Board – CBSE	Class – 10th	Topic – Life Processes

1. Why is diffusion insufficient to meet the oxygen requirements of multi-cellular organisms like humans?

Ans. Multicellular organisms such as humans possess complex body designs. They have specialized cells and tissues for performing various necessary functions of the body such as intake of food and oxygen. Unlike unicellular organisms, multicellular cells are not in direct contact with the outside environment. Therefore, diffusion cannot meet their oxygen requirements.

2. What criteria do we use to decide whether something is alive?

Ans. Any visible movement such as walking, breathing, or growing is generally used to decide whether something is alive or not. However, a living organism can also have movements, which are not visible to the naked eye. Therefore, the presence of life processes is a fundamental criterion that can be used to decide whether something is alive or not.

3. What are outside raw materials used by an organism?

Ans. An organism uses outside raw materials mostly in the form of food and oxygen. The raw materials required by an organism can be quite varied depending on the complexity of the organism and its environment.

4. What processes would you consider essential for maintaining life?

Ans. Life processes such as nutrition, respiration, transportation, excretion, etc. are essential for maintaining life.

5. What are the differences between autotrophic nutrition and heterotrophic nutrition?

Ans.

	Autotrophic nutrition		**Heterotrophic nutrition**
(i)	Food is synthesized from simple inorganic raw materials such as CO_2 and water.	(i)	Food is obtained directly or indirectly from autotrophs. This food is broken down with the help of enzymes.
(ii)	The presence of green pigment (chlorophyll) is necessary.	(ii)	No pigment is required in this type of nutrition.

(iii)	Food is generally prepared during day time.	(iii)	Food can be prepared at all times.
(iv)	All green plants and some bacteria have this type of nutrition.	(iv)	All animals and fungi have this type of nutrition.

6. Where do plants get each of the raw materials required for photosynthesis?

Ans. The following raw materials are required for photosynthesis.

- The raw material CO_2 enters the atmosphere through stomata.
- Water is absorbed from the soil by the plant roots.
- Sunlight, an important component to manufacture food, is absorbed by the chlorophyll and other green parts of the plants.

7. What is the role of the acid in our stomach?

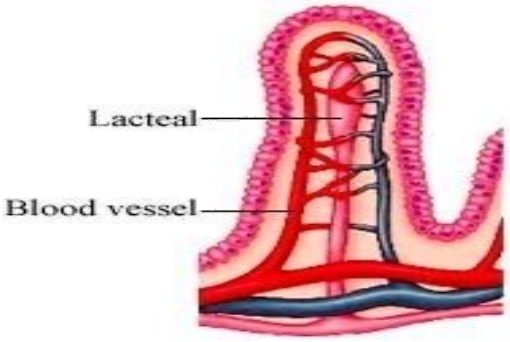
Ans. Following are the roles of acid in our stomach.

1. The hydrochloric acid present in our stomach dissolves bits of food and creates an acidic medium. In this acidic medium, the enzyme pepsinogen is converted to pepsin, which is a protein-digesting enzyme.

2. The hydrochloric acid kills the harmful microbes that enter with food and thus prevents infection of the digestive tract.

8. What is the function of digestive enzymes?

Ans. Digestive enzymes such as amylase, lipase, pepsin, trypsin, etc. help in the breaking down of complex food particles into simple ones. These simple particles can be easily absorbed by the blood and thus transported to all the cells of the body.



Enlarged view of a villus

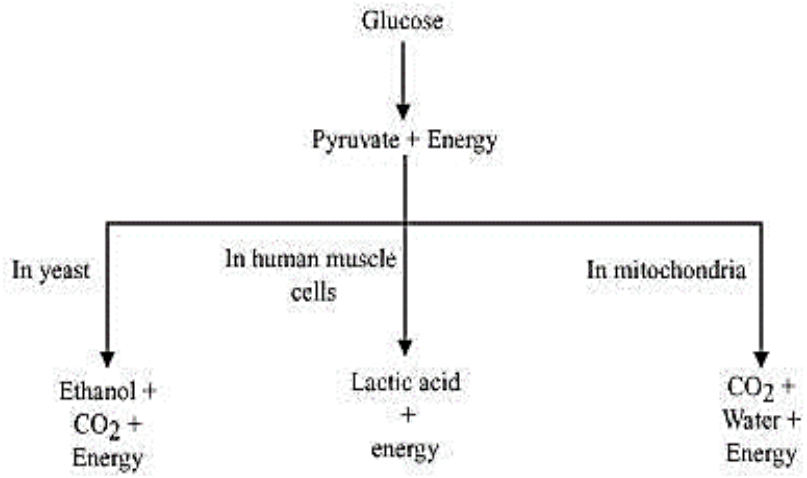
9. What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Ans. Terrestrial organisms take up oxygen from the atmosphere whereas aquatic animals need to utilize oxygen present in the water. Air contains more O2 as compared to water. Since the content of O2 in the air is high, terrestrial animals do not have to breathe faster to get more oxygen. Therefore, unlike aquatic animals, terrestrial animals do not have to show various adaptations for better gaseous exchange.

10. What are the different ways in which glucose is oxidized to provide energy in various organisms?

Ans. Glucose is first broken down in the cell cytoplasm into a three-carbon molecule called pyruvate. Pyruvate is further broken down into different ways to provide energy.

The breakdown of glucose by different pathways can be illustrated as follows.

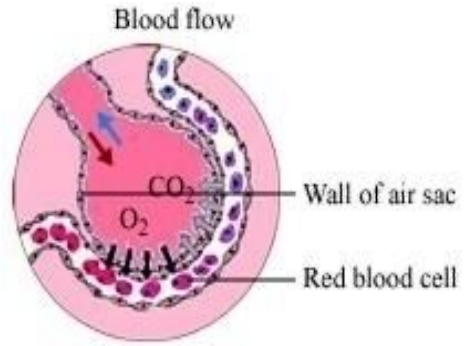


In yeast and human muscle cells, the breakdown of pyruvate occurs in the absence of oxygen whereas, in mitochondria, the breakdown of pyruvate occurs in the presence of oxygen.

11. How are oxygen and carbon dioxide transported in human beings?

Ans. Haemoglobin transports oxygen molecules to all the body cells for cellular respiration. The haemoglobin pigment present in the blood gets attached to four O_2molecules that are obtained from breathing. It thus forms oxyhaemoglobin and the blood becomes oxygenated. This oxygenated blood is then distributed to all the body cells by the heart. After giving away $O_2$to the body cells, blood takes away CO_2which is the end product of cellular respiration. Now the blood becomes de-oxygenated.

Since haemoglobin pigment has less affinity for CO_2, CO_2 is mainly transported in the dissolved form. This de-oxygenated blood gives $CO_2$to lung alveoli and takes O_2 in return.



Transportation of O_2 and CO_2 in blood

12. How are the lungs designed in human beings to maximize the area for the exchange of gases?

Ans. The exchange of gases takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli. Thus, alveoli are the site for an exchange of gases. The lungs get filled up with air during the process of inhalation as ribs are lifted up and the diaphragm is flattened. The air that is rushed inside the lungs fills the numerous alveoli present in the lungs.

Each lung contains 300-350 million alveoli. These numerous alveoli increase the surface area for gaseous exchange making the process of respiration more efficient.

13. What are the components of the transport system in human beings? What are the functions of these components?

Ans. The main components of the transport system in human beings are the heart, blood, and blood vessels.

- The heart pumps oxygenated blood throughout the body. It receives deoxygenated blood from the various body parts and sends this impure blood to the lungs for oxygenation.
- Being a fluid connective tissue, blood helps in the transport of oxygen, nutrients, CO_2, and nitrogenous wastes.
- The blood vessels (arteries, veins, and capillaries) carry blood either away from the heart to various organs or from various organs back to the heart.

14. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans. Warm-blooded animals such as birds and mammals maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies

when they are in a cooler environment. Hence, these animals require more oxygen (O_2) for more cellular respiration so that they can produce more energy to maintain their body temperature.

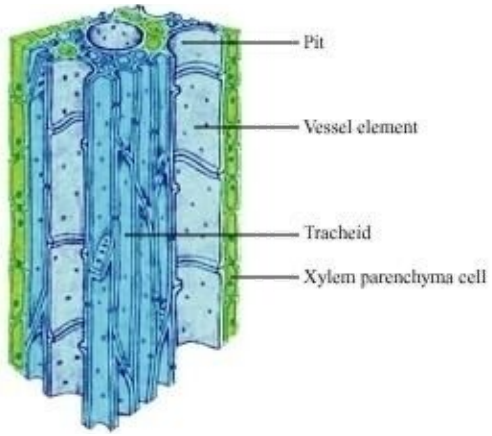
Thus, it is necessary for them to separate oxygenated and de-oxygenated blood, so that their circulatory system is more efficient and can maintain their constant body temperature.

15. What are the components of the transport system in highly organized plants?

Ans. In highly organized plants, there are two different types of conducting tissues — xylem and phloem. Xylem conducts water and minerals obtained from the soil (via roots) to the rest of the plant. Phloem transports food materials from the leaves to different parts of the plant body.

16. How are water and minerals transported in plants?

Ans. The components of xylem tissue (tracheids and vessels) of roots, stems, and leaves are interconnected to form a continuous system of water-conducting channels that reaches all parts of the plant. Transpiration creates a suction pressure, as a result of which water is forced into the xylem cells of the roots. Then there is a steady movement of water from the root xylem to all the plant parts through the interconnected water-conducting channels.

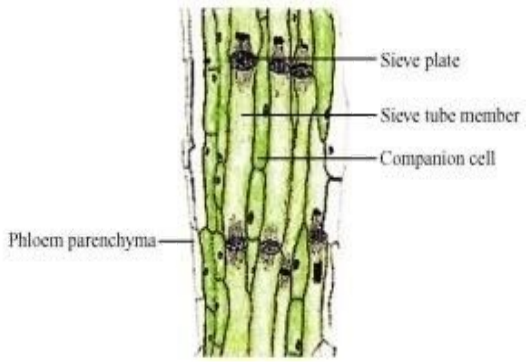


Components of xylem tissue

17. How is food transported in plants?

Ans. Phloem transports food materials from the leaves to different parts of the plant body. The transportation of food in phloem is achieved by utilizing energy from ATP. As a result of this, the osmotic pressure in the tissue increases causing water to move into it. This pressure moves the material in the phloem to the tissues which have less pressure. This is helpful in moving

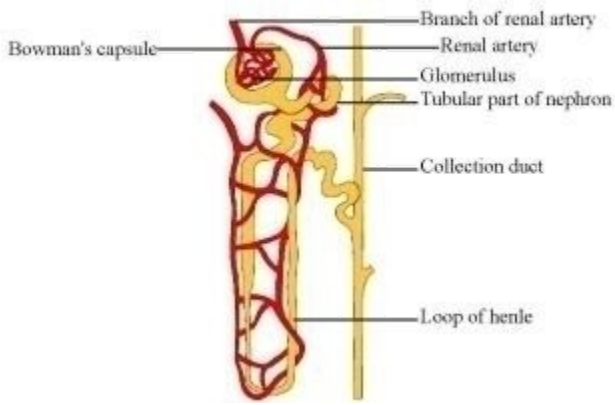
materials according to the needs of the plant. For example, the food material, such as sucrose, is transported into the phloem tissue using ATP energy.



Components of phloem tissue

18. Describe the structure and functioning of nephrons.

Ans. Nephrons are the basic filtering units of kidneys. Each kidney possesses a large number of nephrons, approximately 1-1.5 million. The main components of the nephron are the glomerulus, Bowman's capsule, and a long renal tubule.



Structure of a nephron

Functioning of a nephron.

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with the glomerulus.
- The water and solute are transferred to the nephron at Bowman's capsule.
- In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively reabsorbed and unwanted molecules are added to the urine.
- The filtrate then moves down into the loop of Henle, where more water is absorbed.

- From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. The collecting duct collects urine from many nephrons.
- The urine formed in each kidney enters a long tube called a ureter. From the ureter, it gets transported to the urinary bladder and then into the urethra.

19. What are the methods used by plants to get rid of excretory products?

Ans. Plants can get rid of excess water by transpiration. Waste materials may be stored in the cell vacuoles or as gum and resin, especially in old xylem. It is also stored in the leaves that later fall off.

20. How is the amount of urine produced regulated?

Ans. The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as the habitat of an organism and hormones such as Anti-diuretic hormone (ADH) also regulate the amount of urine produced.