PREP YOURSELF · BOARD EXAM REVISION

Class 10 Science Revision Pack

All 13 chapters in one place: short revision notes, key diagrams and equations, common mistakes, and new board-pattern practice questions with full answers.

- **13** chapters
- **260** practice questions
- **26** case-based questions
- Answers with **marking points**

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HOW TO USE THIS PACK

- Read the **Chapter at a glance** box first, then the notes. Each chapter takes 20–30 minutes to revise.
- Learn the key equations, formulae and tables; they are what board questions are built on.
- Read **Common mistakes that cost marks** just before the exam.
- Attempt the 20 practice questions on paper, without looking, then check with the **answers and marking points** at the end of the chapter.

CLASS 10 SCIENCE · CHAPTER 1

Chemical Reactions and Equations

Revision notes · Key points · Practice questions with answers

CHAPTER AT A GLANCE

- A **chemical reaction** forms new substances. You can tell from a change in state, a change in colour, a gas given off, or a change in temperature.
- A **balanced equation** has the same number of atoms of each element on both sides, because mass is neither created nor destroyed.
- Five reaction types: **combination, decomposition, displacement, double displacement** and **redox**. Each is also either **exothermic** or **endothermic**.
- **Oxidation** is gain of oxygen or loss of hydrogen. **Reduction** is loss of oxygen or gain of hydrogen. Both always happen together.
- Oxidation in everyday life: **corrosion** of metals and **rancidity** of fats and oils.

1 Chemical reactions and equations

Signs that a reaction has happened: change in state, change in colour, evolution of a gas, change in temperature. One sign alone is not proof: melting ice changes state, but no new substance forms.

Writing an equation, step by step

Stage	Example: burning magnesium
Word equation	magnesium + oxygen → magnesium oxide
Skeletal (unbalanced) equation	$Mg + O_2 \longrightarrow MgO$
Balanced equation	$2Mg + O_2 \longrightarrow 2MgO$
With state symbols	$2Mg_{(s)} + O_{2(g)} \longrightarrow 2MgO_{(s)}$

How to balance: the hit-and-trial method

- Write the skeletal equation and count the atoms of each element on each side.
- Start with the compound that has the most atoms. Balance one element at a time by changing **coefficients** (the big numbers in front).
- Leave hydrogen and oxygen until last if they appear in several compounds.
- Check every element again at the end.

Worked example. $Al + O_2 \longrightarrow Al_2O_3$. Oxygen is 2 on the left and 3 on the right; the lowest common multiple is 6, so write $3O_2$ and $2Al_2O_3$. Now aluminium is 4 on the right, so write 4Al:

$$4Al_{(s)} + 3O_{2(g)} \longrightarrow 2Al_2O_{3(s)}$$

Check: Al 4 = 4, O 6 = 6

Conditions go **above the arrow**: heat, sunlight, electric current, a catalyst, or a temperature or pressure.

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EXAM TIP

Balancing questions are almost always worth a mark in the board exam. Never change a **subscript** to balance: H_2O cannot become H_2O_2, because that is a different substance (hydrogen peroxide).

2 Types of chemical reactions

Type	General form	Example	How to spot it
Combination	A + B → AB	$CaO_{(s)} + H_2O_{(l)} \longrightarrow Ca(OH)_{2(aq)}$ + heat	Two or more reactants, one product
Decomposition	AB → A + B	$CaCO_{3(s)} \xrightarrow{\text{heat}} CaO_{(s)} + CO_{2(g)}$	One reactant breaks into simpler products; needs energy
Displacement	A + BC → AC + B	$Fe_{(s)} + CuSO_{4(aq)} \longrightarrow FeSO_{4(aq)} + Cu_{(s)}$	A more reactive element pushes out a less reactive one
Double displacement	AB + CD → AD + CB	$Na_2SO_{4(aq)} + BaCl_{2(aq)} \longrightarrow BaSO_{4(s)} + 2NaCl_{(aq)}$	Two compounds swap ions; often a precipitate forms
Redox	one substance oxidised, another reduced	$CuO_{(s)} + H_{2(g)} \xrightarrow{\text{heat}} Cu_{(s)} + H_2O_{(l)}$	Oxygen or hydrogen moves between substances

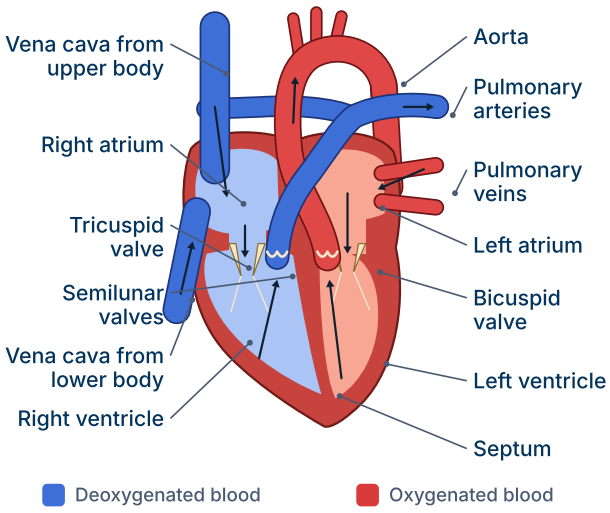
Three kinds of decomposition

Kind	Energy from	Example
Thermal	Heat	$2FeSO_{4(s)} \xrightarrow{\text{heat}} Fe_2O_{3(s)} + SO_{2(g)} + SO_{3(g)}$
Electrolytic	Electric current	$2H_2O_{(l)} \xrightarrow{\text{electric current}} 2H_{2(g)} + O_{2(g)}$
Photolytic	Light	$2AgCl_{(s)} \xrightarrow{\text{sunlight}} 2Ag_{(s)} + Cl_{2(g)}$

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- Aquatic animals breathe **faster** than land animals because water holds much less dissolved oxygen than air does.
- Plants exchange gases by diffusion through stomata, and through lenticels in stems.

3 Transportation



The human heart. Blue: deoxygenated blood; red: oxygenated.

Double circulation: blood passes through the heart **twice** in one complete round.

Body → vena cava → **right atrium** → **right ventricle** → pulmonary artery → lungs → pulmonary vein → **left atrium** → **left ventricle** → aorta → body.

Valves stop blood flowing backwards. Ventricles have thicker walls because they pump blood to organs.

Animal	Heart chambers
Fish	2 (blood passes once per circuit)
Amphibians, most reptiles	3
Birds, mammals	4 (complete separation: high energy needs, constant body temperature)

Vessel or component	Key feature
Artery	Carries blood away from the heart; thick, elastic walls (blood under high pressure)
Vein	Carries blood to the heart; thinner walls; valves
Capillary	Wall one cell thick; exchange with body cells
Platelets	Help blood to clot at a cut
Lymph	Tissue fluid; carries digested fat from the intestine; drains extra fluid back to the blood
Blood pressure	Normal: about 120 mm Hg (systolic) over 80 mm Hg (diastolic); measured with a sphygmomanometer

Xylem	Phloem
Carries water and minerals from the roots upwards	Carries food (sucrose) from leaves to other parts: **translocation**
Root pressure (at night) and **transpiration pull** (by day)	Uses energy from ATP; flow is in both directions
Made of vessels and tracheids (dead cells)	Made of sieve tubes and companion cells (living)

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For questions on Assertion (A) and Reason (R), choose: (a) both A and R are true and R is the correct explanation of A; (b) both A and R are true but R is not the correct explanation of A; (c) A is true but R is false; (d) A is false but R is true.

9. **Assertion (A):** Convex mirrors are used as rear-view mirrors in vehicles. [1]
Reason (R): A convex mirror always forms an erect, diminished image and gives a wider field of view.

10. **Assertion (A):** A concave lens can form a real image of a real object. [1]
Reason (R): A concave lens is a diverging lens.

SECTION B · SHORT ANSWER (2 MARKS EACH)

11. The refractive index of diamond is 2.42. Find the speed of light in diamond ($c = 3 \times 10^8$ m s^{-1}). [2]

12. A convex lens of power +4 D is placed in contact with a concave lens of power −1.5 D. Find the power and the focal length of the combination. Is it converging or diverging? [2]

13. State two differences between the image formed by a plane mirror and the image formed by a convex mirror. [2]

14. The refractive index of water is 1.33 and that of glass is 1.5. Find the refractive index of glass with respect to water. [2]

SECTION C · NUMERICALS (3 MARKS EACH)

15. An object 2 cm tall is placed 30 cm in front of a concave mirror of focal length 20 cm. Find the position, size and nature of the image. [3]

16. An object 6 cm tall is placed 30 cm from a convex lens of focal length 12 cm. Find the position, size and nature of the image. [3]

17. A convex rear-view mirror of a car has a radius of curvature of 3 m. A bus is 6 m behind the car. Find the position and magnification of the image of the bus. [3]

SECTION D · CASE-BASED (4 MARKS EACH)

18. [4]

An optician writes a prescription of −2.5 D for Neha's spectacles. Her friend's spectacles have lenses of +4.0 D.

(i) What type of lens does Neha need? (1)

(ii) Find the focal length of Neha's lens. (1)

(iii) If Neha's lens and her friend's lens were placed in contact, what would be the power and the nature of the combination? (2)

OR (iii) Define 1 dioptre. Why is the power of a convex lens taken as positive? (2)

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