

# UNIQUE STUDY POINT

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<b>Class:</b> X	<b>Subject:</b> Science	<b>Session:</b> 2025-26
<b>Chapter:</b> 05 - Life Processes	<b>Time:</b> 1½ Hours	<b>Max. Marks:</b> 40

## General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

## SECTION A - Multiple Choice Questions (1 mark each)

1. Which of the following is the primary function of stomata in plants?
  - (a) Absorption of water from soil
  - (b) Exchange of gases during photosynthesis and respiration
  - (c) Transport of food materials
  - (d) Storage of excess food
2. The enzyme salivary amylase acts on:
  - (a) Proteins
  - (b) Fats
  - (c) Starch
  - (d) Vitamins
3. Which chamber of the human heart receives oxygenated blood from the lungs?
  - (a) Right atrium
  - (b) Right ventricle
  - (c) Left atrium
  - (d) Left ventricle
4. The breakdown of glucose in the absence of oxygen is called:
  - (a) Aerobic respiration
  - (b) Anaerobic respiration
  - (c) Photosynthesis
  - (d) Transpiration
5. Which blood vessel carries deoxygenated blood from the heart to the lungs?
  - (a) Pulmonary vein
  - (b) Pulmonary artery

- (c) Aorta
  - (d) Vena cava
6. The functional unit of the kidney is:
- (a) Neuron
  - (b) Nephron
  - (c) Alveolus
  - (d) Villus
7. Which part of the digestive system is responsible for the complete digestion of food?
- (a) Stomach
  - (b) Large intestine
  - (c) Small intestine
  - (d) Oesophagus
8. Chlorophyll is present in which organelle of plant cells?
- (a) Mitochondria
  - (b) Chloroplast
  - (c) Nucleus
  - (d) Ribosome
9. The process by which plants lose water in the form of vapour is:
- (a) Respiration
  - (b) Excretion
  - (c) Transpiration
  - (d) Photosynthesis
10. Which tissue in plants is responsible for transporting water and minerals?
- (a) Phloem
  - (b) Xylem
  - (c) Parenchyma
  - (d) Collenchyma

### SECTION B - Short Answer Questions (2 marks each)

11. Explain why herbivores have longer small intestine compared to carnivores.
12. What is the role of hydrochloric acid in the stomach?
13. Why do ventricles have thicker muscular walls than atria?
14. How do guard cells regulate the opening and closing of stomatal pores?

### SECTION C - Short Answer Questions (3 marks each)

15. Describe the process of nutrition in Amoeba with the help of key steps.
16. Explain the pathway of air from nostrils to alveoli in human respiratory system.
17. What is double circulation? Why is it necessary in human beings?

### SECTION D - Long Answer Question (5 marks)

**18.** Describe the structure and function of a nephron. How does it help in the formation of urine?

### SECTION E - Case Study Based Questions (4 marks each)

#### **19. Case Study 1:**

Photosynthesis is the process by which green plants prepare their own food using carbon dioxide and water in the presence of sunlight and chlorophyll. The process involves absorption of light energy by chlorophyll, conversion of light energy to chemical energy, and reduction of carbon dioxide to carbohydrates. Oxygen is released as a by-product. The carbohydrates produced are either used immediately or stored as starch for future use.

Based on the above information, answer the following:

- (i) What is the role of chlorophyll in photosynthesis? (1 mark)
- (ii) Why is photosynthesis considered an endothermic reaction? (1 mark)
- (iii) How can you prove that chlorophyll is essential for photosynthesis? (2 marks)

#### **20. Case Study 2:**

The human heart is a muscular organ about the size of a fist. It has four chambers - two atria and two ventricles. The right side receives deoxygenated blood from the body and pumps it to the lungs, while the left side receives oxygenated blood from the lungs and pumps it to the body. Valves ensure one-way flow of blood. The separation of oxygenated and deoxygenated blood is essential for efficient oxygen supply to body cells.

Based on the above information, answer the following:

- (i) Why does the left ventricle have thicker walls than the right ventricle? (1 mark)
- (ii) What is the function of valves in the heart? (1 mark)
- (iii) Explain why separation of oxygenated and deoxygenated blood is important in mammals. (2 marks)

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SECTION A - Answers to MCQs

1. (b) Exchange of gases during photosynthesis and respiration

Stomata are tiny pores present on the surface of leaves that facilitate massive amounts of gaseous exchange for photosynthesis and respiration.

2. (c) Starch

Salivary amylase is an enzyme present in saliva that breaks down starch (a complex carbohydrate) into simple sugars.

3. (c) Left atrium

The left atrium receives oxygen-rich blood from the lungs through pulmonary veins.

4. (b) Anaerobic respiration

When glucose is broken down in the absence of oxygen, it is called anaerobic respiration, producing less energy than aerobic respiration.

5. (b) Pulmonary artery

The pulmonary artery carries deoxygenated blood from the right ventricle to the lungs for oxygenation.

6. (b) Nephron

The nephron is the basic structural and functional unit of the kidney responsible for filtering blood and forming urine.

7. (c) Small intestine

The small intestine is the site of complete digestion of carbohydrates, proteins, and fats with the help of various enzymes.

8. (b) Chloroplast

Chlorophyll, the green pigment essential for photosynthesis, is present in chloroplasts.

9. (c) Transpiration

Transpiration is the loss of water in the form of water vapour from the aerial parts of the plant, mainly through stomata.

10. (b) Xylem

Xylem tissue consists of vessels and tracheids that transport water and minerals from roots to all parts of the plant.

SECTION B - Answers to Short Answer Questions

11. Longer small intestine in herbivores

**Answer:** Herbivores eat grass and plant material which contains cellulose, a complex carbohydrate that is difficult to digest. The longer small intestine provides more time and surface area for the cellulose to be completely digested and absorbed. In contrast, carnivores eat meat which is easier to digest, so they have a shorter small intestine.

## 12. Role of hydrochloric acid in stomach

**Answer:** Hydrochloric acid in the stomach performs two important functions:

- It creates an acidic medium (pH 1-2) which is necessary for the enzyme pepsin to work effectively on proteins
- It kills harmful bacteria and microorganisms that may enter with food, thus protecting the body from infections

## 13. Thicker walls of ventricles

**Answer:** Ventricles have thicker muscular walls compared to atria because they need to pump blood to various organs of the body with greater force. The atria only need to transfer blood to the ventricles below them, which requires less force. The left ventricle has even thicker walls than the right ventricle as it pumps blood to the entire body, while the right ventricle only pumps blood to the lungs.

## 14. Regulation by guard cells

**Answer:** Guard cells regulate the opening and closing of stomatal pores based on water availability:

- When water flows into guard cells, they swell and become turgid, causing the stomatal pore to open
- When guard cells lose water, they shrink and become flaccid, causing the stomatal pore to close

This mechanism helps control water loss and gas exchange according to the plant's needs.

## SECTION C - Answers to Short Answer Questions

### 15. Nutrition in Amoeba

**Answer:** Amoeba is a unicellular organism that follows these steps for nutrition:

**1. Ingestion:** Amoeba uses temporary finger-like extensions called pseudopodia to engulf food particles. The pseudopodia surround the food and fuse together to form a food vacuole.

**2. Digestion:** Inside the food vacuole, complex food substances are broken down into simpler ones by digestive enzymes.

**3. Absorption:** The digested simple molecules diffuse from the food vacuole into the surrounding cytoplasm for use in various life processes.

**4. Egestion:** The undigested food material is moved to the cell surface and expelled out of the cell.

### 16. Pathway of air in respiratory system

**Answer:** The pathway of air from nostrils to alveoli is as follows:

**1. Nostrils:** Air enters through the nostrils where it is filtered by fine hairs and warmed and moistened by mucus.

**2. Pharynx and Larynx:** Air passes through the throat region. Rings of cartilage in the larynx prevent the air passage from collapsing.

**3. Trachea:** Air moves down the windpipe, which is also supported by cartilage rings.

**4. Bronchi:** The trachea divides into two bronchi, each leading to a lung.

**5. Bronchioles:** Within the lungs, bronchi divide into smaller and smaller tubes called bronchioles.

**6. Alveoli:** Bronchioles finally terminate in balloon-like structures called alveoli where gas exchange occurs.

## 17. Double circulation

**Answer:** Double circulation means that blood passes through the heart twice during one complete circuit of the body.

**Pulmonary circulation:** Deoxygenated blood from the right ventricle goes to the lungs for oxygenation and returns to the left atrium.

**Systemic circulation:** Oxygenated blood from the left ventricle is pumped to all body parts and deoxygenated blood returns to the right atrium.

**Necessity:** Double circulation is necessary in mammals and birds because:

- It ensures complete separation of oxygenated and deoxygenated blood

- This allows highly efficient oxygen supply to body cells
- It supports the high energy requirements needed to maintain constant body temperature in warm-blooded animals

## SECTION D - Answer to Long Answer Question

### 18. Structure and function of nephron

**Answer:** The nephron is the basic filtration unit of the kidney. Each kidney contains millions of nephrons.

#### Structure:

- **Bowman's capsule:** A cup-shaped structure that contains a cluster of blood capillaries called glomerulus
- **Glomerulus:** A network of thin-walled blood capillaries where filtration occurs
- **Tubular part:** A long coiled tube connected to Bowman's capsule where reabsorption takes place
- **Collecting duct:** The tubule opens into this duct which carries urine to the ureter

#### Function in urine formation:

**1. Filtration:** Blood enters the glomerulus under high pressure. Water, glucose, amino acids, salts, urea, and other small molecules are filtered into Bowman's capsule. This fluid is called filtrate.

**2. Reabsorption:** As the filtrate flows through the tubular part, useful substances like glucose, amino acids, salts, and most of the water are selectively reabsorbed back into the blood capillaries surrounding the tubule. The amount of water reabsorbed depends on body needs.

**3. Secretion:** Additional waste substances and excess salts are secreted into the tubule from blood.

**4. Excretion:** The remaining fluid, now called urine containing urea, excess salts and water, flows into the collecting duct and eventually to the ureter, bladder, and out through urethra.

This process maintains the body's water balance and removes nitrogenous wastes effectively.

## SECTION E - Answers to Case Study Based Questions

### 19. Case Study 1 - Photosynthesis

**(i) Role of chlorophyll (1 mark):**

Chlorophyll absorbs light energy from the sun and converts it into chemical energy. It is the green pigment that captures light energy necessary to drive the photosynthesis reaction.

**(ii) Why photosynthesis is endothermic (1 mark):**

Photosynthesis is an endothermic reaction because it requires energy input in the form of sunlight to convert simple substances (CO<sub>2</sub> and water) into complex substances (glucose). Energy is absorbed and stored in the chemical bonds of glucose.

**(iii) Proving chlorophyll is essential (2 marks):**

We can prove this using a variegated leaf experiment:

- Take a variegated leaf (with green and non-green areas) from a plant kept in sunlight
- Mark and trace the green areas
- Boil the leaf in water, then in alcohol to remove chlorophyll
- Test with iodine solution
- Only the previously green areas turn blue-black, indicating starch presence
- This proves that chlorophyll-containing areas can perform photosynthesis and produce starch, while non-green areas cannot.

## 20. Case Study 2 - Human Heart

**(i) Thicker walls of left ventricle (1 mark):**

The left ventricle has thicker muscular walls than the right ventricle because it needs to pump oxygenated blood to all parts of the body against high resistance. The right ventricle only pumps blood to the nearby lungs, which requires less force.

**(ii) Function of valves (1 mark):**

Valves in the heart ensure one-way flow of blood. They prevent the backflow of blood when the chambers contract, ensuring that blood moves in the correct direction - from atria to ventricles and from ventricles to arteries.

**(iii) Importance of blood separation (2 marks):**

Separation of oxygenated and deoxygenated blood is important in mammals because:

- Mammals are warm-blooded animals that need to maintain constant body temperature
- This requires high energy which can only be provided by efficient oxygen supply
- Complete separation ensures that only fully oxygenated blood reaches body tissues
- This maximizes oxygen delivery to cells for efficient energy production through aerobic respiration
- Mixed blood would reduce oxygen concentration and decrease metabolic efficiency.

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