**

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

Q4. The metals obtained from their molten chlorides by the process of electrolytic reduction are: [Board 2025 (31/1/1)] **[1]**

(a) Gold and silver (b) Calcium and magnesium
(c) Aluminium and silver (d) Sodium and iron

Q5. Iron articles are coated with zinc (galvanisation). Zinc protects iron from rusting even when the coating is scratched because: [CBSE-style] **[1]**

(a) zinc is more reactive than iron and corrodes in preference to iron.
(b) zinc is less reactive than iron and forms a coat that stops air from reaching iron.
(c) zinc is a non-metal and does not react with oxygen or moisture.
(d) zinc reacts with iron to form a harder alloy on the surface.

Assertion–Reason

Q6. **Assertion (A):** On adding dilute HCl to a substance X, a colourless gas is produced which gives a pop sound when a burning match stick is brought near it.
Reason (R): In this reaction metal X is displaced by hydrogen. [SQP 2024-25] **[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):** Sodium and potassium are stored immersed in kerosene.
Reason (R): Sodium and potassium react vigorously with oxygen and moisture of the air. [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. Iron filings are added to four test tubes A, B, C and D containing aqueous solutions of $ZnSO_4$, $CuSO_4$, $FeSO_4$ and $Al_2(SO_4)_3$ respectively. (i) In which test tube will a reaction be observed, and why?
(ii) Write a balanced equation for the reaction involved. [Adapted from Board 2026 (31/2/1)] **[2]**

Q9. Aluminium oxide is an amphoteric oxide. (a) Write the balanced equation for its reaction with dilute hydrochloric acid.
(b) Write the balanced equation for its reaction with aqueous sodium hydroxide. [CBSE-style] **[2]**

Q10. Aluminium and copper are used for making cooking utensils. Give two properties of metals that make them suitable for this purpose. [CBSE-style] **[2]**

Short Answer (SA)

Q11. List the two main differences between roasting and calcination, with suitable chemical equations. How is the metal reduced from the product obtained after roasting or calcination of the ore? Write the chemical equation for the reaction involved. [Board 2023 (31/2/1)] **[3]**

Q12. A reddish-brown metal X, when heated in air, gives a black compound Y. Y on heating in the presence of hydrogen gives X back. X is refined by electrolysis and the refined form is used in electrical wiring. Identify X and Y. Draw a well-labelled diagram of the electrolytic refining of X. [SQP 2023-24 (Q28 OR)] **[3]**

Long Answer (LA)

Q13. Metal X is found in nature as its sulphide XS and is used in the galvanisation of iron articles. Identify the metal X. How is this sulphide ore converted into the metal? Explain with equations. [SQP 2019-20 (Q25)] **[5]**

Case Study

Case Study: Ionic compounds Ionic compounds are formed when a metal atom transfers electrons to a non-metal atom, so that both attain a stable octet. The melting points of some of these compounds are: NaCl 1074 K, LiCl 887 K, CaCl2 1045 K, CaO 2850 K and MgCl2 981 K. Their boiling points are: NaCl 1686 K, LiCl 1600 K, CaCl2 1900 K, CaO 3120 K and MgCl2 1685 K. Ionic compounds have high melting and boiling points because strong electrostatic forces hold the ions together. Study the data and answer the questions.

Q14. Answer the following questions based on the above. [Board 2023 (31/4/1)] **[4]**

(i) Show the electron transfer in the formation of magnesium chloride (Mg = 12, Cl = 17). [1]

(ii) List two properties of ionic compounds other than their high melting and boiling points. [1]

(iii) (a) While forming sodium chloride, how does a sodium atom attain a stable configuration? [2]

OR

(iii) Give reasons: (i) why ionic compounds in the solid state do not conduct electricity; (ii) what happens

at the cathode when electricity is passed through aqueous sodium chloride. [2]

4. Carbon and its Compounds

Multiple Choice Questions (MCQs)

Q1. Consider the following four compounds: A: CH_3-CH_3 (ethane) B: $CH_2=CH_2$ (ethene) C: $CH_3-CH_2-CH_3$ (propane) D: $CH_2=CH-CH_3$ (propene) Which statement is correct? [Adapted from SQP 2022-23 (Q7)] **[1]**
(a) A and B are unsaturated hydrocarbons.
(b) C and D are saturated hydrocarbons.
(c) Addition of hydrogen in the presence of a catalyst changes B to A.
(d) Addition of alkaline potassium permanganate changes C to D.

Q2. Four organic compounds have molecular formulae: P: C_4H_{10} Q: C_4H_8 R: C_5H_{12} S: C_5H_{10} Which pair will show the same chemical properties? [CBSE-style] **[1]**
(a) P and Q (b) P and R (c) Q and S (d) R and S

Q3. In a soap micelle, the hydrocarbon (hydrophobic) tails: [CBSE-style] **[1]**
(a) face outwards towards water
(b) point inwards towards the oil/dirt at the centre
(c) lie along the water surface only
(d) attach to calcium ions

Q4. Which of the following is not observed in a homologous series? [SQP 2020-21] **[1]**
(a) Change in chemical properties
(b) Difference of $-CH_2$ and 14 u molecular mass
(c) Gradation in physical properties
(d) Same functional group

Q5. Vishakha performed a saponification reaction in the laboratory and wrote the following comments: (i) Soap is a salt of a fatty acid. (ii) Heat is absorbed in this reaction. (iii) The reaction mixture is basic in nature. (iv) These are neutralisation reactions. The correct statements are: [SQP 2016-17] **[1]**
(a) (i) and (iii) (b) (ii) and (iv)
(c) (i) and (ii) (d) (i), (ii) and (iii)

Assertion–Reason

Q6. **Assertion (A):** Carbon compounds can form chains, branched and ring structures.
Reason (R): Carbon exhibits the property of catenation. [Board 2026 (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):** n-Butane ($CH_3-CH_2-CH_2-CH_3$) and 2-methylpropane ($CH_3-CH(CH_3)-CH_3$) are structural isomers of each other.
Reason (R): Structural isomers have the same molecular formula but different structural formulae. [Adapted from SQP 2019-20 (Q13)] **[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. Carbon forms millions of compounds whereas silicon, which is just below it in the periodic table, forms only a few compounds. Explain the reason for the difference. [SQP 2026-27] **[2]**

Q9. Write the name and one use of the product formed when ethanol reacts with ethanoic acid in the presence of a few drops of conc. H_2SO_4. [CBSE-style] **[2]**

Q10. Name the functional group and give the general formula of: (a) alkynes, (b) carboxylic acids. [CBSE-style] **[2]**

Short Answer (SA)

Q11. An organic compound X is a liquid at room temperature, a very good solvent, and has the molecular formula C_2H_6O. On oxidation X gives Y, which gives a brisk effervescence with $NaHCO_3$. X reacts with Y in the presence of conc. H_2SO_4 to give a compound Z with a pleasant smell. Identify X, Y and Z, and write chemical equations for the formation of Y and Z. [SQP 2016-17 (Q8)] **[3]**

Q12. Convert: (a) ethene to ethane, (b) ethanol to ethyl ethanoate, (c) ethanoic acid to sodium ethanoate. Give one condition each. [CBSE-style] **[3]**

Long Answer (LA)

Q13. A compound A ($C_2H_4O_2$) reacts with sodium metal to form a compound B and evolves a gas which burns with a pop sound. A on treatment with an alcohol C in the presence of an acid forms a sweet-smelling compound D ($C_4H_8O_2$). Addition of NaOH to D gives back B and C. Identify A, B, C and D, and write the reactions involved. [SQP 2018-19 (Q17)] **[5]**

Case Study

Case Study: Two unlabelled bottles In a school laboratory, a lab attendant found two unlabelled bottles, one containing ethanol and the other ethanoic acid. A student was asked to identify them using simple chemical tests.

Q14. Answer the following questions based on the above. [SQP 2024-25 (Q37 VI alt)] **[4]**

(i) Distinguish between ethanol and ethanoic acid experimentally. [1]

(ii) Give the IUPAC name of the first member of the alkene series, which is formed by removing water from ethanol with conc. sulphuric acid. Illustrate the change with an equation. [1]

(iii) "All combustion reactions are oxidation but all oxidation reactions are not combustion." Justify. [2]

OR

(iii) Write the equation for the reaction of ethanoic acid with sodium carbonate and name the gas evolved. [2]

5. Life Processes

Multiple Choice Questions (MCQs)

Q1. A sportsman, after a long break from his routine exercise, suffered muscular cramps during a heavy exercise session. This happened due to: [SQP 2023-24] **[1]**

(a) lack of carbon dioxide and formation of pyruvate.

(b) presence of oxygen and formation of ethanol.

(c) lack of oxygen and formation of lactic acid.

(d) lack of oxygen and formation of carbon dioxide.

Q2. During photosynthesis, what happens to carbon dioxide and water as glucose is formed? [SQP 2026-27] **[1]**

(a) Carbon dioxide gains hydrogen, while water loses electrons.
(b) Carbon dioxide loses oxygen, while water gains oxygen.
(c) Carbon dioxide is oxidised, while water is reduced.
(d) Both carbon dioxide and water undergo reduction.

Q3. During cellular oxidation of glucose, ATP is produced along with other products. Which of the following events is associated with production of the maximum number of ATP molecules per molecule of glucose? Synthesis of [SQP 2024-25] **[1]**

(a) ethanol in yeast
(b) lactic acid in muscle cells
(c) carbon dioxide in yeast cells
(d) carbon dioxide in human cells

Q4. In the transverse section of the leaf described in the figure, identify the layers of cells where maximum photosynthesis occurs. [SQP 2022-23] **[1]**

[Figure: Transverse section of a leaf with four layers labelled I (upper epidermis), II (palisade mesophyll), III (spongy mesophyll) and IV (lower epidermis).]

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

Q5. What is common between the extensive network of blood vessels around the walls of alveoli and in the glomerulus of a nephron? [SQP 2021-22 Term 1] **[1]**

(a) Thick walled arteries richly supplied with blood
(b) Thin walled veins poorly supplied with blood
(c) Thick walled capillaries poorly supplied with blood
(d) Thin walled capillaries richly supplied with blood

Assertion–Reason

Q6. **Assertion (A):** The rate of breathing in aquatic organisms is much lower than in terrestrial organisms.
Reason (R): The amount of oxygen dissolved in water is less as compared to the amount of oxygen in air. [SQP 2026-27] **[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 walls of the atria are thicker than those of the ventricles.
Reason (R): The ventricles have to pump blood into various organs at high pressure. [Board 2023 (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 process of digestion of food in human beings, two protein-digesting enzymes are secreted. Name the enzymes along with the glands that secrete them. [Board 2023 (31/5/1)] **[2]**

Q9. Differentiate between alveoli and nephron on the basis of (i) structure and location and (ii) function. [Adapted from SQP 2024-25 Q22] **[2]**

Q10. State the events occurring during the process of photosynthesis. Is it essential that these steps take place one after the other immediately? [SQP 2020-21] **[2]**

Q11. (a) List the events in proper sequence that take place during the process of photosynthesis. [Board 2023 (31/5/1)] **[2]**

Short Answer (SA)

Q12. A variegated leaf with green and pale yellow patches is used for an experiment to prove that chlorophyll is required for photosynthesis. Before the experiment, the green portions (A) and the pale yellow portions (B) are observed. What will be the colour of A just before and after the starch test? Also write the equation of photosynthesis, and mark, as well as validate, from which molecule the by-product is obtained. [SQP 2018-19] **[3]**

Q13. (a) With the help of an activity, explain the action of saliva on the food we eat. (b) Why is bile juice important in the process of digestion? [Board 2023 (31/5/1)] **[3]**

Long Answer (LA)

Q14. (i) Name two chambers of the human heart which contain oxygenated blood and two which contain deoxygenated blood. (ii) Explain the process of double circulation with the help of a flow chart. [Adapted from SQP 2019-20 Q27 (heart figure converted to text)] **[5]**

Case Study

Case Study: Neha's breakfast Neha ate boiled sweet potatoes and boiled eggs for breakfast. Sweet potatoes are rich in starch, and eggs are rich in proteins and contain some fats. Each type of food is digested in different parts of the alimentary canal. Digested food is mainly absorbed in the small intestine, which is long and has a large inner surface.

Q15. Answer the following questions based on the above. [Adapted from SQP 2025-26 Q15] **[4]**

(i) Which of these foods is rich in protein, in which part of the alimentary canal is its digestion started, and which enzyme and gland are involved? [1]

(ii) Where is the digestion of starch started, and by which enzyme? [1]

(iii) Which part of the alimentary canal will contain the maximum amount of digested food when digestion is complete, and how is the digested food taken up? [2]

OR

(iii) Which of these foods contains fats, and how is it digested? [2]

6. Control and Coordination

Multiple Choice Questions (MCQs)

Q1. The blood glucose level in a patient was very high. It may be due to inadequate secretion of: [SQP 2025-26; SQP 2019-20 (concept)] **[1]**

(a) growth hormone from pituitary gland (b) oestrogen from ovary
(c) insulin from pituitary gland (d) insulin from pancreas

Q2. Growth of a plant root towards water is an example of: [CBSE-style] **[1]**

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

Q3. A shoot is placed so that gravity acts on it. Which of the following correctly describes the response of the shoot? [CBSE-style] **[1]**

(a) Shoot grows downwards; positive geotropism
(b) Shoot grows upwards; positive geotropism
(c) Shoot grows upwards; negative geotropism
(d) Shoot grows downwards; negative geotropism

Q4. Adapted from the printed question (stem illegible in the scan). A person touches a hot object and withdraws the hand unconsciously. Which sequence correctly shows the reflex arc? [Board 2024 (31/5/1)] **[1]**

(a) Receptors in skin → Motor neuron → Relay neuron → Sensory neuron → Effector muscle in arm
(b) Receptors in skin → Relay neuron → Sensory neuron → Motor neuron → Effector muscle in arm
(c) Receptors in skin → Sensory neuron → Relay neuron → Motor neuron → Effector muscle in arm
(d) Receptors in skin → Sensory neuron → Effector muscle in arm → Motor neuron → Relay neuron

Q5. A child has stunted growth, but normal body proportions. The cause is most likely the under-secretion of: [CBSE-style] **[1]**
(a) Growth hormone in childhood, from the pituitary gland
(b) Adrenaline in childhood, from the adrenal gland
(c) Insulin in childhood, from the pancreas
(d) Testosterone in childhood, from the testes

Assertion–Reason

Q6. **Assertion (A):** Chemical transmitters are needed for an impulse to pass from one neuron to the next.
Reason (R): There is a gap called the synapse between the axon end of one neuron and the dendrite of the next neuron. [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 shoot of a plant grows upwards, against the pull of gravity.
Reason (R): Auxin accumulates on the lower side of the shoot and promotes cell elongation there. [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) The timing and the amount of a hormone secreted by a gland are regulated in the human body. Justify this statement with the help of an example. [Board 2026 (31/2/1)] **[2]**

Q9. Name the parts of the hind-brain of the human brain. Which part of the hind-brain controls involuntary actions such as blood pressure and salivation? [Board 2025 (31/2/1)] **[2]**

Q10. (a) Name the gland which secretes thyroxine.
(b) Name the disease caused in adults when the thyroxine level is low, and state its effect on the body. [CBSE-style] **[2]**

Short Answer (SA)

Q11. (a) Define hormone.
(b) "Hormones should be secreted in precise quantities. We have a feedback mechanism through which this is done." With the help of an example, justify the statement. [Board 2025 (31/2/1)] **[3]**

Q12. Explain with an example how positive phototropism and negative geotropism are shown by a plant shoot, using the role of auxin. [CBSE-style] **[3]**

Long Answer (LA)

Q13. (a) (i) List three points of difference between nervous and hormonal mechanisms for control and coordination in animals.
(ii) How are auxins related with the bending of a plant shoot towards unidirectional light? Explain. [Board 2023 (31/2/1)] **[5]**

Case Study

Case Study: Growth of a boy Rohan, a 12-year-old boy, is much shorter than other boys of his age. His doctor noted that his body proportions are normal, but his height is far below the expected range for his age. Blood tests showed that the level of one hormone, which controls the growth and development of bones and muscles, was much lower than normal. The hormone is made by a small gland at the base of the brain. The doctor explained that the condition can be treated with hormone therapy if it is detected early.

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

(i) Name the hormone which is deficient in Rohan and the gland which secretes it. [1]

(ii) Name the disorder shown by Rohan. [1]

(iii) Explain how the level of growth hormone is regulated in the body. Give a reason for the regulation. [2]

OR

(iii) Explain how the level of thyroxine is regulated by TSH from the pituitary gland. [2]

7. How do Organisms Reproduce?

Multiple Choice Questions (MCQs)

Q1. The vas deferens and the oviduct are both targets for surgical contraception (vasectomy and tubectomy respectively). Analysing the process of reproduction, what common biological event is prevented by blocking both these structures? [SQP 2026-27] **[1]**

(a) The production of gametes (sperm and egg).
(b) The implantation of the fertilized egg into the uterine wall.
(c) The successful meeting and fusion of the male and the female gametes.
(d) The release of hormones - testosterone and estrogen.

Q2. The correct/true statement(s) for a bisexual flower is/are: (i) They possess both stamen and pistil. (ii) They possess either stamen or pistil. (iii) They exhibit either self-pollination or cross-pollination. (iv) They cannot produce fruits on their own. [Board 2025 (31/1/1)] **[1]**

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

Q3. Spirogyra, despite being a multi-cellular organism, still shows a simple reproductive method. Select the correct option with regard to reproduction in Spirogyra. [Board 2026 (31/2/1)] **[1]**

(a) Asexual reproduction by division of cells into two cells
(b) Sexual reproduction by division of cells into many cells
(c) Asexual reproduction by breaking up of Spirogyra filaments into smaller parts
(d) Sexual reproduction by the formation of gametes after meiosis of cells of filaments followed by fusion of male and female gametes

Q4. Which of the following flowers contains both stamens and carpels? [Adapted from SQP 2017-18] **[1]**

(a) Maize (b) Hibiscus (c) Cucumber (d) Watermelon

Q5. Plasmodium reproduces asexually in the human host. In this process the nucleus divides several times before the cytoplasm divides into many daughter cells. This process is called: [CBSE-style] **[1]**

(a) Binary fission (b) Multiple fission (c) Budding (d) Fragmentation

Assertion–Reason

Q6. **Assertion (A):** Condoms help prevent sexually transmitted diseases.
Reason (R): A condom forms a barrier that prevents the exchange of body fluids during sexual contact. [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):** Yeast reproduces by budding.
Reason (R): Budding is a type of binary fission. [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. Define pollination. Differentiate between self-pollination and cross-pollination. [CBSE-style] **[2]**

Q9. (a) Trace the path a male gamete takes to fertilise a female gamete after being released from the penis.
(b) State the number of sets of chromosomes present in a zygote. [SQP 2021-22 (Term 2)] **[2]**

Q10. (a) Write one function each of the following, in a seed: (i) seed coat (ii) cotyledon (iii) radicle (iv) plumule. [Board 2025 (31/2/1)] **[2]**

Short Answer (SA)

Q11. List any four methods of contraception used by humans. How does the use of three of these methods have a direct effect on the health and prosperity of a family? [SQP 2016-17] **[3]**

Q12. List three ways in which a sexually transmitted disease can be prevented. [CBSE-style] **[3]**

Long Answer (LA)

Q13. (i) Describe the various steps involved in the process of binary fission with the help of a diagram.
(ii) Why do multicellular organisms use a complex way of reproduction? [SQP 2019-20] **[5]**
[Figure: Labelled stages of binary fission in amoeba: nucleus duplicates, nuclei separate, cytoplasm divides, two daughter cells.]

Case Study

Case Study: Female reproductive system When a girl is born, her ovaries already contain thousands of immature eggs. On reaching puberty, some of these start maturing, and one matured egg is released every month by one of the ovaries. The two fallopian tubes open into an elastic, bag-like organ called the uterus. Every month the uterus prepares itself to receive and nurture a growing embryo. If fertilisation does not take place, the lining of the uterus is shed.

Q14. Answer the following questions based on the above. [Board 2025 (31/2/1)] **[4]**

(i) (a) Write the site of fertilisation in the human female. [1]

(ii) (b) How does the uterus prepare itself to receive and nurture the growing embryo? Explain. [1]

(iii) (c) (i) What happens when the egg is not fertilised? [2]

OR

(iii) (c) (ii) How does the developing embryo get nutrition from the mother's blood? Explain. [2]

8. Heredity

Multiple Choice Questions (MCQs)

Q1. A cross between a pea plant with white flowers (vv) and a pea plant with violet flowers (VV) gives F_1 progeny, which are then self-pollinated. The ratio of violet to white flowers in the F_2 progeny will be: [Board 2023 (31/4/1)] **[1]**

(a) 1 : 1 (b) 2 : 1 (c) 3 : 1 (d) 1 : 3

Q2. In the F_2 generation of a monohybrid cross, the genotypic ratio TT : Tt : tt is: [CBSE-style] **[1]**

(a) 3 : 1 (b) 1 : 2 : 1 (c) 1 : 1 (d) 9 : 3 : 3 : 1

Q3. A man (XY) and a woman (XX) have a child. The probability that the child is a girl is: [CBSE-style] **[1]**

(a) 25% (b) 50% (c) 75% (d) 100%

Q4. Consider the following two statements:
(i) The trait that expresses itself in the F_1 generation.
(ii) The trait that keeps on passing from one generation to another.
The appropriate terms for statements (i) and (ii) respectively are: [Board 2023 (31/5/1)] **[1]**

(a) Recessive trait, Dominant trait (b) Dominant trait, Recessive trait
(c) Dominant trait, Inherited trait (d) Recessive trait, Inherited trait

Q5. The genotype of a pure dwarf pea plant is: [CBSE-style] **[1]**

(a) TT (b) Tt (c) tt (d) TT or Tt

Assertion–Reason

Q6. **Assertion (A):** A geneticist crossed a pea plant having violet flowers with a pea plant with white flowers; he got all violet flowers in the first generation.
Reason (R): White colour gene is not passed on to the next generation. [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):** The sex of a human child is determined by the chromosome it inherits from its father.
Reason (R): The father has both an X and a Y chromosome, so the child can inherit either. [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. Sahil crossed tall pea plants (TT) with short pea plants (tt) and obtained all tall plants in the F_1 generation.
(a) What will be the set of genes present in the F_1 generation?
(b) Give reason why only tall plants are observed in the F_1 progeny. [Adapted from SQP 2021-22 (Term 2)] **[2]**

Q9. Using a cross, show how the sex of a human child is determined. Write the chromosome combinations of the parents and possible progeny. [CBSE-style] **[2]**

Q10. Long ears (L) are dominant over short ears (l). A pure long-eared father (LL) and a pure short-eared mother (ll) have an F_1 child (Ll). This child marries an unrelated individual of the same genotype. Show the cross and write the ratio of genotypes in the F_2 generation. [Adapted from SQP 2024-25 (Q30 A)] **[2]**

Short Answer (SA)

Q11. The gene for free earlobe is dominant over the gene for attached earlobe. A man with attached earlobes marries a woman having free earlobes. 50% of their children have free earlobes and 50% have attached earlobes.
(a) Explain the inheritance of this trait and write the trait combinations of the progeny.
(b) Write the gene combinations of the father and the mother in the above case. [Board 2025 (31/2/1)] **[3]**
[Figure: Figure X shows an attached earlobe, where the lobe joins the side of the head; Figure Y shows a free earlobe, where the lobe hangs freely.]

Q12. In a pea plant, the trait of flowers bearing purple colour (PP) is dominant over white colour (pp). Explain the inheritance pattern of F_1 and F_2 generations with the help of a cross following the rules of inheritance of traits. State the visible characters of F_1 and F_2 progenies. [SQP 2019-20] **[3]**

Long Answer (LA)

Q13. A pure round yellow pea plant (RRYY) is crossed with a pure wrinkled green pea plant (rryy). Explain the F_1 and F_2 generations with the help of a Punnett square, and state the law explaining the new combinations in the F_2 generation. [CBSE-style] **[5]**

Case Study

Case Study: Inheritance of eye colour Pooja has green eyes while her parents and brother have black eyes. Pooja's husband Ravi has black eyes, while his mother has green eyes and his father has black eyes. Eye colour is controlled by one pair of genes: B for black eyes and b for green eyes. Use only the information given above to answer the questions.

Q14. Answer the following questions based on the above. [SQP 2022-23] **[4]**

(i) (a) On the basis of the above information, is the green eye colour a dominant or recessive trait? Justify your answer. [1]

(ii) (b) What is the possible genetic makeup of Pooja's brother's eye colour? [1]

(iii) (c) What is the probability that the offspring of Pooja and Ravi will have green eyes? Show the inheritance of eye colour in the offspring with a suitable cross. [2]

OR

(iii) 50% of the offspring of Pooja's brother are green-eyed. His wife has green eyes. Show with a cross how this is possible. [2]

9. Light – Reflection and Refraction

Multiple Choice Questions (MCQs)

Q1. A converging lens is used to obtain a sharp image of an object on a screen. In which position of the object is a real, inverted and diminished image formed on the screen? [Adapted from SQP 2021-22 Term 1 Q18 (figure-based option rewritten in words)] **[1]**
(a) Object at the principal focus
(b) Object between the optical centre and the focus
(c) Object beyond twice the focal length
(d) Object exactly at twice the focal length, with image of same size

Q2. A student wants to determine the focal length of a convex lens using sunlight. Which practical procedure will give the most accurate result? [SQP 2026-27 Q30] **[1]**
(a) Move the lens close to a wall and measure the blurred circle
(b) Hold the lens above a sheet of paper and adjust until the smallest, brightest spot is formed
(c) Measure the thickness of the lens with a scale
(d) Look through the lens at a distant object

Q3. A ray of light passes through a rectangular glass slab placed in air. Which statement describes the emergent ray? [Adapted from SQP 2016-17 Q30] **[1]**
(a) Bent towards the normal, so the angle of emergence is smaller than the angle of incidence
(b) Parallel to the incident ray but laterally displaced
(c) Deviated by 90° from the direction of the incident ray
(d) Bent away from the normal, so the angle of emergence is greater than the angle of incidence

Q4. If a virtual, erect and enlarged image is formed by a lens, which option is correct? [Adapted from SQP 2021-22 Term 1 Q18 (VI alternative)] **[1]**
(a) It is a concave lens and the object is placed between the optical centre and the focus
(b) It is a convex lens and the object is placed between the focus and the centre of curvature
(c) It is a convex lens and the object is placed between the optical centre and the focus
(d) It is a concave lens and the object is placed between the focus and the centre of curvature

Q5. A ray of light from air enters a spherical glass slab and passes through its centre. The angle of incidence at the point where it enters the slab is: [Adapted from SQP 2021-22 Term 1 (hemispherical/spherical slab item, VI alternative)] **[1]**
(a) 0° (b) 30° (c) 45° (d) 90°

Assertion–Reason

Q6. **Assertion (A):** A point object is placed at a distance of 26 cm from a convex mirror of focal length 26 cm. The image will not form at infinity.
Reason (R): For this system, the mirror equation gives v = infinity. [SQP 2025-26 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):** A convex lens can form a magnified virtual image of an object.
Reason (R): A convex lens forms a virtual, erect and magnified image when the object lies between its optical centre and focus. [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 object of height 1.2 m is placed in front of a concave mirror of focal length 20 cm so that a real image is formed 60 cm from the mirror. Find the position of the object and the height of the image. [SQP 2017-18 Q4] **[2]**

Q9. An object is placed at a distance of 60 cm from a concave lens of focal length 30 cm. Use the lens formula to find the position of the image. [Board 2025 (31/1/1) Q24] **[2]**

Q10. A depressed (concave) mirror forms an erect, enlarged image of a face. It is placed on a stand at the 15 cm mark of a metre scale. A sharp, inverted image of a distant tree forms on a screen at the 35 cm mark. (a) Name the mirror and find its focal length. (b) Why is the image of the distant tree sharp at the 35 cm mark? [SQP 2018-19 Q27 (OR part)] **[2]**

Q11. (a) What type of lens always forms a virtual, erect and diminished image? (b) List one use of such a lens. [SQP 2024-25 Q24 (A and B)] **[2]**

Short Answer (SA)

Q12. Rohit focused the image of a candle flame on a white screen using a convex lens. The candle, lens and screen were at 26.0 cm, 50.0 cm and 74.0 cm on a scale. (i) What is the focal length of the convex lens? (ii) Where will the image be formed if he shifts the candle to 38 cm? (iii) Draw a ray diagram for case (ii). [SQP 2017-18

Q12] **[3]**

Q13. (a) An object of height 3 cm is focussed on a white screen using a concave mirror of focal length 12 cm. The object is 18 cm from the mirror. Find (i) the image distance and (ii) the height of the image. [Board 2023 (31/2/1) Q31] **[3]**

Long Answer (LA)

Q14. A thin lens of focal length 5 m is shown. (i) What kind of lens is it? (ii) If a real inverted image is to be formed by this lens at a distance of 7 m from the optical centre, calculate where the object should be placed. (iii) Draw a neatly labelled diagram of this image formation. [SQP 2023-24 Q36] **[5]**

Case Study

Case Study: Optical density and speed of light The ability of a medium to refract light is expressed in terms of its optical density. The medium with the larger refractive index is optically denser, and the speed of light in a medium is inversely proportional to its optical density. The absolute refractive index of a medium is $n = \frac{c}{v}$, where $c = 3 \times 10^8$ m/s is the speed of light in vacuum.

Q15. Answer the following questions based on the above. [Board 2023 (31/4/1) Q39] **[4]**

(i) Determine the speed of light in diamond whose refractive index with respect to vacuum is 2.42. [1]

(ii) The refractive indices of glass, water and carbon disulphide are 1.5, 1.33 and 1.62. For the same angle of incidence, write these media in increasing order of the angle of refraction. [1]

(iii) The speeds of light in glass and in water are 2×10^8 m/s and 2.25×10^8 m/s. (a) Which medium is optically denser? (b) Find the refractive index of water with respect to glass. [2]

OR

(iii) The absolute refractive indices of water and glass are $\frac{4}{3}$ and $\frac{3}{2}$. If the speed of light in glass is 2×10^8 m/s, find the speed of light in (i) vacuum and (ii) water. [2]

10. The Human Eye and the Colourful World

Multiple Choice Questions (MCQs)

Q1. An old person is suffering from an eye defect caused by weakening of the ciliary muscles and diminishing flexibility of the eye lens. If the defect of vision is 'a' which can be corrected by lens 'b', then 'a' and 'b' respectively are [Board 2025 (31/1/1)] **[1]**

(a) Hypermetropia and convex lens (b) Presbyopia and bifocal lens
(c) Myopia and concave lens (d) Myopia and bifocal lens

Q2. The least distance of distinct vision for a normal human eye is [CBSE-style] **[1]**

(a) 2.5 cm (b) 25 cm (c) 2.5 m (d) infinity

Q3. When light from the Sun enters the atmosphere, it strikes extremely fine particles, which deflect the rays of light in all possible directions. This is due to [SQP 2023-24] **[1]**

(a) reflection of light (b) atmospheric refraction
(c) scattering of light (d) dispersion of light

Q4. The phenomena of light involved in the formation of a rainbow are [Board 2024 (31/5/1)] **[1]**

(a) Refraction, reflection and dispersion
(b) Refraction, dispersion and internal reflection
(c) Reflection, dispersion and internal reflection
(d) Refraction, dispersion, scattering and total internal reflection

Q5. Pooja projects a narrow beam of white light through an equilateral glass prism and sees many colours as

patches on a screen. When she replaces the source with a red light source, she sees only a red patch. The best explanation is that [Adapted from SQP 2021-22 Term 1] **[1]**

(a) red colour does not refract in a prism

(b) red light is made of a single colour, so it cannot be split further

(c) the prism is defective for red light

(d) the prism is opaque to all colours except red

Assertion–Reason

Q6. **Assertion (A):** The focal length of the eye lens decreases when we look at objects placed close to the eye.
Reason (R): To focus a nearby object on the retina, the eye lens must become more curved so that it is more converging. [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 sky appears blue to us on a clear day.
Reason (R): Air molecules scatter light of longer wavelengths more strongly than light of shorter wavelengths. [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) A diagram shows parallel rays from a nearby object forming an image behind the retina of an eye instead of on it. Identify the defect of vision, list its two causes and name the type of lens used for its correction. (b) The lens used is also used in some common optical instruments: name one. [Board 2023 (31/4/1)] **[2]**

[Figure: schematic eye; rays from a nearby point converge too slowly and meet behind the retina, indicating hypermetropia.]

Q9. A student can read a book comfortably at 25 cm but cannot read the blackboard from the last bench of the classroom. Name the defect of vision. Calculate the power of the corrective lens if the far point of the student's eye is 50 cm. [CBSE-style] **[2]**

Q10. (a) Define the power of accommodation of the human eye. (b) Name the part of the eye that brings it about. [CBSE-style] **[2]**

Short Answer (SA)

Q11. A diagram shows a corrective measure for a defect of vision: a convex lens is placed in front of an eye, and rays from a nearby point on the left are converged by this lens so that they focus exactly on the retina. (i) Identify the defect of vision and state the kind of lens used to correct it. (ii) Draw and label a ray diagram showing the defect of vision before correction. [SQP 2025-26] **[3]**

[Figure: schematic eye; a convex lens in front of the eye converges rays from a nearby object onto the retina; dashed lines show that without the lens the rays would have met behind the retina.]

Q12. (a) A lens of focal length 5 cm is being used by Debashree in the laboratory as a magnifying glass. Her least distance of distinct vision is 25 cm. (i) What magnification is obtained by using the glass? (ii) She keeps a book at a distance of 10 cm from her eyes and tries to read, but is unable to read. Give the reason. (b) Her classmate Ravi keeps the same book at a distance of 10 cm from the eyes of his friend Hari, who also cannot read it. State the defect Hari could be suffering from and the lens that would correct it. [SQP 2022-23] **[3]**

Long Answer (LA)

Q13. Noopur needs a lens of power -4.5 D for correction of her vision. (a) What kind of defect in vision is she suffering from? (b) What is the focal length and nature of the corrective lens? (c) Draw ray diagrams showing the defective eye and the correction for this defect. (d) What are the causes of this defect? [SQP 2017-18] **[5]**

[Figure: (1) myopic eye: rays from a distant object converge in front of the retina; (2) correction: a concave lens before the eye diverges the rays so they focus on the retina.]

Case Study

Case Study: The eye check-up During an eye-screening camp at school, an optometrist tested four students. Aarav could read the eye chart at 6 m but the print in his book blurred when he held it at 15 cm. Bhavna could read her book at 25 cm but the eye chart at 6 m appeared blurred. Chetan, aged 55, had normal distance vision but needed to hold the newspaper at 60 cm. Divya's vision was normal in every test: she could read both the chart and the book at 25 cm. The optometrist noted the near point (25 cm) and far point (infinity) of a normal eye before prescribing lenses.

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

(i) Aarav can read the chart at 6 m but the print blurs when held at 15 cm. State whether this indicates a defect of vision, and justify your answer. [1]

(ii) Name the defect Bhavna has and the type of lens that corrects it. [1]

(iii) (i) Name Chetan's defect and its cause. (ii) Chetan's distance vision is normal; state the kind of lens that corrects his reading problem and the type of spectacle lens used when a person has both Chetan's defect and myopia. [2]

OR

(iii) (i) State the values of the near point and far point of Divya's normal eye. (ii) The optometrist says the eye "changes its focal length" to see near and far objects: name this ability and the muscles that produce it. [2]

11. Electricity

Multiple Choice Questions (MCQs)

Q1. A conductor allows a current of 0.5 A when a potential difference of 3 V is applied across its ends, at constant temperature. Its resistance is: [CBSE-style] **[1]**

(a) $1.5\,\Omega$ (b) $6\,\Omega$ (c) $0.17\,\Omega$ (d) $3.5\,\Omega$

Q2. The resistance of a resistor is reduced to half of its initial value. If other parameters of the electrical circuit remain unaltered, the amount of heat produced in the resistor will become: [Board 2023 (31/4/1)] **[1]**

(a) Four times (b) Two times (c) Half (d) One fourth

Q3. Four identical resistors of $12\,\Omega$ each are joined in series to form a closed square ABCD, one resistor per side. The resistance between the adjacent corners A and B is: [Adapted from Board 2025 (31/2/1) Q15] **[1]**

(a) $48\,\Omega$ (b) $36\,\Omega$ (c) $9\,\Omega$ (d) $6\,\Omega$

Q4. Two resistors of $6\,\Omega$ each are connected in parallel. Their equivalent resistance is: [CBSE-style] **[1]**

(a) $12\,\Omega$ (b) $3\,\Omega$ (c) $6\,\Omega$ (d) $0.33\,\Omega$

Q5. In the external circuit of a cell, the conventional current flows: [CBSE-style] **[1]**

(a) from the negative terminal to the positive terminal of the cell
(b) from the positive terminal to the negative terminal of the cell
(c) in both directions alternately
(d) only through the resistors, not through the connecting wires

Assertion–Reason

Q6. **Assertion (A):** Nichrome is an alloy which is commonly used in electrical heating devices such as electric irons, toasters, etc.
Reason (R): The resistivity of nichrome is high and its resistance decreases with increase in temperature. [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 equivalent resistance of two unequal resistors connected in parallel is less than the smaller of the two.
Reason (R): In a parallel combination the reciprocal of the equivalent resistance is the sum of the reciprocals of the individual resistances. [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 current I through a resistor and the corresponding potential difference V across it are: I = 0.5, 1.0, 2.0, 3.0, 4.0 A and V = 1.6, 3.4, 6.7, 10.2, 13.2 V. Plot a graph between V and I and calculate the resistance of the resistor. [SQP 2017-18 (Q26)] **[2]**

Q9. Establish the relationship between 1 kWh and 1 joule. [Board 2023 (31/5/1) Q36(c)] **[2]**

Q10. Two lamps, one of 60 W and one of 100 W (both rated 220 V), are connected in series across a 220 V supply. Which lamp glows more brightly, and why? [CBSE-style] **[2]**

Short Answer (SA)

Q11. Four 1.5 V cells are connected in series with a 5 Ω, a 10 Ω and a 15 Ω resistor and a plug key. When the key is closed, find (I) the electric current in the circuit and (II) the potential difference across the 10 Ω resistor. [Board 2024 (31/5/1) Q36(a)(ii)] **[3]**

Q12. The three resistors can each withstand a maximum power of 16 W without melting. Find the maximum current that can flow through the circuit. [SQP 2017-18 (Q7)] **[3]**
[Figure: Circuit with a cell, a key and an ammeter in series with a 4 Ω resistor, followed by two 8 Ω resistors in parallel; a voltmeter is connected across the parallel pair.]

Long Answer (LA)

Q13. (A) A 100 Ω resistor is in series with two 25 Ω resistors in parallel. The power dissipated in the 100 Ω resistor is 81 W. Calculate (i) the current in the circuit, (ii) the reading of voltmeter V2, and (iii) the reading of voltmeter V1. [SQP 2025-26 (Q39 A; option B adapted from VI alternative of Q39)] **[5]**
[Figure: A battery supplies a 100 Ω resistor in series with two 25 Ω resistors in parallel. Voltmeter V1 is across the battery and voltmeter V2 is across the parallel pair. Assume an ideal battery.]

Case Study

Case Study: Car lamp circuit Vinita and Ahmed demonstrated a circuit that operates two lamps X and two lamps Y of a car at a school exhibition. The lamps are connected to a 12 V battery through a switch A, which can be thrown to contact 2 or contact 3. Each lamp X has a resistance of 4 Ω and the two lamps X are connected in parallel to contact 3. Each lamp Y has a resistance of 12 Ω and the two lamps Y are connected

in parallel to contact 2. All lamps return to the battery.

Q14. Answer the following questions based on the above. [Adapted from SQP 2023-24 (Q39)] **[4]**

(i) (i) State what happens when switch A is connected to (a) position 2 and (b) position 3. [1]

(ii) (ii) Find the potential difference across each lamp when it is lit. [1]

(iii) (iii) Calculate (a) the current in each $12\,\Omega$ lamp when lit and (b) the current in each $4\,\Omega$ lamp when lit. [2]

OR

(iii) (iv) Show with calculations which lamp, the $4\,\Omega$ or the $12\,\Omega$ lamp, has the higher power. [2]

12. Magnetic Effects of Electric Current

Multiple Choice Questions (MCQs)

Q1. A uniform magnetic field exists in the plane of the paper and points into the paper. A positron (a positively charged particle) moves towards the right in the plane of the paper and enters the field at right angles to it. The direction of the force on the positron is: [Board 2023 (31/2/1); Board 2023 (31/4/1); Board 2024 (31/5/1)] **[1]**

(a) Upwards in the plane of the paper
(b) Downwards in the plane of the paper
(c) Out of the plane of the paper
(d) Into the plane of the paper

Q2. For a current in a long straight solenoid, N and S poles are formed at its two ends. Which of the following statements is INCORRECT? [Board 2023 (31/5/1)] **[1]**

(a) The field lines inside the solenoid are straight and parallel, so the field is uniform inside it
(b) The strong field inside the solenoid can magnetise a soft iron core placed inside it
(c) The field pattern of a current-carrying solenoid is different from that of a bar magnet
(d) The N and S poles exchange positions when the direction of current is reversed

Q3. A straight conductor carrying current is placed parallel to a uniform magnetic field. The force on the conductor is: [CBSE-style] **[1]**

(a) Maximum
(b) Zero
(c) Half of its maximum value
(d) Maximum and perpendicular to the field

Q4. In the three-pin plug of an electric iron, the earth pin is connected to: [CBSE-style] **[1]**

(a) The neutral wire at the meter
(b) The metallic body of the iron
(c) The live wire through the switch
(d) The outer insulated cover of the flex

Q5. Soft iron is used as the core of an electromagnet because: [CBSE-style] **[1]**

(a) It stays permanently magnetised after the current is switched off
(b) It is strongly magnetised while current flows and loses its magnetism when the current is switched off
(c) It has very high resistance
(d) It prevents the flow of current

Assertion–Reason

Q6. **Assertion (A):** The direction of force on a current-carrying conductor placed in a magnetic field remains the same if the directions of both the magnetic field and the current are reversed.
Reason (R): The direction of force on a current-carrying conductor placed in an external magnetic field can be determined by using a magnetic compass. [Board 2026 (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):** On freely suspending a current-carrying solenoid, it comes to rest in the geographical North-South direction.
Reason (R): One end of a current-carrying straight solenoid behaves as a North pole and the other end as a South pole, just like a bar magnet. [SQP 2022-23] **[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 current-carrying solenoid has magnetic field lines that are closely spaced near its two ends. (a) What does this pattern indicate about the magnetic field? (b) What happens to the magnetic field when the current in the solenoid is reversed? [Adapted from SQP 2021-22 (Term 2)] **[2]**

Q9. Why is a fuse connected in the live wire, and not in the neutral wire, of a household circuit? [CBSE-style] **[2]**

Q10. State two advantages of an electromagnet over a permanent magnet, as used in a scrap-yard crane. [CBSE-style] **[2]**

Short Answer (SA)

Q11. (a) A straight cylindrical conductor is suspended with its axis perpendicular to the magnetic field of a horse-shoe magnet. When a current is passed, it is displaced towards the left. What happens to the displacement if (i) the current is increased, (ii) a stronger horse-shoe magnet is used, (iii) the direction of current is reversed? Name and state the rule for the direction of force on a current-carrying conductor. [Board 2023 (31/5/1)] **[3]**

Q12. (a) Why is alternating current (AC) considered advantageous over direct current (DC) for long distance transmission of electric power? (b) How is the type of current in household supply different from the current given by a battery of dry cells? (c) How does an electric fuse protect the circuit and appliances from damage due to short circuiting or overloading? [Board 2023 (31/4/1)] **[3]**

Long Answer (LA)

Q13. (a) A straight conductor XY carries current from X to Y, with X on the left and Y on the right, lying in the plane of the paper. An electron enters a uniform magnetic field directed into the plane of the paper, moving towards the right in the plane of the paper. (i) Copy the diagram and draw the magnetic field lines around the conductor XY when current flows from X to Y. (ii) Name and state the rule used to determine the direction of the magnetic field lines. (iii) State Fleming left-hand rule. Using it, determine the direction of the force on the electron. [Board 2025 (31/2/1)] **[5]**

Case Study

Case Study: Domestic electric supply In our homes, electric power is supplied through the mains, either by overhead poles or by underground cables. The potential difference between the live wire and the neutral wire of this supply is 220 V. Appliances such as electric irons have metallic bodies, which are connected to a third wire, the earth wire, through a three-pin plug. Fuses are used to protect circuits against excessive current.

Q14. Answer the following questions based on the above. [Board 2025 (31/1/1)] **[4]**

(i) Write the colours of the insulation covers of the live and neutral wires that bring the supply into homes. [1]

(ii) What should be the current rating of the circuit (220 V) so that an electric iron of 1 kW can be operated? [1]

(iii) What is the function of the earth wire? State its advantage in an electric iron. [2]

OR

(iii) List two precautions to avoid electrical accidents. How do they prevent damage to the circuit or the appliance? [2]

13. Our Environment

Multiple Choice Questions (MCQs)

Q1. Identify the incorrect statement: 'The energy available to the producers is maximum' because: [SQP 2024-25] **[1]**
(a) It is the first trophic level which absorbs 1% of light energy directly from the source.
(b) It utilizes the most of the chemical energy for its own respiration, growth, reproduction, movement etc.
(c) It utilizes 10% of light energy and transfers the rest to the next trophic level.
(d) It transfers only 10% of light energy to the next trophic level.

Q2. Which of the following is correct about the flow of energy in a food chain? [CBSE-style] **[1]**
(a) Energy flow is bidirectional between producers and consumers.
(b) Energy available to producers is the minimum in the food chain.
(c) Energy available is maximum at the producer level and decreases at each higher level.
(d) Energy is recycled back from the top carnivore to the sun.

Q3. Which of the following features relates to biodegradable substances? [SQP 2023-24] **[1]**
(a) Broken down by biological processes
(b) Remain inert in the environment
(c) Persist in the environment for a long time
(d) May harm the ecosystem

Q4. Identify from the following a group containing all non-biodegradable substances. [Board 2025 (31/2/1)] **[1]**
(a) Leather, Glass, Plastic (b) Cotton, Wood, Nylon
(c) DDT, Polyester, Glass (d) Leather, Silk, Wool

Q5. Which of the following is an abiotic component of an ecosystem? [CBSE-style] **[1]**
(a) Earthworm (b) Fungi (c) Soil (d) Grass

Assertion–Reason

Q6. **Assertion (A):** In an ecosystem, 1% of energy is available for transfer from one trophic level to the next.
Reason (R): An average of 10% of the food eaten by organisms is available for flow in the form of chemical energy. [SQP 2026-27] **[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):** Biodegradable substances result in the formation of compost and natural replenishment.
Reason (R): It is due to breakdown of complex inorganic substances into simple organic substances. [SQP 2023-24] **[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. Study the food chain: Leaf → Caterpillar → Chameleon → Snake → Mongoose. (a) If the amount of energy available at the third trophic level is 100 joules, how much energy will be available at the producer level? Justify your answer.
(b) Is it possible to have 2 more trophic levels in this food chain just before the fourth trophic level? Justify your answer. [SQP 2023-24] **[2]**

Q9. About 100 acres of forest land was declared a natural reserve park. The following organisms were predominant: rabbit, frog, grass, fish, fox, water insects, zebra, peacock, snake, trees, bird, owl, insects, tiger, vulture, duck. Create a food web comprising two separate food chains with different producers by using the above data. [SQP 2025-26] **[2]**

Q10. Suggest one best way to dispose of the following wastes: (i) kitchen waste, (ii) metallic waste, (iii) plastic bottles, (iv) sanitary waste. [Board 2026 (31/2/1)] **[2]**

Short Answer (SA)

Q11. (i) Create a terrestrial food chain depicting four trophic levels.
(ii) Why do we not find food chains of more than four trophic levels in nature? [SQP 2019-20] **[3]**

Q12. Write one difference between biodegradable and non-biodegradable wastes. List two impacts of each type of the accumulated waste on environment if not disposed off properly. [Board 2023 (31/4/1)] **[3]**

Long Answer (LA)

Q13. (a) Describe how ozone is formed in the upper atmosphere and state its role.
(b) Name the chemicals responsible for its depletion and explain how UV radiation harms living beings.
(c) Mention one step taken to protect the ozone layer. [CBSE-style] **[5]**

Case Study

Case Study: UV radiation and ozone Ozone in the upper atmosphere absorbs most of the harmful ultraviolet (UV) radiation coming from the sun. Scientists observed that the ozone layer over a region had become thinner over several years. Chlorofluorocarbons (CFCs), used in refrigerators and aerosol sprays, were found to be responsible. People in that region were advised to use sunscreen and to avoid long exposure to the sun.

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

(i) Name the harmful radiation that ozone absorbs. [1]

(ii) Name the group of chemicals responsible for thinning of the ozone layer. [1]

(iii) Explain how ozone is formed in the upper atmosphere. Suggest one step to prevent further depletion. [2]

OR

(iii) Why is thinning of the ozone layer harmful to living beings? Give two effects. [2]

Answer Key (MCQs and Assertion–Reason)

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

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

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

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

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

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

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

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

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

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

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

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

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