

CBSE Class 10 Science Exam Pattern (2024-25)

Total Marks: 100 (80 Theory + 20 Internal Assessment)

Theory Paper Structure:

- Section A: 20 MCQs $\times$ 1 mark = 20 marks
- Section B: 6 Short Answer-I $\times$ 2 marks = 12 marks
- Section C: 7 Short Answer-II $\times$ 3 marks = 21 marks
- Section D: 3 Long Answer $\times$ 5 marks = 15 marks
- Section E: 3 Case-based $\times$ 4 marks = 12 marks
- **Total: 39 questions = 80 marks**

Unit-wise Weightage:

- Unit I: Chemical Substances – Nature & Behaviour = 25 marks
- Unit II: World of Living = 25 marks
- Unit III: Natural Phenomena = 12 marks
- Unit IV: Effects of Current = 13 marks
- Unit V: Natural Resources = 5 marks



QUESTION PAPER 1 (SET A)

CBSE CLASS X SCIENCE (CODE 086)

Time Allowed: 3 Hours

Maximum Marks: 80

SECTION A

(20 questions of 1 mark each)

Q.1 Which of the following is NOT a characteristic of chemical reactions?

- (a) Evolution of gas
- (b) Change in temperature
- (c) Change in state of matter only
- (d) Formation of precipitate

Q.2 The pH of a solution is 3. This solution is:

- (a) Strongly acidic
- (b) Weakly acidic
- (c) Neutral
- (d) Basic

Q.3 Which metal is stored under kerosene to prevent oxidation?

- (a) Iron
- (b) Sodium
- (c) Copper
- (d) Zinc

Q.4 The functional group present in ethanol is:

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

Q.5 In human beings, the exchange of gases takes place in:

- (a) Trachea
- (b) Bronchi
- (c) Alveoli
- (d) Larynx

Q.6 The gap between two neurons is called:

- (a) Synapse
- (b) Dendrite
- (c) Axon
- (d) Cyton

Q.7 Which of the following is a bisexual flower?

- (a) Papaya
- (b) Watermelon
- (c) Mustard
- (d) Cucumber

Q.8 The focal length of a concave mirror is 15 cm. Its radius of curvature is:

- (a) 7.5 cm
- (b) 15 cm
- (c) 30 cm
- (d) 45 cm

Q.9 The power of a lens is +2.5 D. The lens is:

- (a) Concave of focal length 40 cm
- (b) Convex of focal length 40 cm
- (c) Concave of focal length 25 cm
- (d) Convex of focal length 25 cm

Q.10 According to Ohm's law, the relationship between potential difference (V) and current (I) is:

- (a) $V \propto \frac{1}{I}$
- (b) $V \propto I$
- (c) $V \propto I^2$
- (d) $V \propto \sqrt{I}$

Q.11 The equivalent resistance of two resistors $R_1 = 4\ \Omega$ and $R_2 = 6\ \Omega$ connected in parallel is:

- (a) $10\ \Omega$
- (b) $2.4\ \Omega$
- (c) $24\ \Omega$
- (d) $0.42\ \Omega$

Q.12 The magnetic field lines inside a solenoid are:

- (a) Circular
- (b) Elliptical
- (c) Parallel and equally spaced
- (d) Converging at center

Q.13 Which of the following is a non-renewable source of energy?

- (a) Solar energy
- (b) Wind energy
- (c) Fossil fuels
- (d) Biomass

Q.14 The phenomenon of splitting of white light into its constituent colors is called:

- (a) Refraction
- (b) Dispersion
- (c) Scattering
- (d) Reflection

Q.15 Which gas is primarily responsible for global warming?

- (a) Oxygen
- (b) Nitrogen
- (c) Carbon dioxide
- (d) Hydrogen

Q.16 The chemical formula of washing soda is:

- (a) NaHCO_3
- (b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
- (c) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
- (d) NaOH

Q.17 Which hormone regulates blood sugar level?

- (a) Thyroxine
- (b) Insulin
- (c) Adrenaline
- (d) Growth hormone

Q.18 The image formed by a plane mirror is:

- (a) Real and inverted
- (b) Virtual and inverted
- (c) Real and erect
- (d) Virtual and erect

Q.19 The SI unit of electric power is:

- (a) Joule
- (b) Watt
- (c) Volt
- (d) Ampere

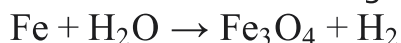
Q.20 Which of the following is a biodegradable waste?

- (a) Plastic
- (b) Glass
- (c) Vegetable peels
- (d) Aluminum foil

SECTION B

(6 questions of 2 marks each)

Q.21 Balance the following chemical equation and identify the type of reaction:



Q.22 Why does an aqueous solution of acid conduct electricity? Explain with the help of a diagram showing ionization of HCl in water.

Q.23 Draw a labeled diagram of the human digestive system showing stomach, small intestine, and liver.

Q.24 State Snell's law of refraction. If light travels from air ($n_1 = 1$) to glass ($n_2 = 1.5$) with angle of incidence 30° , calculate the angle of refraction.

Q.25 What is the difference between direct current (DC) and alternating current (AC)? Why is AC preferred for long-distance transmission?

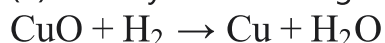
Q.26 Define ecosystem. Name two abiotic components of an ecosystem.

SECTION C

(7 questions of 3 marks each)

Q.27 (a) What is a redox reaction?

(b) Identify the oxidizing and reducing agents in:



(c) Why is respiration considered an exothermic reaction?

Q.28 (a) What are amphoteric oxides? Give two examples.

(b) Write chemical equations showing reaction of aluminum oxide with:

(ii) NaOH

Q.29 Explain the process of photosynthesis with a balanced chemical equation. Why is it considered an endothermic reaction?

Q.30 (a) Draw a ray diagram showing the formation of image by a convex lens when the object is placed between F and $2F$.

(b) State three characteristics of the image formed.

Q.31 Derive the expression for equivalent resistance of three resistors R_1 , R_2 , and R_3 connected in series. If $R_1 = 2\ \Omega$, $R_2 = 3\ \Omega$, $R_3 = 5\ \Omega$, calculate the equivalent resistance.

Q.32 (a) What is electromagnetic induction?

(b) State Fleming's right-hand rule.

(c) Name the device which works on the principle of electromagnetic induction.

Q.33 Explain the 10% law of energy transfer in a food chain with an example. Why does energy decrease at each trophic level?

SECTION D

(3 questions of 5 marks each)

Q.34 (a) What is corrosion? Write the chemical reaction showing rusting of iron.

(b) Suggest three methods to prevent rusting of iron.

(c) Why do silver articles become black after some time? Write the chemical equation.

(d) What is galvanization?

Q.35 (a) Draw a labeled diagram of the human heart showing all four chambers.

(b) Why is the wall of the left ventricle thicker than the right ventricle?

(c) What is double circulation? Why is it necessary in human beings?

(d) Name the valve present between right atrium and right ventricle.

Q.36 (a) State Joule's law of heating. Derive the expression $H = I^2 R t$.

(b) An electric iron consumes 1100 W power at 220 V supply. Calculate:

 (i) Current drawn

Resistance of its heating element

Energy consumed in 2 hours (in kWh)

SECTION E

(3 case-based questions of 4 marks each)

Q.37 Read the following case study and answer the questions:

A student performed an experiment to study the reaction of zinc granules with dilute hydrochloric acid. He observed effervescence and collected the gas evolved in a test tube. When a burning splinter was brought near the mouth of the test tube, the gas burnt with a pop sound.

- (a) Identify the gas evolved. Write the balanced chemical equation for the reaction.
- (b) What type of reaction is this?
- (c) Why does the gas burn with a pop sound?
- (d) What will happen if copper granules are used instead of zinc? Explain.

Q.38 Study the diagram showing refraction of light through a glass slab and answer:

(Diagram description: Light ray entering glass slab from air, bending towards normal at first surface, traveling straight inside glass, bending away from normal at second surface)

- (a) Why does light bend towards the normal when entering glass from air?
- (b) What is lateral displacement? Show it in the diagram.
- (c) If angle of incidence = 45° and refractive index of glass = 1.5, calculate angle of refraction using Snell's law.
- (d) Does the emergent ray remain parallel to the incident ray? Justify.

Q.39 A food chain in a grassland ecosystem is given below:

Grass → Grasshopper → Frog → Snake → Hawk

- (a) Identify the producer and tertiary consumer in this food chain.
- (b) If energy available at producer level is 10,000 kJ, calculate energy available at snake level using 10% law.
- (c) What is biological magnification? How does it affect top consumers like hawk?
- (d) Why are food chains generally limited to 3-4 trophic levels?

✓ ANSWER KEY & SOLUTIONS (SET A)

SECTION A

- 1. (c) Change in state of matter only (*Physical change*)
- 2. (a) Strongly acidic ($pH < 7 = \text{acidic}$; lower $pH = \text{stronger acid}$)
- 3. (b) Sodium (*Highly reactive metal*)
- 4. (c) -OH (*Hydroxyl group*)
- 5. (c) Alveoli (*Site of gaseous exchange in lungs*)
- 6. (a) Synapse (*Junction between neurons*)
- 7. (c) Mustard (*Has both stamens and pistil*)
- 8. (c) 30 cm ($R = 2f = 2 \times 15 = 30 \text{ cm}$)
- 9. (b) Convex of focal length 40 cm ($f = \frac{1}{P} = \frac{1}{2.5} = 0.4 \text{ m} = 40 \text{ cm}$; +ve power = convex)
- 10. (b) $V \propto I$ (*Ohm's law: $V = IR$*)
- 11. (b) 2.4Ω ($\frac{1}{R_p} = \frac{1}{4} + \frac{1}{6} = \frac{5}{12} \Rightarrow R_p = 2.4 \Omega$)
- 12. (c) Parallel and equally spaced (*Uniform magnetic field*)

13. (c) Fossil fuels (*Cannot be replenished quickly*)
14. (b) Dispersion (*Splitting by prism*)
15. (c) Carbon dioxide (*Greenhouse gas*)
16. (b) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ (*Sodium carbonate decahydrate*)
17. (b) Insulin (*Secreted by pancreas*)
18. (d) Virtual and erect (*Plane mirror property*)
19. (b) Watt (*SI unit of power*)
20. (c) Vegetable peels (*Decomposed by microbes*)

SECTION B

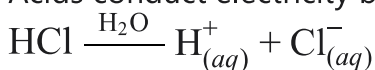
Q.21

Balanced equation: $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$

Type: Redox reaction (Displacement reaction)

Q.22

Acids conduct electricity because they dissociate into ions in aqueous solution.



These mobile ions carry electric current through the solution.

Q.23

(Diagram description: Alimentary canal showing mouth → esophagus → stomach (J-shaped) → small intestine (long coiled tube) → large intestine; liver shown as large brown organ above stomach producing bile)

Q.24

Snell's law: $\frac{\sin i}{\sin r} = \frac{n_2}{n_1} = \text{constant}$

Given: $i = 30^\circ$, $n_1 = 1$, $n_2 = 1.5$

$$\sin r = \frac{\sin 30^\circ}{1.5} = \frac{0.5}{1.5} = 0.333$$

$$r = \sin^{-1}(0.333) \approx 19.5^\circ$$

Q.25

DC	AC
Unidirectional flow	Reverses direction periodically
Constant magnitude	Magnitude varies sinusoidally
Produced by cells/batteries	Produced by generators

AC preferred because:

- (i) Voltage can be stepped up/down using transformers
- (ii) Reduces power loss during transmission ($P_{\text{loss}} = I^2 R$; high voltage → low current → less loss)

Ecosystem = Community of living organisms interacting with each other and their physical environment.

Abiotic components: Sunlight, temperature, water, soil minerals (*any two*)

SECTION C

Q.27

(a) Redox reaction = Simultaneous oxidation and reduction

(b) CuO = oxidizing agent (reduced to Cu); H_2 = reducing agent (oxidized to H_2O)

(c) Respiration releases energy ($\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + \text{Energy}$), hence exothermic

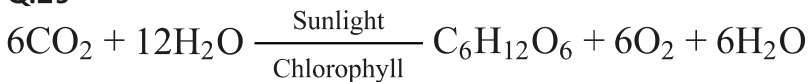
Q.28

(a) Amphoteric oxides react with both acids and bases $\rightarrow$ salt + water

Examples: Al_2O_3 , ZnO

$$(b) (i) \text{Al}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2\text{O}$$
$$\text{(ii) } \text{Al}_2\text{O}_3 + 2\text{NaOH} \rightarrow 2\text{NaAlO}_2 + \text{H}_2\text{O}$$

Q.29



Endothermic because it absorbs solar energy to convert CO_2 and H_2O into glucose.

Q.30

(Ray diagram description: Object between F and $2F$ on left side of convex lens; two rays – one parallel to principal axis passing through F on other side, second through optical center undeviated; rays converge beyond $2F$ forming real, inverted, magnified image)

Characteristics: Real, inverted, magnified

Q.31

In series: I same through all resistors

$$V = V_1 + V_2 + V_3 = IR_1 + IR_2 + IR_3 = I(R_1 + R_2 + R_3)$$

$$\Rightarrow R_s = R_1 + R_2 + R_3 = 2 + 3 + 5 = 10 \, \Omega$$

Q.32

(a) Production of induced current in a coil when magnetic field around it changes

(b) Fleming's right-hand rule: Thumb $\rightarrow$ Motion, Forefinger $\rightarrow$ Field, Middle finger $\rightarrow$ Current

(c) Electric generator

Q.33

10% law: Only 10% energy transferred to next trophic level

Example: Plants (1000 kJ) → Herbivores (100 kJ) → Carnivores (10 kJ)

Energy decreases due to:

(i) Respiration losses

(ii) Incomplete consumption

(iii) Heat loss to environment

SECTION D

Q.34

(a) Corrosion = Gradual eating away of metals by reaction with environment

Rusting: $4\text{Fe} + 3\text{O}_2 + 2x\text{H}_2\text{O} \rightarrow 2\text{Fe}_2\text{O}_3 \cdot x\text{H}_2\text{O}$ (hydrated iron oxide)

(b) Prevention: Painting, galvanization, oiling/greasing

(c) Reaction with H_2S in air: $4\text{Ag} + 2\text{H}_2\text{S} + \text{O}_2 \rightarrow 2\text{Ag}_2\text{S} + 2\text{H}_2\text{O}$ (black silver sulfide)

(d) Coating iron with zinc layer to prevent rusting

Q.35

(Diagram description: Four-chambered heart – right atrium, right ventricle, left atrium, left ventricle separated by septum; superior/inferior vena cava entering RA; pulmonary artery from RV; pulmonary vein entering LA; aorta from LV)

(b) Left ventricle pumps blood to entire body (higher pressure needed) vs right ventricle pumps only to lungs

(c) Double circulation = Blood passes through heart twice per cycle (pulmonary + systemic circuits)

Necessity: Maintains high pressure for systemic circulation; separates oxygenated/deoxygenated blood

(d) Tricuspid valve

Q.36

(a) Joule's law: Heat produced $\propto I^2$, R , and t

Derivation: $H = VIt = (IR)It = I^2Rt$

(b) Given: $P = 1100 \text{ W}$, $V = 220 \text{ V}$

(i) $I = \frac{P}{V} = \frac{1100}{220} = 5 \text{ A}$

(ii) $R = \frac{V}{I} = \frac{220}{5} = 44 \Omega$

(iii) Energy = $P \times t = 1.1 \text{ kW} \times 2 \text{ h} = 2.2 \text{ kWh}$

SECTION E

Q.37

(a) Hydrogen gas; $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2 \uparrow$

(b) Displacement reaction

(c) Hydrogen burns rapidly with oxygen in air producing small explosion $\rightarrow$ pop sound

(d) No reaction – copper less reactive than hydrogen (below H in reactivity series)

Q.38

(a) Light slows down in denser medium (glass) $\rightarrow$ bends towards normal

(b) Perpendicular distance between incident and emergent rays

(c) $\sin r = \frac{\sin 45^\circ}{1.5} = \frac{0.707}{1.5} = 0.471 \Rightarrow r = 28^\circ$

(d) Yes – emergent ray parallel to incident ray (lateral shift occurs but direction unchanged)

Q.39

(a) Producer = Grass; Tertiary consumer = Snake

(b) Grass (10,000 kJ) $\rightarrow$ Grasshopper (1,000 kJ) $\rightarrow$ Frog (100 kJ) $\rightarrow$ Snake (10 kJ)

(c) Biological magnification = Increasing concentration of non-biodegradable substances at higher

trophic levels; affects hawks with toxic accumulation causing health issues

(d) Energy loss at each level (90%) → insufficient energy beyond 4 levels for survival