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CLASS X · SCIENCE (086) · BIOLOGY · CBSE BOARD EXAMINATION 2027

CHAPTER 5

Life Processes

ATP · O_2 RA → RV

Chapter Practice Booklet · Questions only · Answers in the separate Answer Booklet

12 note blocks + 7 diagrams | 83 practice questions | 3 case studies | Board question index

INSIDE THIS BOOKLET

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STUDENT DETAILS

NAME _____

CLASS & SECTION _____

ROLL NO. _____

BOOKLET STARTED ON _____

CHAPTER TEST SCORE _____ / 20

1

READ THIS FIRST

Chapter Notes

The whole chapter in short-note form: every definition, activity, diagram, formula and reason. Revise from here – you should not need the textbook again.

1 Life processes and modes of nutrition

Life processes: the basic processes that together keep an organism alive and repair its body – **nutrition, respiration, transportation and excretion**. They go on even when we sleep.

- Living things show orderly, organised structure and **molecular movement**; without it there is no life.
- Single-celled organisms take in food, oxygen and remove waste by simple **diffusion** through the cell surface. In large multicellular organisms most cells are far from the surface, so diffusion is too slow: they need special organs.

Autotrophic nutrition	Heterotrophic nutrition
Organism makes its own food from CO_2 and water using sunlight (photosynthesis)	Organism takes ready-made food from other organisms
Green plants, some bacteria (autotrophs)	Animals, fungi, most bacteria (heterotrophs)

Heterotrophs: saprophytes break down food outside the body and absorb it (fungi such as bread mould, yeast, mushroom); **parasites** feed on a living host without killing it (Cuscuta/amar-bel, ticks, lice, leeches, tapeworm); **holozoic** animals take in whole food and digest it inside (Amoeba, humans).

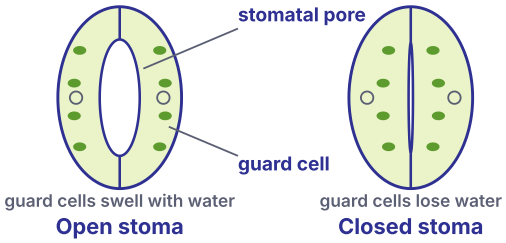
2 Photosynthesis

Photosynthesis: green plants take in CO_2 and water and, in the presence of sunlight and chlorophyll, make carbohydrates and release oxygen.

$$6\,CO_2 + 12\,H_2O \xrightarrow[\text{sunlight}]{\text{chlorophyll}} C_6H_{12}O_6 + 6\,O_2 + 6\,H_2O$$

- **Three events:** (i) **light energy is absorbed** by chlorophyll; (ii) light energy is changed to chemical energy and **water is split** into hydrogen and oxygen (the O_2 given out comes from water); (iii) **CO_2 is reduced** to carbohydrates.
- These need not happen one after another at once. **Desert plants** open their stomata at **night**, take in CO_2 and store it as an intermediate; in the day (stomata closed to save water) they use it with the light energy absorbed by chlorophyll.
- Extra carbohydrate is stored as **starch** (in animals, as **glycogen**).
- **Raw materials:** CO_2 from air (through stomata); water and minerals from soil (through roots); sunlight; chlorophyll in chloroplasts. Plants take **nitrogen** from soil as nitrates or nitrites (or organic compounds made by bacteria) and use it to make **proteins**. Phosphorus, iron and magnesium also come from soil.

3 Stomata and two key experiments



- **Stomata** are tiny pores, mostly on the lower surface of leaves. Gases are exchanged through them, and much water is lost through them as vapour.
- Each pore is guarded by two **guard cells**. When water flows into them they swell and the pore **opens**; when they lose water they shrink and the pore **closes**. The pore closes when CO_2 is not needed, to save water.

CHLOROPHYLL NEEDED

Keep a plant with a variegated leaf (green and white patches) in the dark for 3 days to remove starch. Put it in sunlight for some hours, boil a leaf in alcohol to remove chlorophyll, then add iodine. Only the parts that were **green** turn blue-black (starch formed).

CO_2 NEEDED

Take two destarched potted plants under separate bell jars, one with a watch glass of **potassium hydroxide** (absorbs CO_2). After some hours in sunlight, the iodine test shows starch only in the leaf from the jar **without** KOH.

4 How other organisms get food

- **Amoeba** (single cell) pushes out finger-like **pseudopodia**, which surround the food particle and form a **food vacuole**. The food is broken down inside the vacuole and the simple substances spread into the cytoplasm. Undigested matter is thrown out at the surface.
- **Paramecium** has a fixed shape; food enters at a **specific spot** (the cell mouth), moved there by hair-like **cilia**.
- In more complex animals, an **alimentary canal** – a long tube from mouth to anus – carries out different steps of digestion in different parts.
- Food must be broken into small, soluble molecules before it can be absorbed; **enzymes** (biological catalysts) do this.

5 Human digestive system – mouth to anus

Mouth	teeth chew; saliva mixes in salivary amylase: starch → sugar
Oesophagus	food pushed down by peristalsis (waves of muscle contraction)
Stomach	gastric juice: HCl, pepsin, mucus acid medium · pepsin digests proteins
Small intestine	bile + pancreatic + intestinal juice digestion ends · villi absorb food
Large intestine	absorbs extra water from the undigested food
Anus	undigested waste removed anal sphincter controls exit

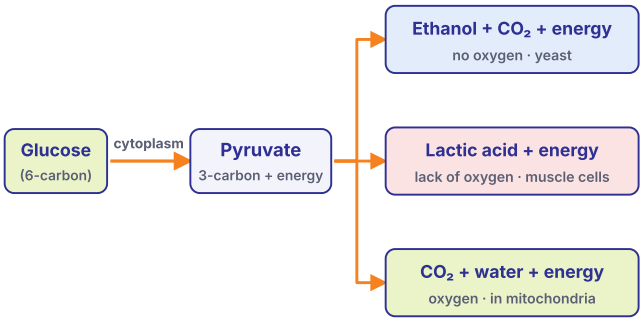
- The **tongue** mixes food with saliva; the teeth grind it, so enzymes act on a larger surface.
- **Peristalsis:** rhythmic contraction of muscles of the canal pushes food forward all along the tube.
- The exit of food from the stomach into the small intestine is controlled by a **sphincter** muscle.

6 Small intestine – digestion completed

Bile (liver; stored in gall bladder)	No enzyme. Makes the acidic food **alkaline** so pancreatic enzymes can act; **bile salts** break large fat globules into small ones (**emulsification**).
Pancreatic juice (pancreas)	**Trypsin** – digests proteins; **lipase** – breaks down emulsified fats; pancreatic amylase – starch.
Intestinal juice (walls of small intestine)	Final steps: proteins → **amino acids**; complex carbohydrates → **glucose**; fats → **fatty acids and glycerol**.

- **Villi**: finger-like folds of the inner lining; they give a very large surface area and are rich in blood vessels, which carry the absorbed food to every cell.
- **Herbivores** (grass eaters) have a **longer** small intestine, as cellulose takes long to digest; **carnivores** have a shorter one, as meat is easier to digest.
- **Large intestine** absorbs extra water; the rest is removed through the anus (controlled by the **anal sphincter**).
- **Tooth decay:** bacteria act on sugar left on teeth and make acids that soften enamel. Brushing after eating removes the sugar and bacteria.

7 Respiration – breaking down glucose

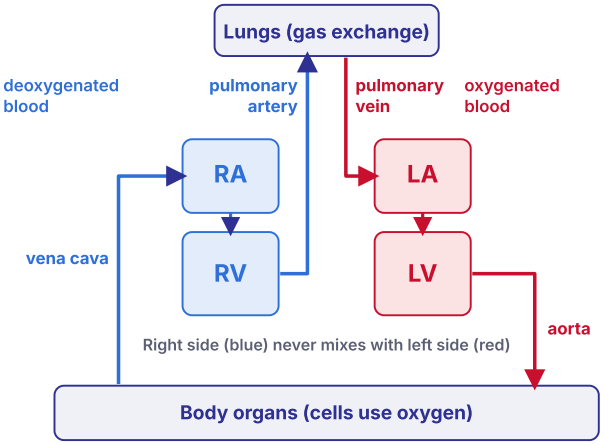


- The first step (glucose → pyruvate) always takes place in the **cytoplasm**.
- **Aerobic** respiration (with oxygen) in **mitochondria** releases much more energy than **anaerobic** respiration (without oxygen).
- During hard exercise our muscles run short of oxygen; pyruvate becomes **lactic acid**, which builds up and causes **cramps**.
- Energy is stored as **ATP** – the **energy currency** of the cell. ADP + phosphate → ATP stores energy; breaking the end phosphate bond releases 30.5 kJ/mol to drive muscle contraction, protein making, nerve impulses and so on.

8 Breathing and the human respiratory system

- **Path of air:** nostrils → pharynx → larynx → **trachea** → bronchi → bronchioles → **alveoli** (tiny air sacs) in the lungs.
- **Fine hairs and mucus** in the nose filter the air. **Rings of cartilage** in the throat keep the air passage from collapsing.
- **Breathing in:** the ribs are lifted and the **diaphragm** (a muscular sheet between chest and abdomen) **flattens**; the chest cavity becomes larger and air is sucked into the lungs. The lungs always hold a **residual volume** of air, so O_2 and CO_2 keep being exchanged.
- **Alveoli** have thin walls and a rich network of blood vessels; spread out, their surface would cover about **80 m²**.
- **Haemoglobin** (in red blood cells) is the respiratory pigment with a very high **affinity for oxygen**. CO_2 is more soluble in water, so it is carried mostly **dissolved in blood**.
- **Aquatic animals** breathe much faster than land animals, as the amount of oxygen dissolved in water is low. Fish use gills.
- **Plants** exchange gases by diffusion through stomata and stem lenticels. In the day, photosynthesis uses the CO_2 of respiration, so the net result is O_2 given out; at night CO_2 is given out.

9 Blood, blood vessels and the heart



- **Blood:** plasma (carries food, CO_2, nitrogenous wastes, salts), red cells (O_2), white cells, and **platelets** that clot blood to plug leaks at a cut.
- **Arteries** carry blood away from the heart; thick, elastic walls (high pressure). **Veins** bring blood back; thinner walls with **valves**. **Capillaries** have walls one cell thick, where exchange with cells takes place.
- **Double circulation:** blood passes through the heart **twice** in one round – body → right side → lungs → left side → body. Valves stop backflow. Ventricles have thicker walls than atria; the left ventricle is the thickest (it pumps to the whole body).

10 Hearts of animals, blood pressure and lymph

Fish	2 chambers; blood goes heart → gills → body → heart: passes through the heart only once in a round.
Amphibians, many reptiles	3 chambers; some mixing of oxygenated and deoxygenated blood is tolerated.
Birds, mammals	4 chambers; complete separation gives a very efficient supply of oxygen, needed for the high energy use of keeping body temperature constant.

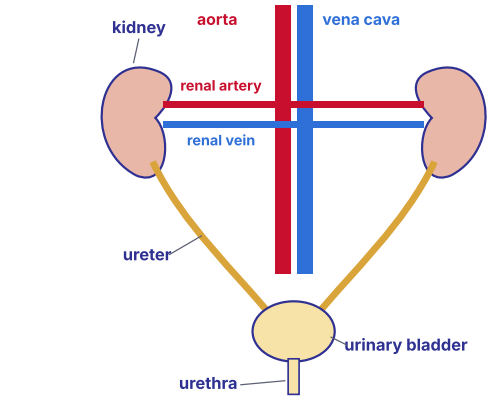
- **Blood pressure:** force of blood on the walls of a vessel. Normal: about **120 mm Hg** (systolic, ventricles contract) / **80 mm Hg** (diastolic, ventricles relax). Measured with a **sphygmomanometer**. High blood pressure (**hypertension**) is caused by narrowing of arterioles and can burst an artery.
- **Lymph** (tissue fluid): plasma, proteins and blood cells escape into spaces between cells; this fluid is lymph. It is **colourless**, has **less protein** than plasma, flows through lymph vessels back into veins, carries **absorbed fat** from the intestine and drains excess fluid from tissues.

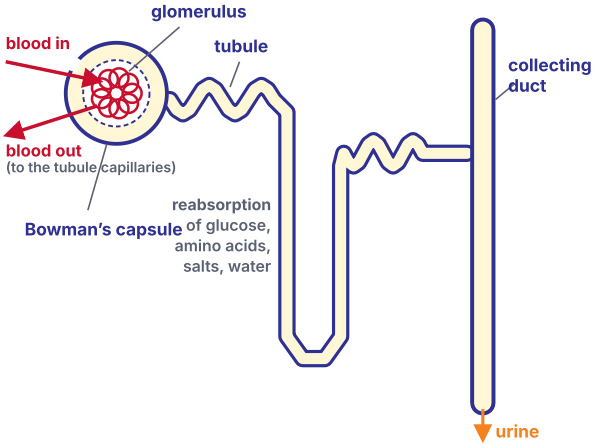
11 Transport in plants

Xylem	Phloem
Carries **water and minerals** from roots to leaves	Carries **food** (sucrose, amino acids) from leaves to other parts – **translocation**
Vessels and tracheids; one direction – upward	Sieve tubes and companion cells; up and down
Driven by root pressure and transpiration pull (no ATP)	Uses energy from **ATP**

- Root cells take up ions actively; the higher ion concentration draws water in from soil, pushing a steady column up the xylem (**root pressure**) – most important at **night**.
- **Transpiration:** loss of water as vapour from leaves (stomata). It creates a suction that pulls water up from the roots – the **main force in the day**. It also helps absorb minerals and keeps the plant cool.
- In phloem, sucrose is moved in using ATP; water enters by osmosis and the pressure pushes food to parts that need it (growing buds, storage organs).

12 Excretion in humans and plants





- **Excretory system:** two kidneys → ureters → urinary bladder (stores urine; under nervous control) → urethra.
- **Nephron** = filtration unit; each kidney has a large number. Blood is filtered in the **glomerulus** (capillary cluster) into **Bowman's capsule**. The filtrate has glucose, amino acids, salts, much water and urea; useful substances are **selectively reabsorbed** in the tubule. How much water is reabsorbed depends on how much excess water and waste the body has. About 180 L of filtrate gives only 1–2 L of urine a day.
- **Dialysis** (artificial kidney): blood flows through long tubes with a semi-permeable lining, in a tank of dialysing fluid; wastes pass out. There is **no reabsorption**.
- **Plants:** O_2 and CO_2 by diffusion; extra water by transpiration; wastes stored in leaves that fall, in cell **vacuoles**, as **gums and resins** in old xylem, or released into the soil.

Key comparisons

Most 3-mark 'differences' come from here

Compare	First	Second
Aerobic / anaerobic respiration	Needs O_2; ends in mitochondria; CO_2 + water; much energy	No O_2; only in cytoplasm; ethanol + CO_2 or lactic acid; little energy

Compare	First	Second
Arteries / veins	Away from heart; thick elastic walls; no valves; mostly oxygenated (not pulmonary artery)	To the heart; thin walls; valves; mostly deoxygenated (not pulmonary vein)
Xylem / phloem	Water and minerals; upward; no energy used	Food; both ways; uses ATP
Transpiration pull / root pressure	Main force in the day	Main force at night
Alveoli / nephron	Lungs; exchange O_2 and CO_2 by diffusion	Kidney; filter blood, reabsorb useful substances, form urine
Breathing / respiration	Taking air in and out of the lungs (physical)	Breaking down food in cells to release energy (chemical)

Explain why – quick answers

Common 1- and 2-mark reasons

Diffusion is not enough in humans – most cells are deep inside the body, far from the air.

Mucus lines the stomach – it protects the inner lining from hydrochloric acid.

Bile is needed though it has no enzyme – it makes food alkaline and emulsifies fats for lipase.

Herbivores have a longer small intestine – cellulose in grass needs more time to digest.

Villi are many and finger-like – they increase the surface area for absorption.

Muscles get cramps after a sprint – lactic acid builds up when oxygen runs short.

Aquatic animals breathe faster – water holds much less dissolved oxygen than air.

Rings of cartilage in the trachea – they stop the air passage from collapsing.

Ventricles have thicker walls – they pump blood out to the lungs and body.

Birds and mammals need a 4-chambered heart – high energy is used to keep body temperature constant.

Urine has no glucose – glucose is reabsorbed in the tubules of the nephron.

Water rises fastest in plants by day – transpiration from open stomata pulls the water column up.

Exam snapshot

What the board asks, and how to prepare

SYLLABUS 2026–27

- 'Living being'; basic concept of **nutrition, respiration, transport and excretion** in plants and animals.
- Whole NCERT chapter is in the 2026–27 syllabus.

BOARD WEIGHTAGE

30 / 80

Biology = 30 marks (Section A). Unit II **World of Living** (Ch 5–8) = 25 marks. This is the heaviest Biology chapter: about 8 marks in the 2026 board paper and 11 marks in the 2026–27 Sample Paper (MCQs, an A–R, 2-mark questions and a 5-mark question on hearts or breathing).

MOST ASKED IN BOARD AND SAMPLE PAPERS, 2025–2027 (5 PAPERS CHECKED)

How often	Question type	Marks	Papers
★★★	Nutrition in plants: photosynthesis, stomata, raw materials	1–3	4 of 5
★★★	Human digestion: juices, enzymes, villi, herbivore gut	1–5	5 of 5
★★★	Respiration: pathways, ATP, breathing, alveoli, haemoglobin	1–5	5 of 5
★★★	Heart, double circulation, blood vessels, lymph, blood pressure	1–5	4 of 5
★★☆	Transport in plants: xylem, phloem, transpiration	1–3	2 of 5
★★★	Excretion: nephron, kidney, dialysis, excretion in plants	1–5	5 of 5

MISTAKES THAT COST MARKS

- Calling bile an enzyme – it has **no enzyme**; bile salts emulsify fats.
- Saying pepsin works in an alkaline medium – it needs the **acidic** medium made by HCl.
- Writing that glucose becomes pyruvate in mitochondria – this step is in the **cytoplasm**.
- Saying all arteries carry oxygenated blood – the **pulmonary artery** carries deoxygenated blood (and the pulmonary vein carries oxygenated blood).
- Mixing up breathing and respiration, or saying plants respire only at night – they respire **all the time**.
- Writing 'urine is formed in the bladder' – it is formed in the **nephrons**; the bladder only stores it.

HOW TO USE THIS BOOKLET

1. **Day 1:** Read the notes and the key tables; then Part A (NCERT).
2. **Day 2:** Part B (Exemplar) and Part C (board pattern). Do every MUST DO question first.
3. **Day 3:** Part D (case studies) and the real board questions listed in Part E.
4. **Thu 10 Dec (zero period): Biology chapter test – 20 marks, 40 minutes.**
5. Check every answer in the **Answer Booklet**. Write each mistake on the My Mistakes page (Part F).

PART A · NCERT PRACTICE

A NCERT Practice

The ideas of every NCERT activity, in-text question and exercise, asked in new words. Finish every question.

Life processes and nutrition

A1. Why is diffusion enough for a single-celled organism but not for a human being to get oxygen? [2]
MUST DO

A2. What do we mean by life processes? Name the four basic life processes. [2]

A3. Distinguish between autotrophic and heterotrophic nutrition, giving two examples of organisms for each. [3]

A4. From where and through which part does a plant get each of these for photosynthesis: (i) carbon dioxide (ii) water (iii) nitrogen? [2]

A5. Write the balanced equation for photosynthesis and list the three events that take place during the process. MUST DO [3]

A6. Describe an activity to show that chlorophyll is necessary for photosynthesis. MUST DO [3]

A7. What are stomata? How are they opened and closed? MUST DO [2]

A8. How does Amoeba take in and digest its food? [2]

Human digestion

A9. What is the role of hydrochloric acid in our stomach? [2]

A10. What is the function of digestive enzymes? [1]

A11. How is the small intestine designed to absorb digested food? MUST DO [2]

A12. Name the three juices that act on food in the small intestine and state one function of each. MUST DO [3]

Respiration

A13. Give three differences between aerobic and anaerobic respiration. Name one organism that uses the anaerobic mode. MUST DO [3]

A14. How are the alveoli designed to make the exchange of gases as large as possible? MUST DO [2]

A15. Why do land animals have an advantage over aquatic animals in getting oxygen? What do aquatic animals do about it? [2]

A16. What would be the effect on a person whose blood has too little haemoglobin? [2]

Transportation

A17. Why is it necessary to keep oxygenated and deoxygenated blood separate in mammals and birds? MUST DO [2]

A18. What are the two parts of the transport system in a flowering plant, and what does each carry? [2]

A19. How are water and minerals carried from the soil to the leaves of a tall tree? MUST DO [3]

A20. How is food transported in plants? [2]

A21. Describe double circulation of blood in human beings. Why is it needed? MUST DO [3]

Excretion

A22. Describe the structure and working of a nephron. MUST DO [3]

A23. Give four ways in which plants get rid of their waste products. [2]

A24. How is the amount of urine produced regulated? [2]

A25. Compare the alveoli in the lungs and the nephrons in the kidneys in structure and function. [3]

PART B · EXEMPLAR PRACTICE

B Exemplar Practice

Exemplar-style questions, one step harder. Give a reason with every short answer.

Multiple choice

1 mark each

B1. Which order shows the parts of the human alimentary canal correctly? [1]

(a) Mouth → stomach → oesophagus → small intestine → large intestine
(b) Mouth → oesophagus → stomach → large intestine → small intestine
(c) Mouth → oesophagus → stomach → small intestine → large intestine
(d) Mouth → small intestine → stomach → oesophagus → large intestine

B2. A person's saliva has no salivary amylase. Which process in the mouth will not take place? [1]

(a) Proteins breaking into amino acids (b) Starch breaking into sugar
(c) Fats breaking into fatty acids (d) Absorption of glucose

B3. The inner lining of the stomach is protected from its own acid by: [1]

(a) pepsin (b) mucus (c) bile (d) saliva

B4. Through which part does a leaf take in carbon dioxide for photosynthesis? [1]

(a) Root hairs (b) Stomata (c) Phloem (d) Xylem vessels

B5. Pyruvate is broken down into carbon dioxide, water and energy in the: [1]

(a) cytoplasm (b) mitochondria (c) chloroplast (d) nucleus

B6. Which blood vessel brings oxygenated blood from the lungs to the heart? [1]

(a) Pulmonary artery (b) Pulmonary vein (c) Aorta (d) Vena cava

B7. Which of these animals has a three-chambered heart? [1]

(a) Fish (b) Frog (c) Pigeon (d) Rabbit

B8. The xylem in plants carries: [1]

(a) water and minerals (b) food
(c) amino acids only (d) oxygen

B9. The basic filtration unit of the kidney is the: [1]

(a) ureter (b) urethra (c) neuron (d) nephron

B10. When our muscle cells are short of oxygen, pyruvate changes into lactic acid. Where does this happen? [1]

(a) Cytoplasm (b) Chloroplast (c) Mitochondria (d) Nucleus

Short answer

2 marks each

B11. A person's bile duct is blocked. Digestion of which food will be affected most, and why? [2]

MUST DO

B12. What would happen to a cut if blood had no platelets? Explain. [2]

B13. Why are the walls of the ventricles thicker than those of the atria? Which ventricle has the thickest wall? [2]

B14. The lower surfaces of all the leaves of a potted plant are coated with petroleum jelly. Give two effects on the plant. [2]

B15. Why is ATP called the energy currency of the cell? How is it used? [2]

B16. Give two uses of transpiration to a plant. [2]

C · Board Pattern Practice

PART C · BOARD PATTERN

Question types from the 2025 and 2026 board papers and the CBSE sample papers. ★★★ = asked in 3 or more of the 5 papers checked · ★★ = 2 papers · ★ = 1 paper.

ASSERTION–REASON: HOW TO ANSWER

(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.

Nutrition in plants

★★★ 4 of 5 papers · 1–3 marks

C1. The oxygen given out by a plant during photosynthesis comes from: [1]

(a) carbon dioxide **(b)** water **(c)** glucose **(d)** chlorophyll

C2. Desert plants keep their stomata closed during the day. How do they get carbon dioxide for photosynthesis? [1]

(a) They take it in through the roots
(b) They take it in at night and store it as an intermediate for use in the day
(c) They do not need carbon dioxide
(d) They make it from oxygen

C3. ASSERTION–REASON [1]

Assertion (A): A leaf of a plant kept in the dark for three days does not turn blue-black with iodine.

Reason (R): In the dark there is no photosynthesis, and the starch already stored is used up by the plant.

C4. How do plants obtain nitrogen, and for what do they use it? [2]

C5. List the events of photosynthesis. How do desert plants manage photosynthesis while saving water? MUST DO [3]

C6. Describe an activity to show that carbon dioxide is needed for photosynthesis. MUST DO [3]

Human digestion

★★★ 5 of 5 papers · 1–5 marks

C7. Which pair of enzymes is found in pancreatic juice? [1]

(a) Pepsin and amylase **(b)** Trypsin and lipase
(c) Pepsin and trypsin **(d)** Salivary amylase and lipase

C8. Large fat globules are broken into smaller ones in the small intestine by: [1]

(a) lipase **(b)** bile salts
(c) hydrochloric acid **(d)** pepsin

C9. A cow has a much longer small intestine than a tiger because: [1]

(a) it eats more often (b) cellulose in grass takes longer to digest
(c) it drinks more water (d) meat needs more time to digest

C10. ASSERTION–REASON [1]
Assertion (A): Food coming from the stomach is acidic, but it becomes alkaline in the small intestine.
Reason (R): Bile from the liver makes the medium alkaline so that the pancreatic enzymes can act.

C11. Our mouth waters when we see tasty food. Name the juice and its enzyme, and state why we must also chew food well. [2]

C12. Name the three substances released by the gastric glands and state the role of each. MUST DO [3]

C13. Name the gland that makes each of the following, and state its function: (i) bile (ii) trypsin (iii) salivary amylase. MUST DO [3]

C14. Trace what happens to the starch in a piece of chapati from the mouth until it reaches the blood. [3]

Respiration and breathing

★★★ 5 of 5 papers · 1–5 marks

C15. Ethanol is an end product of respiration in: [1]

(a) human muscle cells during a race (b) yeast without oxygen
(c) mitochondria of leaf cells (d) red blood cells

C16. The energy currency of a cell is: [1]

(a) ADP (b) ATP (c) glucose (d) pyruvate

C17. Tube P has lime water through which a student breathes out with a straw. Tube Q has lime water through which room air is pumped with a syringe. What is seen? [1]

(a) P turns milky sooner, as breathed-out air has more CO_2
(b) Q turns milky sooner
(c) Both turn milky together
(d) Neither turns milky

C18. ASSERTION–REASON [1]
Assertion (A): Aquatic animals breathe much faster than land animals.
Reason (R): The amount of oxygen dissolved in water is low compared with the oxygen in air.

C19. ASSERTION–REASON [1]
Assertion (A): Haemoglobin is called a respiratory pigment.
Reason (R): Haemoglobin carries most of the carbon dioxide from the tissues to the lungs.

C20. Why do we sometimes get muscle cramps after running fast? MUST DO [2]

C21. Where is the diaphragm found? What happens to it and to the ribs when we breathe in? [2]

C22. Trace the path of air from the nostrils to the alveoli. Why are there rings of cartilage in the throat? [3]

C23. Show by a flow chart the breakdown of glucose (i) in yeast (ii) in our muscle cells short of oxygen (iii) in the presence of oxygen. Name where the first step takes place. MUST DO [3]

Heart, blood and circulation

★★★ 4 of 5 papers · 1–5 marks

C24. Which chamber of the human heart has the thickest muscular wall? [1]

(a) Right atrium (b) Left atrium (c) Right ventricle (d) Left ventricle

C25. Which statement about lymph is NOT correct? [1]

(a) It is a colourless fluid (b) It carries absorbed fat from the intestine
(c) It has more protein than blood plasma (d) It returns extra tissue fluid to the blood

C26. The normal blood pressure (systolic/diastolic) of a healthy adult is about: [1]

(a) 80/120 mm Hg (b) 120/80 mm Hg (c) 120/80 cm Hg (d) 160/100 mm Hg

C27. ASSERTION–REASON [1]

Assertion (A): In birds and mammals the right and left sides of the heart are completely separate.

Reason (R): Birds and mammals need a lot of energy to keep their body temperature constant.

C28. Name: (i) the vessel bringing deoxygenated blood from the body to the heart (ii) the vessel taking it to the lungs (iii) the chamber that receives blood from the lungs (iv) the vessel carrying oxygenated blood to the body. Why are valves present in the heart? MUST DO [3]

C29. Compare the hearts of a fish, a frog and a bird. Why is a bird's heart best suited to its needs? [3]

C30. What is blood pressure? Name the instrument used to measure it. What is hypertension caused by? [2]

Transport in plants

★★☆ 2 of 5 papers · 1–3 marks

C31. Food made in the leaves is carried to other parts of a plant through: [1]

(a) xylem vessels (b) phloem sieve tubes
(c) root hairs (d) stomata

C32. ASSERTION–REASON [1]

Assertion (A): In the daytime, water rises in the xylem mainly because of transpiration.

Reason (R): Evaporation of water from the leaves creates a suction that pulls water up from the roots.

C33. Give two differences between the transport of water and the transport of food in plants. [2]

Excretion

★★★ 5 of 5 papers · 1–5 marks

C34. Which of these is normally NOT present in the urine of a healthy person? [1]

(a) Urea (b) Water (c) Glucose (d) Salts

C35. The urinary bladder: [1]

(a) filters blood (b) stores urine
(c) makes urea (d) reabsorbs glucose

C36. ASSERTION–REASON [1]

Assertion (A): The fluid filtered into Bowman's capsule contains glucose, but urine does not.

Reason (R): Glucose is selectively reabsorbed as the filtrate passes along the tubule.

C37. Name the structural and functional unit of (i) the kidney (ii) the nervous system. [1]

C38. Give one difference in structure and one difference in function between alveoli and nephrons. Give one feature they share. [3]

C39. What is dialysis? When is it needed, and how is it different from the working of a kidney? [3]

Long answer

5 marks

C40. (a) Describe how blood flows through the four chambers of the human heart and the blood vessels joined to it. (b) What is double circulation? (c) Why do ventricles have thicker walls than atria? MUST DO [5]

C41. (a) Describe the digestion of food in the stomach and small intestine, naming the juices and their enzymes. (b) How is digested food absorbed? (c) What happens in the large intestine? MUST DO [5]

C42. (a) Name the organs of the human excretory system and state the function of each. (b) How is urine formed in a nephron? (c) How do plants get rid of excess water? [5]

D

PART D · SECTION A CASE STYLE

Case-Based Questions

Each case carries 4 marks (1 + 1 + 2), as in the case-based questions of the board paper.

D1. Case Study · The Sprint and the Dough [4]

Riya ran a 400 m race on Sports Day. Near the finish her leg muscles began to ache and cramp. That evening her mother mixed yeast into flour and water; after two hours the dough had risen and smelt faintly of alcohol. Her teacher explained that both events are linked to how cells break down glucose.

(i) Name the substance that built up in Riya's muscles and caused the cramp. [1]

(ii) Which gas made the dough rise? Name the process. [1]

(iii) Show the breakdown of glucose in yeast by a flow chart, and name the part of the cell where the first step happens. [2]

OR

(iii) Why does aerobic respiration release more energy than anaerobic respiration? Where in the cell is it completed? [2]

D2. Case Study · The Dialysis Ward [4]

Aman's grandfather has kidney failure and goes to hospital three times a week for dialysis. The doctor tells Aman that healthy kidneys filter about 180 litres of fluid from the blood each day, but only one or two litres leave the body as urine. The dialysis machine removes urea from the blood but returns nothing to it.

(i) Name the unit of the kidney that filters blood. [1]

(ii) The filtrate has glucose, but urine does not. Why? [1]

(iii) Explain how the dialysis machine cleans the blood and how its working differs from a nephron. [2]

OR

(iii) Trace the path of urine from the kidney to the outside, and state what decides how much water is reabsorbed. [2]

D3. Case Study · The Starch Test [4]

In the lab, students took three test tubes with equal amounts of starch solution. To tube A they added fresh saliva, to tube B saliva that had been boiled, and to tube C plain water. All three were kept warm (about 37 °C) for 20 minutes, and then a drop of iodine was added. Tube A stayed light brown; tubes B and C turned blue-black.

(i) In which tube was the starch digested? [1]

(ii) Why did tube B turn blue-black? [1]

(iii) Name the enzyme in saliva and the product it forms. Where in the canal is the digestion of starch completed? [2]

OR

(iii) Why must food be broken into small soluble molecules, and which structures absorb them? [2]

PART E · REAL BOARD QUESTIONS

E Board PYQ Index

Real questions from recent Science board papers and CBSE sample papers, by type. Open the official paper and solve the listed questions.

Frequency	Question type	Marks	Where asked (year: paper code, question number)	Practise here
★★★	**Nutrition in plants: photosynthesis, stomata, raw materials**	1–3	**2026:** 31/1/1 Q1 (stomata) · **2025:** Delhi Set 1 Q5 (nitrogen for proteins) · **SQP 2024–25:** Q23 (desert plants) · **SQP 2026–27:** Q1 (CO_2 and water in photosynthesis)	A3–A8, B4, B14, C1–C6
★★★	**Human digestion: juices, enzymes, villi, herbivore gut**	1–5	**2026:** 31/1/1 Q5 (pancreatic enzymes), Q11(a) (chewing and saliva) · **2025:** OD Set 1 Q12 (gastric juice) · **2025:** Delhi Set 1 Q29 (saliva, bile, pancreatic juice) · **SQP 2024–25:** Q10 (cellulose), Q23 OR (enzymes) · **SQP 2026–27:** Q10 (bile duct OR length of intestine)	A9–A12, B1–B3, B11, C7–C14, C41, D3
★★★	**Respiration: pathways, ATP, breathing, alveoli, haemoglobin**	1–5	**2026:** 31/1/1 Q9 (A–R, haemoglobin), Q10 (diaphragm) · **2025:** OD Set 1 Q27(c) (oxidation of glucose) · **2025:** Delhi Set 1 Q17 (A–R, respiratory pigments) · **SQP 2024–25:** Q8 (ATP), Q22 (alveoli) · **SQP 2026–27:** Q2 (lime water), Q8 (A–R, aquatic breathing), Q16 OR (breathing in)	A1, A13–A16, B5, B10, B15, C15–C23, D1
★★★	**Heart, double circulation, blood vessels, lymph, blood pressure**	1–5	**2025:** OD Set 1 Q29 (heart chambers and vessels) · **2025:** Delhi Set 1 Q6 (lymph) · **SQP 2024–25:** Q9 (circulation) · **SQP 2026–27:** Q16 (hearts of fish, birds, mammals)	A17, A21, B6–B7, B12–B13, C24–C30, C40
★★☆	**Transport in plants: xylem, phloem, transpiration**	1–3	**2025:** OD Set 1 Q18 (A–R, xylem) · **SQP 2024–25:** Q29 (water from soil to leaves)	A18–A20, B8, B16, C31–C33
★★★	**Excretion: nephron, kidney, dialysis, excretion in plants**	1–5	**2026:** 31/1/1 Q14(a) (nephron vs neuron) · **2025:** OD Set 1 Q11 (nephron) · **2025:** Delhi Set 1 Q23 (excretion in plants) · **SQP 2024–25:** Q22 (nephron vs alveoli) · **SQP 2026–27:** Q3 (reabsorption)	A22–A25, B9, C34–C39, C42, D2

PAPERS CHECKED (5)

- 2026 board paper 31/1/1 (Set 1) – first paper with separate Biology, Chemistry and Physics sections
- 2025 board paper, Outside Delhi Set 1
- 2025 board paper, Delhi Set 1
- CBSE Sample Question Paper 2024–25
- CBSE Sample Question Paper 2026–27 (the pattern for your exam)

★★★ = asked in 3 or more of the 5 papers checked · ★★ = 2 papers · ★ = 1 paper. Codes: OD = Outside Delhi. Each paper was read question by question; questions from the 2026–27 Sample Paper after Q20 were checked from a summary of the paper. Download the official papers from cbse.gov.in → Previous Year Question Papers and cbseacademic.nic.in → Sample Question Papers, and solve the exact questions listed.

F

PART F · YOUR RECORD

My Mistakes

Write down each mistake from this chapter, including the chapter test.

Every wrong answer is a free lesson. Write it here, find the rule you missed, and redo the question after three days. Bring this page to class before the chapter test.

Date	Part & Q No.	What went wrong	Correct rule or method	Redone ✓