CENTRAL BOARD OF SECONDARY EDUCATION

# CBSE 2026-27

## Science

Subject Code: 086 | Class X

Solutions

## Sample Question Paper – Set 4

**Time Allowed: 3 Hours** **Maximum Marks: 80**

### General Instructions

1. This question paper comprises 39 questions. All questions are compulsory.
2. The question paper is divided into three sections: Section A (Biology), Section B (Chemistry) and Section C (Physics).
3. Section A – Questions No. 1 to 16: Q. Nos. 1 to 7 are Multiple Choice Questions of 1 mark each; Q. Nos. 8 and 9 are Assertion–Reason based questions of 1 mark each; Q. Nos. 10 to 12 are Very Short Answer questions of 2 marks each; Q. Nos. 13 and 14 are Short Answer questions of 3 marks each; Q. No. 15 is a case/source-based question of 4 marks and Q. No. 16 is a Long Answer question of 5 marks.
4. Section B – Questions No. 17 to 29: Q. Nos. 17 to 23 are Multiple Choice Questions of 1 mark each; Q. No. 24 is an Assertion–Reason based question of 1 mark; Q. No. 25 is a Very Short Answer question of 2 marks; Q. Nos. 26 and 27 are Short Answer questions of 3 marks each; Q. No. 28 is a case/source-based question of 4 marks and Q. No. 29 is a Long Answer question of 5 marks.
5. Section C – Questions No. 30 to 39: Q. Nos. 30 and 31 are Multiple Choice Questions of 1 mark each; Q. No. 32 is an Assertion–Reason based question of 1 mark; Q. Nos. 33 and 34 are Very Short Answer questions of 2 marks each; Q. Nos. 35 to 37 are Short Answer questions of 3 marks each; Q. No. 38 is a case/source-based question of 4 marks and Q. No. 39 is a Long Answer question of 5 marks.
6. There is no overall choice. However, an internal choice has been provided in some questions. Only one of the alternatives has to be attempted in such questions.
7. Use of calculators is not permitted.

## Exam Pattern

| Section | Type of Questions | No. of Qs | Marks each | Total Marks |
|---|---|---|---|---|
| A | Biology (Q1–16): MCQ (7), Assertion–Reason (2), VSA (3), SA (2), Case-based (1), LA (1) | 16 | – | 30 |
| B | Chemistry (Q17–29): MCQ (7), Assertion–Reason (1), VSA (1), SA (2), Case-based (1), LA (1) | 13 | – | 25 |
| C | Physics (Q30–39): MCQ (2), Assertion–Reason (1), VSA (2), SA (3), Case-based (1), LA (1) | 10 | – | 25 |
| | **Total** | **39** | | **80** |

## Unit-wise Weightage of Marks

| Unit | Unit Name | Chapter | Marks |
|---|---|---|---|
| I | Chemical Substances – Nature and Behaviour | Chemical Reactions and Equations; Acids, Bases and Salts; Metals and Non-metals; Carbon and its Compounds | 25 |

| Unit | Unit Name | Chapter | Marks |
|---|---|---|---|
| II | World of Living | Life Processes; Control and Coordination; How do Organisms Reproduce?; Heredity | 25 |
| III | Natural Phenomena | Light – Reflection and Refraction; The Human Eye and the Colourful World | 12 |
| IV | Effects of Current | Electricity; Magnetic Effects of Electric Current | 13 |
| V | Natural Resources | Our Environment | 5 |
| | **Total** | | **80** |

## SECTION – A

*Section A (Biology) consists of 16 questions: Q. Nos. 1–7 MCQs, 8–9 Assertion–Reason, 10–12 Very Short Answer, 13–14 Short Answer, 15 Case-based and 16 Long Answer.*

**Q1.** The number of chromosomes in a cell division is halved. This kind of cell division is observed in: **[1]**

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

**Q2.** Pea plants with round and green seeds (RRyy) are crossed with pea plants having wrinkled and yellow seeds (rrYY). The seeds developed by the plants of the $F_1$ generation will be: **[1]**

(a) 50% round and green (b) 75% wrinkled and green
(c) 100% round and yellow (d) 75% wrinkled and yellow

**Q3.** Identify the incorrect statement: 'The energy available to the producers is maximum' because: **[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.

**Q4.** A sportsman, after a long break from his routine exercise, suffered muscular cramps during a heavy exercise session. This happened due to: **[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.

**Q5.** In the transverse section of the leaf described in the figure, identify the layers of cells where maximum photosynthesis occurs. **[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

**Q6.** In a set-up to show that carbon dioxide is released during respiration, a chemical X is kept in a vial inside the flask to absorb the carbon dioxide evolved. Name X. **[1]**

(a) NaOH (b) KOH (c) $Ca(OH)_2$ (d) $K_2CO_3$

**Q7.** The plant hormone whose concentration stimulates the cells to grow longer on the side of the shoot which is away from light is: **[1]**

(a) Cytokinins (b) Gibberellins (c) Adrenaline (d) Auxins

**Q8.** **Assertion (A):** Probability of survival of an organism produced through sexual reproduction is more than that of an organism produced through asexual mode.
**Reason (R):** Variations provide advantages to individuals for survival. **[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.

**Q9.** **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. **[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.

**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. **[2]**

**Q11.** Unlike animals, plants do not have any excretory products as they do not eat food. Comment upon this statement with justification. **[2]**

**OR**

(A) How many chambers are there in the heart of (i) fishes and (ii) humans? How is mixing of oxygenated and deoxygenated blood prevented in the human body?

**Q12.** 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? **[2]**

**Q13.** (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? **[3]**

**OR**

How will you create an artificial aquatic ecosystem which is self-sustainable?

**Q14.** Explain the ways in which glucose is broken down in the absence of oxygen. **[3]**

**OR**

List three differences between arteries and veins.

**Case Study: Energy from breakdown of carbohydrates** All living cells require energy for various activities. This energy is available by the breakdown of simple carbohydrates, either using oxygen or without using oxygen. During a 400 m race, the blood lactic acid level of an athlete was measured. It peaked at the end of the race, when the muscles had run short of oxygen, and then fell during recovery. The athlete's breathing rate also increased during the race.

**Q15.** Answer the following questions based on the above. **[4]**

(i) Name the process by which energy is obtained in higher plants and animals: breathing, tissue respiration, organ respiration or digestion of food. [1]

(ii) Lactic acid was produced in the athlete during the race. Which process explains this: aerobic respiration, anaerobic respiration, fermentation or breathing? [1]

(iii) Compare the energy supplied by aerobic and anaerobic respiration during a sprint, and justify your answer. [2]

**OR**

(iii) Why does an athlete breathe heavily after a sprint? [2]

**Q16.** (a) A doctor has advised Sameer to reduce sugar intake and do regular exercise. Which disease is he suffering from? Name the hormone responsible for it and the organ producing it. (3 marks)
(b) Which hormone is present in the areas of rapid cell division in a plant, and which hormone inhibits growth? (2 marks) **[5]**

**OR**

(a) Name the gland which secretes adrenaline and write any two effects of this hormone during danger. (3 marks)
(b) Name the plant hormone that promotes seed germination and cell elongation, and state one more effect. (2 marks)

## SECTION – B

*Section B (Chemistry) consists of 13 questions: Q. Nos. 17–23 MCQs, 24 Assertion–Reason, 25 Very Short Answer, 26–27 Short Answer, 28 Case-based and 29 Long Answer.*

**Q17.** 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. **[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)

**Q18.** In the preparation of soap from an oil or fat, sodium chloride is added to the reaction mixture because it causes: **[1]**

(a) complete saponification
(b) complete hydrolysis
(c) complete neutralisation
(d) complete precipitation of the soap

**Q19.** 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: **[1]**

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

**Q20.** The balanced chemical equation showing reaction between quicklime and water is: **[1]**

(a) $2\,CaO + H_2O \longrightarrow 2\,CaOH + H_2 + Heat$
(b) $CaO + H_2O \longrightarrow Ca(OH)_2 + H_2 + Heat$
(c) $CaO + H_2O \longrightarrow Ca(OH)_2 + Heat$
(d) $2\,CaO + 3\,H_2O \longrightarrow 2\,Ca(OH)_3 + O_2 + Heat$

**Q21.** Fresh milk has a pH of 6. To delay its curdling, a chemical substance is added to it, which is: **[1]**

(a) Sodium carbonate
(b) Baking powder
(c) Sodium hydroxide (caustic soda)
(d) Baking soda (sodium hydrogen carbonate)

**Q22.** Hydronium ions are formed by the reaction between: **[1]**

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

**Q23.** The electronic configurations of three elements are: X = 2, 8, 7; Y = 2, 8, 2; Z = 2, 8. Which statement is correct? **[1]**

(a) Y and Z are metals.
(b) Y and X are non-metals.
(c) X is a non-metal and Y is a metal.
(d) Y is a non-metal and Z is a metal.

**Q24. 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. **[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.

**Q25.** 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. **[2]**

**OR**

Name the salt formed when milk of magnesia reacts with dilute hydrochloric acid, and write the balanced equation.

**Q26.** (a) Define a double displacement reaction.
(b) Write the chemical equation of a double displacement reaction which is also a (i) neutralisation reaction and (ii) precipitation reaction. Give justification for your answer. **[3]**

**OR**

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.

**Q27.** 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. **[3]**

**OR**

"Sweet tooth may lead to tooth decay." Explain why, and state the role of toothpaste in preventing cavities.

**Case Study: Rusting in different test tubes** Ravi placed three iron nails in three test tubes. Tube A had only dry air. Tube B had boiled water covered with a layer of oil. Tube C had moist air with a pinch of common salt. He left the set-up for one week. The nail in tube C was covered with a reddish-brown flaky layer, while the nails in tubes A and B remained shiny. Rusting is a process in which iron reacts with oxygen and water to form hydrated iron(III) oxide, and it is an everyday effect of oxidation.

**Q28.** Answer the following questions based on the above. **[4]**

(i) In which test tube did rusting occur fastest, and why? [1]

(ii) Write the balanced equation for rusting of iron, with x as the number of water molecules. [1]

(iii) Identify the substance oxidised and the substance reduced in rusting, and explain why the nail in tube B did not rust. [2]

**OR**

(iii) Name one method of preventing rusting of iron and explain how it works. [2]

**Q29.** (I) Alisha says the formation of ammonia from nitrogen and hydrogen is a reduction reaction. Drishti says both rusting of iron and formation of ammonia are redox reactions. Bhushan says rusting of iron is an oxidation reaction. Who do you agree with, and why?
(II) Identify the error(s) in each equation and rewrite it correctly: (i) $MgCl_2 + AgNO_3 \longrightarrow AgCl_2 + MgNO_3$
(ii) $Al + H_2SO_4 \longrightarrow Al_2SO_4 + H_2O$ **[5]**

**OR**

(B) Daljeet says that in a decomposition reaction a substance breaks into two simpler compounds, and gives $MgCO_3 \longrightarrow MgO + CO_2$ as an example. Avik says decomposition gives two elements. Who has understood decomposition correctly? (ii) Iron fillings are added to magnesium sulphate solution and the solution is said to turn greenish. Aluminium is added to dilute sulphuric acid and brisk effervescence is seen. Are these observations correct? Give reasons, and write the equation for the second reaction.

## SECTION – C

*Section C (Physics) consists of 10 questions: Q. Nos. 30–31 MCQs, 32 Assertion–Reason, 33–34 Very Short Answer, 35–37 Short Answer, 38 Case-based and 39 Long Answer.*

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**Q30.** An electric kettle consumes 1 kW of electric power when operated at 220 V. The minimum rating of the fuse wire to be used for it is: **[1]**

(a) 1 A (b) 2 A (c) 4 A (d) 5 A

**Q31.** Which of the following correctly describes the magnetic field pattern around a long straight wire carrying current? **[1]**

(a) Straight lines perpendicular to the wire
(b) Straight lines parallel to the wire
(c) Radial lines originating from the wire
(d) Concentric circles centred around the wire

**Q32.** **Assertion (A):** No two magnetic field lines are found to cross each other.
**Reason (R):** The compass needle cannot point towards two directions at the point of intersection of two magnetic field lines. **[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.

**Q33.** 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. **[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.]*

**OR**

Why does white light split into its component colours when it passes through a glass prism but not when it passes through a rectangular glass slab (with faces parallel to each other)?

**Q34.** 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. **[2]**

**OR**

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.

**Q35.** 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? **[3]**

**OR**

Rohit wants an erect image of an object using a converging (concave) mirror of focal length 40 cm. (a) Specify the range of distance where the object can be placed in front of the mirror. Justify. (b) Draw a ray diagram for image formation in this case. (c) State one use of the mirror based on this image formation.

**Q36.** (a) State one important function of each of the following parts of the human eye: (i) retina (ii) pupil. (b) State the role of ciliary muscles in focussing objects at varying distances from the eye. **[3]**

**OR**

(a) Name the part of the human eye that produces the greatest convergence of light entering the eye. (b) Name the screen on which the image is formed in the eye. (c) State the nature of the image formed on this screen and how we nevertheless see the world erect.

**Q37.** Three cylindrical copper conductors are given: (a) length $L$, face area $A$; (b) length $3L$, face area $A/3$; (c) length $L/3$, face area $3A$. Compare the resistance and the resistivity of the three conductors, and justify. **[3]**

**Case Study: Refracting telescope** Sumati wants to see distant stars and decides to build a refracting telescope. She buys two convex lenses: a bigger lens L1 that gathers and bends light, and a smaller lens L2 that acts as the eyepiece and magnifies the image. A big lens gathers more light but is heavy, hard to make and hard to hold in place, and any flaw in its surface spoils the image. Sumati therefore chooses lenses that are not very thick and polishes them carefully.

**Q38.** Answer the following questions based on the above. **[4]**

(i) Based on the lens arrangement, what kind of lenses would Sumati need to make the telescope? [1]

(ii) If the powers of L1 and L2 are in the ratio 4:1, what is the ratio of their focal lengths? [1]

(iii) The eyepiece L2 has a magnification of 3. If the image formed by L2 is 24 cm from the lens, at what distance is the object placed from L2? State the formula for magnification produced by a lens. [2]

**OR**

(iii) Give one reason why Sumati should choose lenses that are not so thick. [2]

**Q39.** (i) Which property of a concave mirror is used when it is used as a shaving mirror? (ii) Light passes through a rectangular glass slab. Draw a ray diagram to show the emergent ray with respect to the incident ray. (iii) A concave lens has a focal length of 50 cm. Calculate its power. **[5]**

**OR**

(i) Rohit claims to have obtained an image twice the size of an object with a concave lens. Is he correct? Give reason. (ii) Where should an object be placed in front of a convex lens to form an image of the same size as the object? Show the position and nature of the image with a ray diagram. (iii) With a ray diagram, illustrate the change in position, nature and size of the image if the convex lens in (ii) is replaced by a concave lens of the same focal length.

***** END OF PAPER *****