Class 10 Biology – Life Processes

Unit II: World of Living | CBSE, ICSE & International Boards

Introduction

Life processes are the essential activities that help living organisms survive, grow, and maintain life. This chapter covers nutrition, respiration, transportation, and excretion in plants and animals.

Characteristics of Living Organisms

Nutrition, respiration, growth, movement, excretion, reproduction, response to stimuli, and cellular organization.

Nutrition

Nutrition is the process of obtaining and utilizing food. Autotrophic nutrition occurs in plants through photosynthesis, while heterotrophic nutrition occurs in animals and fungi.

Photosynthesis

$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$. Requires sunlight, chlorophyll, water, and carbon dioxide.

Human Digestive System

Digestive pathway: Mouth → Oesophagus → Stomach → Small Intestine → Large Intestine → Rectum → Anus.

Respiration

Respiration releases energy from food. Aerobic respiration uses oxygen; anaerobic respiration occurs without oxygen.

Transportation

In humans, transportation is carried out by the circulatory system. In plants, xylem transports water and phloem transports food.

Excretion

Excretion removes metabolic wastes. The nephron is the functional unit of the kidney.

Important Comparisons

Photosynthesis vs Respiration

Photosynthesis	**Respiration**
Produces food	Releases energy
Uses CO_2	Uses O_2
Releases O_2	Releases CO_2
Requires sunlight	Occurs continuously

Xylem vs Phloem

Xylem	**Phloem**
Transports water	Transports food
Upward movement	Bidirectional movement
Mostly dead cells	Mostly living cells

Aerobic vs Anaerobic Respiration

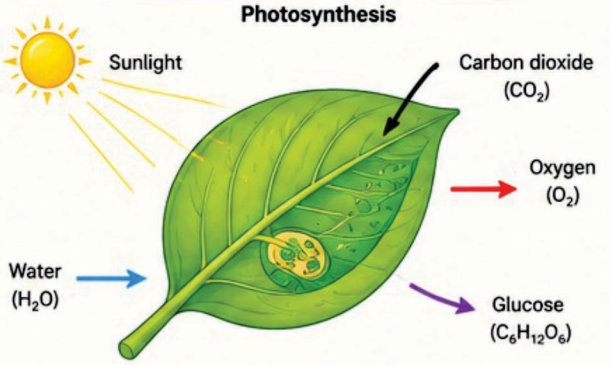
Aerobic	**Anaerobic**
Uses oxygen	No oxygen
More energy	Less energy
Complete breakdown	Incomplete breakdown

Quick Revision Summary

- Life processes are essential for survival.
- Nutrition provides food and energy.
- Photosynthesis is the basis of food production.
- Respiration releases energy from food.
- The circulatory system transports materials.
- Xylem transports water and minerals.
- Phloem transports food.
- Kidneys remove nitrogenous waste.
- Nephron is the functional unit of the kidney.
- Plants remove waste through diffusion, storage, and transpiration

1. NUTRITION IN PLANTS

Photosynthesis



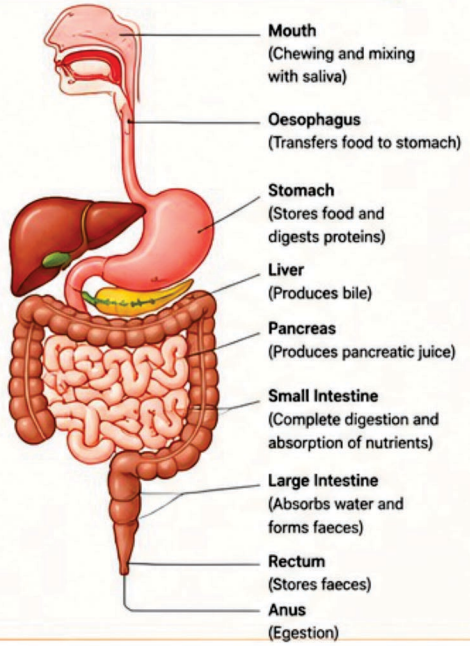
Equation

$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

Importance

- Produces food
- Releases oxygen
- Maintains atmospheric balance
- Basis of food chains

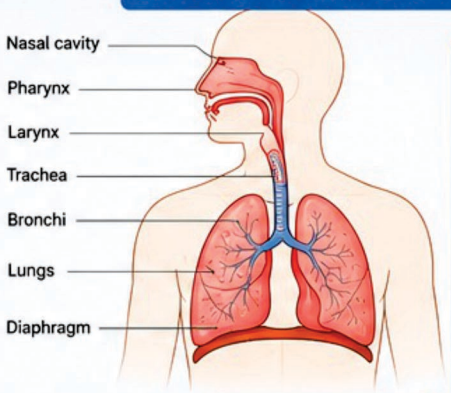
2. HUMAN DIGESTIVE SYSTEM



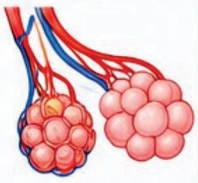
Steps of Nutrition

1. Ingestion
2. Digestion
3. Absorption
4. Assimilation
5. Egestion

3. HUMAN RESPIRATORY SYSTEM



Alveoli (Air Sacs)



- Thin walls
- Rich blood supply
- Large surface area
- Site of gas exchange

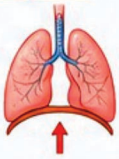
Mechanism of Breathing

Inhalation

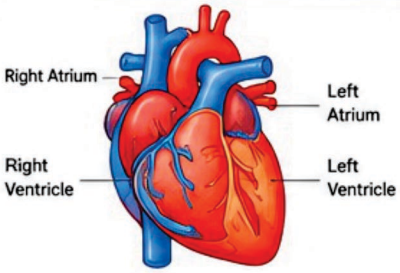
- Diaphragm contracts
- Chest cavity expands
- Air enters the lungs

Exhalation

- Diaphragm relaxes
- Chest cavity reduces
- Air leaves the lungs



4. TRANSPORTATION IN HUMANS



Double Circulation

Blood passes through the heart twice during one complete cycle.

Pulmonary Circulation

Heart → Lungs → Heart

Systemic Circulation

Heart → Body → Heart

Blood

- Plasma – transports nutrients, hormones, wastes
- RBCs – carry oxygen (haemoglobin)
- WBCs – fight infection
- Platelets – help in clotting

Blood Vessels

- Arteries – carry blood away from heart (thick walls)
- Veins – carry blood towards heart (valves present)
- Capillaries – exchange of materials (very thin walls)

5. TRANSPORTATION IN PLANTS

Xylem

Transports water and minerals from roots to leaves.

- Unidirectional (Upward)

Phloem

Transports food (prepared in leaves) to all parts of the plant.

- Bidirectional (Up & Down)

Transpiration

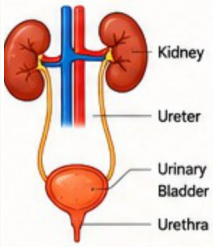
Loss of water vapour from leaves through stomata.

- Helps in cooling
- Helps in transport of water and minerals

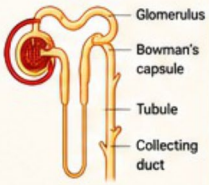
6. EXCRETION IN HUMANS AND PLANTS

A. In Humans

Human Excretory System



Nephron – Functional unit of kidney



Functions of Nephron

1. **Ultrafiltration** – Filtration of blood
2. **Reabsorption** – Reabsorption of useful substances
3. **Secretion** – Additional wastes added
4. **Urine formation** – Final waste product formed

Composition of Urine

Water, Urea, Salts, Uric acid, Creatinine

B. In Plants

Diffusion
Through stomata and lenticels.

Storage
Wastes stored in leaves, bark, fruits.

Resins & Gums
Wastes converted into resins, gums and latex.

Transpiration
Removal of excess water.

Life Processes Question Bank

Section A: Very Short Answer Questions (1 Mark)

1. Define life processes.
2. What is nutrition?
3. Name the process by which green plants prepare food.
4. What is the raw material required for photosynthesis?
5. Name the pigment that absorbs sunlight.
6. Define autotrophic nutrition.
7. Define heterotrophic nutrition.
8. Name one saprophytic organism.
9. Name one parasitic plant.
10. What is ingestion?
11. What is digestion?
12. What is assimilation?
13. What is respiration?

Section B: Short Answer Questions (2–3 Marks)

1. Differentiate between living and non-living organisms.
2. State any three characteristics of living organisms.
3. Explain autotrophic nutrition with an example.
4. What are the requirements for photosynthesis?
5. Write the balanced chemical equation of photosynthesis.
6. Differentiate between autotrophic and heterotrophic nutrition.
7. What are the different types of heterotrophic nutrition?
8. Explain the role of saliva in digestion.
9. What is peristalsis?
10. Explain the functions of the stomach.
11. Why the small intestine is considered the main site of digestion?
12. Differentiate between aerobic and anaerobic respiration.
13. State any three adaptations of alveoli.

Section C: Long Answer Questions (4–5 Marks)

1. Explain the process of photosynthesis with a labelled diagram.
2. Describe the human digestive system and its functions.
3. Explain the process of aerobic respiration.
4. Describe the structure and function of alveoli.
5. Explain the mechanism of breathing in humans.
6. Describe the structure of the human heart.
7. Explain double circulation with a suitable diagram.
8. Describe transportation in plants.
9. Explain the structure and functions of xylem and phloem.
10. Describe the structure and working of a nephron.
11. Explain the process of urine formation.
12. Compare transportation in plants and animals.
13. Explain excretion in humans and plants.

HOTS (Higher Order Thinking Skills)

1. Why can plants survive without a circulatory system like humans?
2. What would happen if stomata remained closed permanently?
3. Why is aerobic respiration more efficient than anaerobic respiration?
4. Why do athletes breathe faster after running?
5. Explain why humans require a four-chambered heart.
6. How does transpiration help plants during hot weather?
7. Predict what would happen if phloem tissue is damaged.
8. Why are alveoli numerous and microscopic?
9. How does the nephron maintain water balance in the body?
10. Explain the relationship between photosynthesis and respiration.

Board Exam Most Important Questions

⭐ Explain photosynthesis with equation and diagram.

⭐ Describe the structure and working of a nephron.

⭐ Explain double circulation in humans.

⭐ Differentiate between xylem and phloem.

⭐ Explain aerobic and anaerobic respiration.

⭐ Describe the human digestive system.

⭐ Explain transportation in plants.

⭐ State the importance of transpiration.

⭐ Explain the role of alveoli in respiration.