Prodigy Educlasses

Class 10 Crash course notes

Subject: Biology

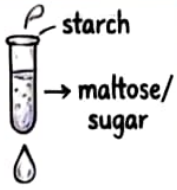
Chapter: Life Processes



Life Processes – Nutrition in Plants & Animals – CBSE PYQs (2020-2025)

2025

- **Less saliva affects starch to sugar conversion?**



Saliva has salivary amylase (optimum pH ~6.8 in mouth) → hydrolyses starch to maltose. Less saliva = slow/incomplete digestion of starch; less maltose formed, impaired carbohydrate digestion.

2025

PYQ

Assertion – Reason

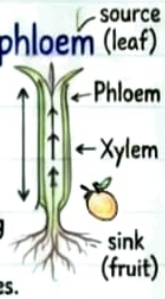
Assertion (A): Animals will not get energy energy if they eat coal as food.

Reason (R): Specific enzymes are needed for breakdown of a particular food.

Answer: Both A and R are true and R is correct explanation of A.

2024

- **Translocation through phloem**



Phloem transports food (sucrose) from **source** (leaf) → **to** sink (roots, fruits, storage organs). Bidirectional movement. Requires energy (ATP) for loading/unloading of sucrose into phloem. Allows distribution of photosynthates.

2024

- **Photosynthesis equation**

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

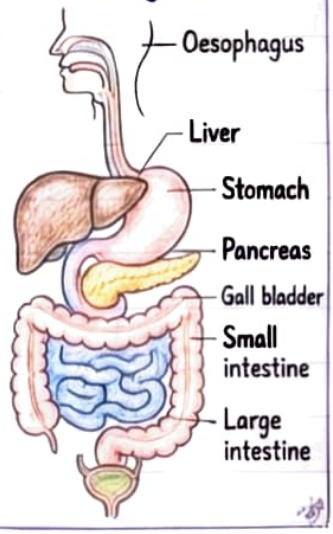
(Chlorophyll, sunlight)

1. Light reaction – light energy absorbed by chlorophyll: H_2O split, O_2 released, ATP & NADPH formed (in grana).
2. Fixation (Calvin cycle) – CO_2 fixed into 3-C compound in stroma.
3. Reduction – ATP & NADPH used to reduce fixed carbon to glucose.

Stomata open when guard cells become turgid (water in) → gaseous exchange.

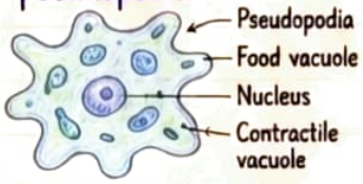
2024

- **Human alimentary canal diagram**



2023

- **Amoeba nutrition with pseudopodia**



1. Ingestion – pseudopodia engulf food.
2. Digestion – enzymes break down food in vacuole.
4. Absorption – nutrients diffuse into cytoplasm.
5. Assimilation – nutrients used for growth/energy.
6. Egestion – undigested waste expelled.

2023

- **Autotrophic vs Heterotrophic**

	Autotrophic	Heterotrophic
1. Nutrition	Make own food	Depend on others for food
2. Example	Green plants, algae	Animals, fungi
3. Chlorophyll	Present	Absent
4. Mode	Photosynthesis/ Chemosynthesis	Ingestion & digestion

2022

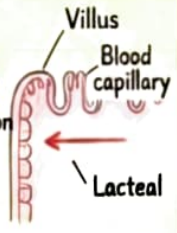
- **Herbivores longer small intestine**

Cellulose digestion needs more **time** & microbes (symbiotic bacteria/protozoa). Longer small intestine & caecum in herbivores (e.g., cow) provide large surface & retention time for microbial fermentation than carnivores (e.g., tiger/lion).



2022

- **Villi function**



Finger-like projections in small intestine – increase surface area for absorption of digested food. Contain blood capillary and lacteal.

2022

- **Stomata**



Tiny pores on **leaf epidermis** for gaseous exchange (CO_2 in, O_2 out) & transpiration. Guard **cells** regulate **opening;** become turgid → **stomatal** pore opens; **flaccid** → **closes.** Contain **chloroplasts.**

2020

- **Salivary amylase**

Enzyme in saliva; breaks down starch → maltose (in mouth, pH ~6.8, optimum). Initiates carbohydrate **digestion;** starch hydrolysed to maltose/disaccharides.



2020

- **Liver – bile emulsification**



Bile (no enzyme) **emulsifies fats** → **breaks** large fat globules **into** smaller droplets; **increases** surface **area** for **lipase action.**

2020

- **Pancreatic enzymes**
  - Trypsin – proteins → peptides
  - Lipase – fats → fatty acids + glycerol
  - Pancreatic amylase → starch → maltose



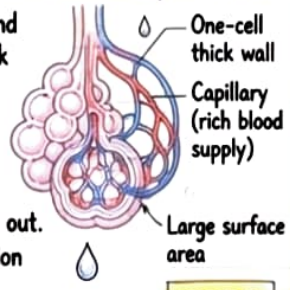
Life Processes – Respiration in Plants & Animals – CBSE PYQs (2020–2025)

2025

• Why alveoli have thin walls and capillaries?

Alveoli have one-cell thick walls and are surrounded by a dense network of capillaries.

- Large surface area for gaseous exchange.
- Rich blood supply ensures fast diffusion of O_2 into blood and CO_2 out.
- Thin (one-cell) wall reduces diffusion distance → efficient exchange.



2025

PYQ

— —

Assertion – Reason

Assertion (A): Breathing rate increases during heavy exercise.

Reason (R): During exercise, muscle cells need more O_2 and produce more CO_2, so breathing rate increases to supply O_2 and remove CO_2.

Answer: Both A and R are true and R is correct explanation of A.

2024

• What is breathing vs respiration?

Breathing

- Physical process
- Inhalation and exhalation of air
- Occurs in lungs
- Involves diaphragm, ribs

Respiration

- Biochemical process
- Breakdown of glucose to release energy
- Occurs in cells (mitochondria)
- $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy

Energy

2024

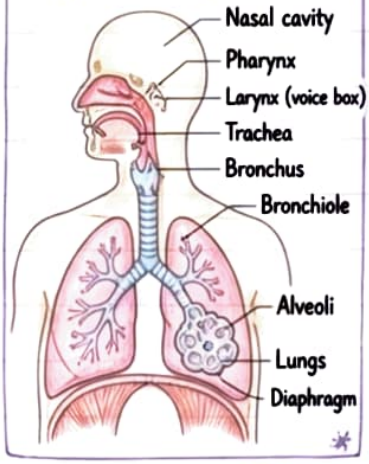
• Aerobic vs Anaerobic

	Aerobic	Anaerobic
1. Oxygen	O_2 present No O_2	
2. Site	In mitochondria Cytoplasm (yeast & muscle)	
3. End products	$CO_2 + H_2O$ + 38 ATP In yeast: Ethanol + CO_2 + 2 ATP In muscle: Lactic acid + 2 ATP	
4. Example	Most plants & animals Yeast, bacteria, muscle during exercise	

$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + Energy

2024

• Human respiratory system diagram



2023

• How does exchange occur in plants?

1. Stomata in leaves – for CO_2 in, O_2 out.
2. Lenticels in stem – gaseous exchange through bark.
3. Root hairs – exchange O_2/CO_2 in soil.
4. Diffusion – gases move from high to low conc.
5. Guard cells become turgid → stomatal pore opens; flaccid → closes.







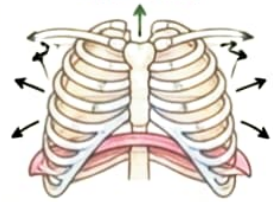
2023

• Pathway of air inin humans?

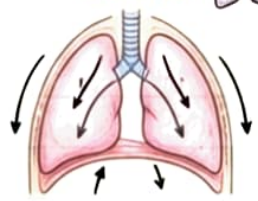
Nostril (Nasal cavity) → Pharynx → Larynx → Trachea → Bronchi → Bronchioles → Alveoli

2022

• Diaphragm and ribs movement



Diaphragm contracts & flattens; Ribs move up & out; Thoracic volume ↑; Pressure ↓; Air in



Diaphragm relaxes & domes; Ribs move down & in; Volume ↓; Pressure ↑; Air out

2022

• Why breathing rate increases during exercise?

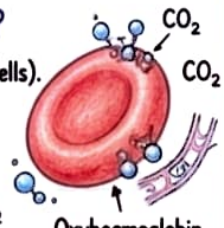


- Muscles work harder → more energy demand.
- Need more O_2 for aerobic respiration.
- More CO_2 produced as waste.
- Breathing rate & depth increase to supply O_2 quickly and remove CO_2.

2021

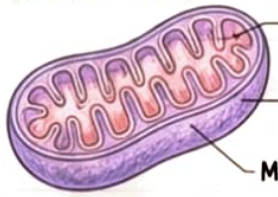
• Role of haemoglobin?

- Present in RBCs (Red Blood Cells).
- Binds with O_2 to form oxyhaemoglobin in lungs.
- Carries O_2 to body tissues.
- Also helps in transport of CO_2 (as carbaminohaemoglobin) back to lungs.



2020

• Mitochondria



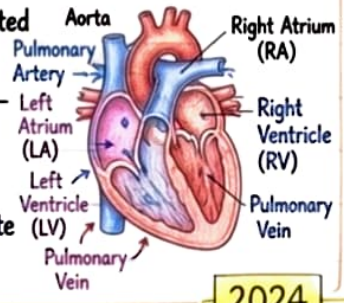
Powerhouse of the cell; Site of aerobic respiration; Produces 38 ATP.

Life Processes – Transportation in Plants & Animals – CBSE PYQs (2020–2025)

2025

• Why is heart divided into 4 chambers?

- Prevents mixing of oxygenated and deoxygenated blood.
- Enables double circulation —
  - Pulmonary circulation
  - Systemic circulation
- Keeps O_2-rich blood separate → efficient supply to body.



2025

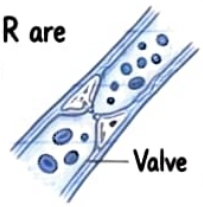
PYQ

Assertion – Reason

Assertion (A): Veins have valves.

Reason (R): To prevent backflow of blood.

Answer: Both A and R are true and R is correct explanation of A.



2024

• What is transpiration?

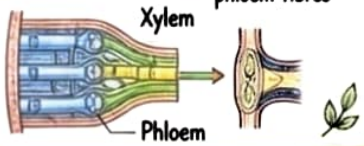
- Loss of water vapour from aerial parts of plant through stomata.
- Creates transpiration pull → helps in ascent of sap.
- Also cools the plant.



2024

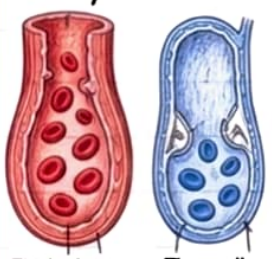
• Xylem vs Phloem

	Xylem	Phloem
1. Nature	Dead tissue (at maturity)	Living tissue
2. Transport	Water + minerals	Food (sucrose)
3. Direction	One way — upward ↑	Bidirectional ↑↓
4. Components	Tracheids, vessels, xylem parenchyma, xylem fibres	Sieve tubes, companion cells, phloem parenchyma, phloem fibres



2024

• Blood vessels



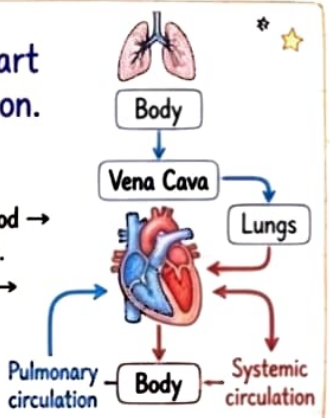
Artery	Vein	Capillary
Thick elastic wall	Thin wall	One-cell thick
Small lumen	Large lumen	Exchange of materials
No valve	Valves present	

Artery → Vein → Capillary

2023

• Describe human heart and double circulation.

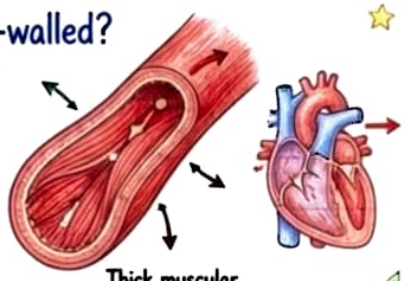
- Heart has 4 chambers — RA, RV, LA, LV.
- Right side: deoxygenated blood → lungs (pulmonary circulation).
- Left side: oxygenated blood → body (systemic circulation).
- Valves — tricuspid, bicuspid (mitral), pulmonary, aortic prevent backflow.



2023

• Why are arteries thick-walled?

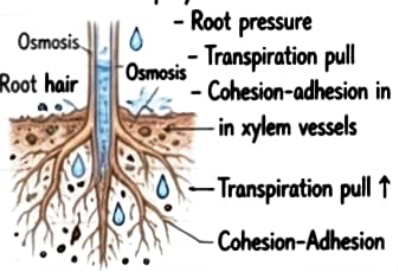
- Carry blood at high pressure from heart.
- Thick elastic & muscular walls withstand pressure.
- Help maintain blood pressure (elastic recoil).
- No valves needed (high pressure, one-way flow).



2022

• How is water transported in plants?

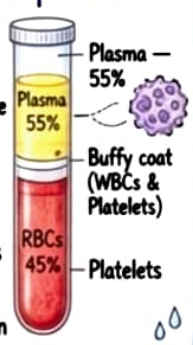
1. Root hairs absorb water by osmosis.
2. Water moves through cortex → endodermis.
3. Enters xylem in root.
4. Ascent of sap by:
   - Root pressure
   - Transpiration pull
   - Cohesion-adhesion in in xylem vessels



2021

• Function of platelets and plasma?

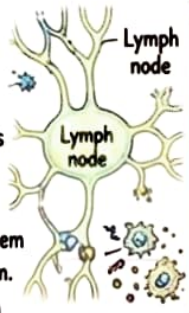
- Platelets —
  - Cell fragments in blood
  - Help in clotting of blood at injury site
  - Release thromboplastin
- Plasma (55% of blood) —
  - Straw-coloured fluid
  - Carries nutrients, hormones, enzymes
  - Transports waste (urea, CO_2)
  - Contains fibrinogen, albumin, globulin



2020

• What is lymph?

- Fluid that leaks from blood capillaries into intercellular spaces.
- Colourless, contains WBCs (mainly lymphocytes), no RBCs.
- Drains into lymphatic system → finally into bloodstream.
- Helps in fighting infection & immunity.

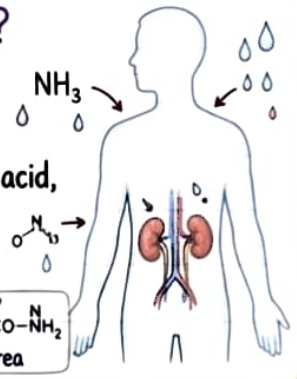


Life Processes – Excretion in Plants & Animals – CBSE PYQs (2020–2025)

2025

• What is excretion?

- Removal of metabolic nitrogenous wastes
- Main wastes: urea, uric acid, ammonia
- From body to maintain homeostasis.

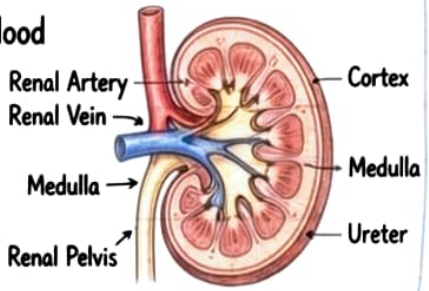


2025 — Assertion — Reason

Assertion (A): Kidneys are main excretory organs.

Reason (R): They filter blood and form urine.

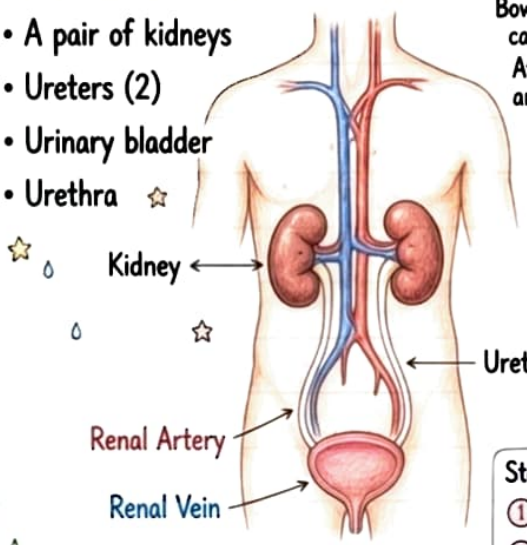
Answer: Both A and R are true and R is correct explanation of A.



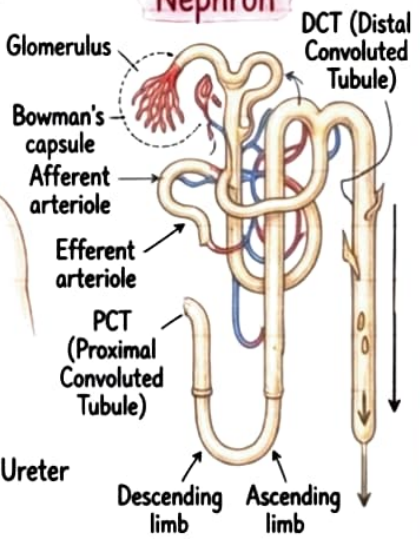
2024

• Describe human excretory system and nephron.

- A pair of kidneys
- Ureters (2)
- Urinary bladder
- Urethra



Nephron



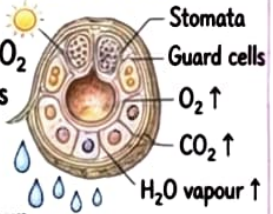
Steps:
① Glomerular filtration
② Selective reabsorption
③ Tubular secretion

Urine composition: 95% urea salts (Na^+, Cl^-)

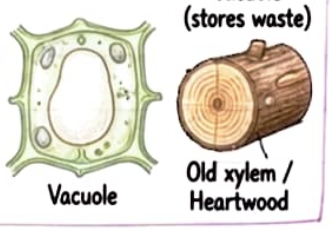
2023

• How do plants excrete?

- Stomata release O_2 and CO_2 (gaseous exchange)
- Transpiration — loss of water vapour
- Shedding — old leaves, bark
- Gums, resins exuded from bark
- Storing waste in vacuoles
- Old xylem stores waste (heartwood)



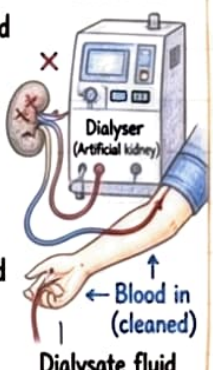




2022

• Why is dialysis needed?

- Kidney failure — cannot filter blood
- Accumulation of urea, excess salts & water
- Haemodialysis — artificial kidney
- Blood cleaned and returned to body



2021

• Function of nephron parts?

• Glomerulus	Filters blood (ultrafiltration)
• PCT	Reabsorbs glucose, amino acids, salts, water (≈70%)
• Loop of Henle	Reabsorbs water & concentrates urine
• DCT	Selective reabsorption of ions (Na^+, $Ca2^+$)
• Collecting duct	Final urine concentration; water reabsorption (ADH)

2020

• What is urine formation and micturition?

- Formation occurs in nephron (filtration, reabsorption, secretion)
- Urine stored in urinary bladder
- Bladder stretches → signal to brain
- Sphincter muscles relax
- Micturition — passage of urine out through urethra

