CBSE Class 10 Science
10 Most-Expected Questions, Fully Solved

Board-exam practice set • Physics • Chemistry • Biology

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Ten questions chosen from the chapters CBSE asks again and again — each one with a complete, step-by-step solution written the way examiners award marks. Work through the numericals with pen and paper, then check every step. Share this file freely with your classmates and study groups.

Q1. Chemical Reactions & Equations [3 marks]

Balance the following equations and name the type of reaction in each case: (a) $Pb(NO_3)_2(aq) + KI(aq) \rightarrow PbI_2(s) + KNO_3(aq)$ (b) $FeSO_4(s) \xrightarrow{heat} Fe_2O_3(s) + SO_2(g) + SO_3(g)$ (c) $CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$

Solution

- (a) $Pb(NO_3)_2 + 2KI \rightarrow PbI_2 + 2KNO_3$. The ions exchange partners and a yellow precipitate of PbI_2 forms — **double displacement (precipitation)** reaction.
- (b) $2FeSO_4 \xrightarrow{heat} Fe_2O_3 + SO_2 + SO_3$. One reactant splits into three products — **decomposition** reaction. (Green $FeSO_4$ crystals turn into brown Fe_2O_3.)
- (c) $CaO + H_2O \rightarrow Ca(OH)_2$ is already balanced. Two substances combine to form a single product — **combination** reaction; it is strongly exothermic.

Q2. Electricity (Numerical) [5 marks]

Resistors of 4 Ω and 6 Ω are connected in parallel across a 12 V battery. Find (a) the equivalent resistance, (b) the total current drawn from the battery, (c) the current through each resistor, and (d) the power dissipated in the 6 Ω resistor.

Solution

- (a) For parallel resistors: $1/R_p = 1/4 + 1/6 = (3 + 2)/12 = 5/12$, so $R_p = 12/5 =$ **2.4 Ω**.
- (b) Total current $I = V/R_p = 12 / 2.4 =$ **5 A**.
- (c) In parallel the voltage across each resistor is the full 12 V: $I(4\ \Omega) = 12/4 =$ **3 A**; $I(6\ \Omega) = 12/6 =$ **2 A**. Check: 3 + 2 = 5 A ✓
- (d) Power in the 6 Ω resistor: $P = V^2/R = 12^2/6 = 144/6 =$ **24 W**. (Check with $P = I^2R = 2^2 \times 6 = 24$ W ✓)

Q3. Light — Reflection & Refraction (Numerical) [5 marks]

An object 4 cm tall is placed 20 cm in front of a convex lens of focal length 15 cm. Find the position, nature and size of the image, and describe the ray diagram.

Solution

- Sign convention: object distance u = −20 cm, focal length f = +15 cm.
- Lens formula: 1/f = 1/v − 1/u → 1/v = 1/f + 1/u = 1/15 − 1/20 = (4 − 3)/60 = 1/60, so v = **+60 cm**.
- The image forms 60 cm on the opposite side of the lens. Positive v means the image is **real and inverted**.
- Magnification m = v/u = 60/(−20) = −3, so image height = 3 × 4 cm = **12 cm**, inverted and magnified.
- Ray diagram: from the top of the object, draw one ray parallel to the principal axis — after refraction it passes through the far-side focus. Draw a second ray through the optical centre — it goes straight. The two rays meet 60 cm beyond the lens, exactly where the inverted image forms.

Q4. Life Processes — Human Heart [5 marks]

Describe the path of blood through the human heart in double circulation, and explain why double circulation is necessary in humans.

Solution

- Deoxygenated blood from the body → vena cava → right atrium → right ventricle → pulmonary artery → lungs, where it releases CO_2 and picks up O_2.
- Oxygenated blood returns: lungs → pulmonary vein → left atrium → left ventricle → aorta → whole body. Valves prevent backflow, and the thick-walled left ventricle pumps blood to the entire body.
- Blood passes through the heart twice in one full circuit — once on the right side, once on the left — hence “double” circulation. The septum keeps the two sides completely separate, so oxygenated and deoxygenated blood never mix.
- Humans are warm-blooded and need a constant, high supply of energy. This efficient oxygen delivery to the tissues maintains body temperature and meets that energy demand.

Q5. Acids, Bases & Salts — Chlor-Alkali [3 marks]

In the chlor-alkali process, brine (concentrated sodium chloride solution) is electrolysed. Write the balanced equation, name the product formed at each electrode, and give one use of each product.

Solution

- Balanced equation: $2NaCl(aq) + 2H_2O(l) \rightarrow 2NaOH(aq) + Cl_2(g) + H_2(g)$.
- At the anode (+ electrode): chlorine gas, Cl_2. At the cathode (− electrode): hydrogen gas, H_2. Sodium hydroxide solution is left behind near the cathode.
- Uses — H_2: as a fuel and to hydrogenate oils (margarine). Cl_2: to disinfect water and to make bleaching powder. NaOH: to make soaps, detergents and paper.

Q6. Metals & Non-metals [3 marks]

(a) Why is sodium metal stored in kerosene oil? (b) Zinc oxide reacts with both hydrochloric acid and sodium hydroxide solution. Write both equations and state what this shows about zinc oxide. (c) Why do ionic compounds have high melting points?

Solution

- (a) Sodium reacts vigorously with air and moisture — it can even catch fire. Kerosene cuts off contact with both, so the metal stays safe.
- (b) $ZnO + 2HCl \rightarrow ZnCl_2 + H_2O$ (ZnO behaves as a base) and $ZnO + 2NaOH \rightarrow Na_2ZnO_2$ (sodium zincate) + H_2O (ZnO behaves as an acid). An oxide reacting with both an acid and a base is an **amphoteric oxide**.
- (c) Ionic compounds are held together by strong electrostatic forces of attraction between oppositely charged ions. A large amount of heat energy is needed to break these forces, so their melting (and boiling) points are high.

Q7. Carbon & Its Compounds [3 marks]

(a) Ethanol is heated with concentrated sulphuric acid at 443 K. Write the equation and name the reaction. (b) What happens when ethanoic acid reacts with sodium hydrogencarbonate? Write the equation. (c) Why does carbon form covalent compounds instead of ionic compounds?

Solution

- (a) $CH_3–CH_2OH \xrightarrow{\text{conc. } H_2SO_4,\ 443\ K} CH_2=CH_2 + H_2O$. The acid removes a water molecule from ethanol — a **dehydration** reaction; the product is ethene.
- (b) $CH_3COOH + NaHCO_3 \rightarrow CH_3COONa + H_2O + CO_2$. Carbon dioxide is given off with brisk effervescence and turns lime water milky.
- (c) Carbon has 4 valence electrons. Losing all 4 (to form C^{4+}) would need a huge amount of energy, and gaining 4 (C^{4-}) would be hard for a nucleus of only 6 protons to hold. So carbon shares electrons instead — forming covalent bonds.

Q8. Heredity — Mendel's Cross [3 marks]

A pure tall pea plant (TT) is crossed with a pure dwarf pea plant (tt). Work out the F_1 and F_2 generations, and state the genotypic and phenotypic ratios in F_2.

Solution

- Parents: TT (tall) × tt (dwarf). Every offspring gets T from one parent and t from the other, so all F_1 plants are Tt — and all are tall, because tallness (T) is dominant over dwarfness (t).
- F_1 self-pollination: Tt × Tt. Each parent gives gametes T and t, giving offspring TT, Tt, Tt, tt.
- Genotypic ratio in F_2: 1 TT : 2 Tt : 1 tt. Phenotypic ratio: **3 tall : 1 dwarf**. The recessive dwarf trait, hidden in F_1, reappears unchanged in F_2.

Q9. Our Environment — Food Chain Energy [3 marks]

In a grassland food chain — Grass → Grasshopper → Frog → Snake → Eagle — the producers trap 10,000 J of energy. Using the 10% law, calculate the energy available at each trophic level and the energy that finally reaches the eagle.

Solution

- The 10% law: only about 10% of the energy at one trophic level is transferred to the next level. The rest is lost as heat in respiration and other life processes, and in waste.
- Grasshopper (herbivore): 10% of 10,000 J = 1,000 J.
- Frog: 10% of 1,000 J = 100 J. Snake: 10% of 100 J = 10 J. Eagle: 10% of 10 J = **1 J**.
- The eagle receives only 1 J out of 10,000 J — this steady energy loss is why food chains rarely have more than four or five trophic levels.

Q10. The Human Eye — Myopia (Numerical) [3 marks]

A person suffering from myopia (short sight) can see clearly only up to a distance of 80 cm. Calculate the focal length and power of the lens needed to correct the defect, and name the type of lens.

Solution

- The far point of the eye is 80 cm = 0.80 m. The correcting lens must form a virtual image of a distant object at this far point, so u = ∞ and v = −0.80 m.
- Lens formula: 1/f = 1/v − 1/u = 1/(−0.80) − 0 = −1.25, so f = **−0.80 m**.
- Power P = 1/f (f in metres) = **−1.25 D**. The negative sign shows a **concave (diverging) lens** of power −1.25 D is needed.
- Why: in myopia the eyeball is too long (or the eye lens too converging), so the image forms in front of the retina. The concave lens diverges the rays slightly, shifting the image back onto the retina.

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