

**QUESTIONS****PAGE NUMBER 95**

**1. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?**

**Solution:**

Multi-cellular organism's like humans have very big body and require a lot of oxygen to diffuse into body quickly in order to meet the oxygen requirement. Diffusion is a slow process which will take a lot of time to circulate oxygen to all the body cells. Because of its slow nature diffusion is insufficient to meet the oxygen requirements of multicellular organisms like humans.

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

**Solution:**

Walking, breathing, growth and other visible changes can be used to determine whether something is alive or dead. However some living things will have changes that are not visible to our eye; Hence, presence of life process is a fundamental criteria to decide whether something is alive.

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

**Solution:**

Outside raw material is used by organism for food and oxygen. Raw materials requirement varies on the complexity of the organism and the environment it is living.

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

**Solution:**

Life processes such as respiration, digestion, excretion, circulation and transportation are essential for maintain life.

**QUESTIONS****PAGE NUMBER 101**

**1. What are the differences between autotrophic nutrition and heterotrophic nutrition?**

**Solution:**

Autotrophic Nutrition	Heterotrophic Nutrition
Organism prepare its own food and is not dependent on any other organism.	Organism does not prepare its own food and dependent on other organism for food.
Food is prepared from $\text{CO}_2$ , water, sunlight.	Food cannot be prepared from $\text{CO}_2$ , water, sunlight.
Chlorophyll is required for food preparation	Chlorophyll is not required for food preparation
Green plants and certain bacteria have autotrophic mode of nutrition.	All the animals and fungi, most bacteria have heterotrophic mode of nutrition

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

**Solution:**

Plants required the following raw material for photosynthesis

1.  $\text{CO}_2$  is obtained from atmosphere through stomata
2. Water is absorbed by plant roots from the soil.
3. Sunlight is an essential raw material for photosynthesis
4. Nutrients are obtained by soil by plant roots

**3. What is the role of the acid in our stomach?**

**Solution:**

HCL present in the stomach dissolves food particles and creates an acidic medium. In acidic environment protein digesting enzymes pepsinogen is converted into pepsin. HCL in the stomach also acts as protective barrier against many disease causing pathogens.

**4. What is the function of digestive enzymes?**

**Solution:**

Digestive enzymes breaks the complex food molecules into simpler ones. This will make the food absorption process easy and effective. Absorbed food is transported to all parts

of the body by blood.

**5. How is the small intestine designed to absorb digested food?**

**Solution:**

Small intestine has small projections called as micro villi which increases the surface volume which make absorption more effective. Within the villi there are numerous blood vessels that absorb digested food and carry it to blood stream. Blood transports food to each part of our body.

## QUESTIONS

## PAGE NUMBER 105

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

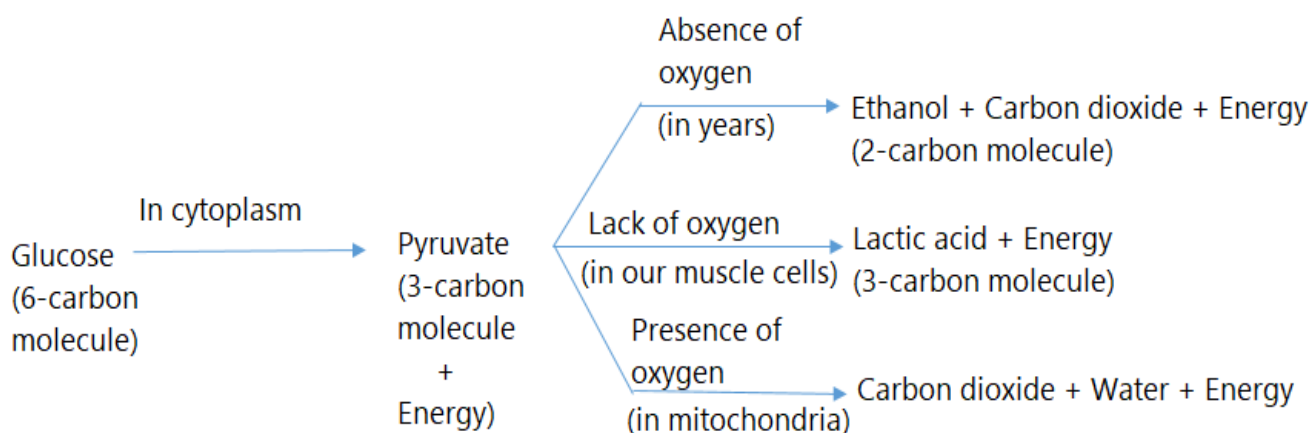
**Solution:**

Terrestrial organisms breathe by using atmospheric oxygen whereas aquatic organism take oxygen dissolved in water. Oxygen level is high in atmosphere when compared to oxygen in water. Hence terrestrial organism need not breathe fast to obtain organism whereas aquatic organisms need to breathe faster to get required oxygen.

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

**Solution:**

In cytoplasm Glucose is first broken down into two 3 carbon compounds called as pyruvate by the process known as Glycolysis. Further breakdown takes place in different organism by different processes.



**3. How is oxygen and carbon dioxide transported in human beings?**

**Solution:**

Oxygen and Carbon-di-oxide is transported in human being via blood stream. Oxygen is carried to the cells whereas carbon-di-oxide is carried away from the cells. Exchange of gases takes place between the alveoli of lungs and the surrounding blood capillaries.

Oxygen is absorbed by the blood capillaries from the lungs alveoli by diffusion while carbon-dioxide is absorbed by the lungs alveoli from blood capillaries by diffusion.

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

**Solution:**

- The lungs is an important part of the body. The passage inside the lungs divides into smaller and smaller tubes, which finally terminate in balloon-like structures, called as alveoli.
- The alveoli provide a surface where the exchange of gases can take place. The walls of the alveoli usually contains an extensive network of blood vessels. We know that, when we breathe in, we lift our ribs, flatten our diaphragm and chest cavity becomes larger.
- Because of this action, air is sucked into the lungs and fills the expanded alveoli.
- The blood brings the essential carbon dioxide from rest of the body and supply it to alveoli; the oxygen in the alveolar air is taken up by the blood in the alveolar blood vessels to be transported to the all other cells of the body. During the normal breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and carbon dioxide to be released.

**QUESTIONS****PAGE NUMBER 110**

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

**Solution:**

Heart, blood and blood vessels are the main components of transport system in human beings.

**Functions of these components**

**Heart**

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.

**Blood**

Blood transports oxygen, nutrients, CO<sub>2</sub>, and nitrogenous wastes.

**Blood vessels**

Blood vessels, arteries and veins carry blood to all parts of body.

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

**Solution:**

Mammals and birds are warm blooded animals which keep their body temperature constant irrespective of the environment they live in. This process requires a lot of oxygen for more cellular respiration so that warm blooded animals produce more energy to balance their body temperature. Hence it is very important for warm blooded animals to separate oxygenated and deoxygenated blood to keep their circulatory system efficient.

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

**Solution:**

There are two types of conducting tissues in highly organized plants that carry out transport system 1) Xylem 2) phloem. Xylem conducts water and minerals from roots to rest of the plant parts. Similarly Phloem transports food materials from leaf to other parts of the plant.

**4. How are water and minerals transported in plants?****Solution:**

Xylems parts 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 which forces water into xylem cells of roots. After this, there will be a steady movement of water from the root xylem to all parts of the plant connected through conducting interconnected water-conducting channels.

**5. How is food transported in plants?****Solution:**

Food is transported in plants by a special organ called as phloem. Phloem transports food materials from leaf to different parts of a plant. Transportation of food in phloem is achieved by the expenditure of ATP (energy). This increases osmotic pressure in the tissue causing water to move. This pressure moves material in the Phloem to the tissues with less pressure. This is helping in transportation of food material as per the needs. Ex: Sucrose

## QUESTIONS

## PAGE NUMBER 112

### 1. Describe the structure and functioning of nephrons

**Solution:**

Nephrons are the filtration units of the kidney which are large in numbers. Some substances in the initial filtrate, such as glucose, amino acids, salts and a major amount of water, are selectively re-absorbed as the urine flows along the tube.

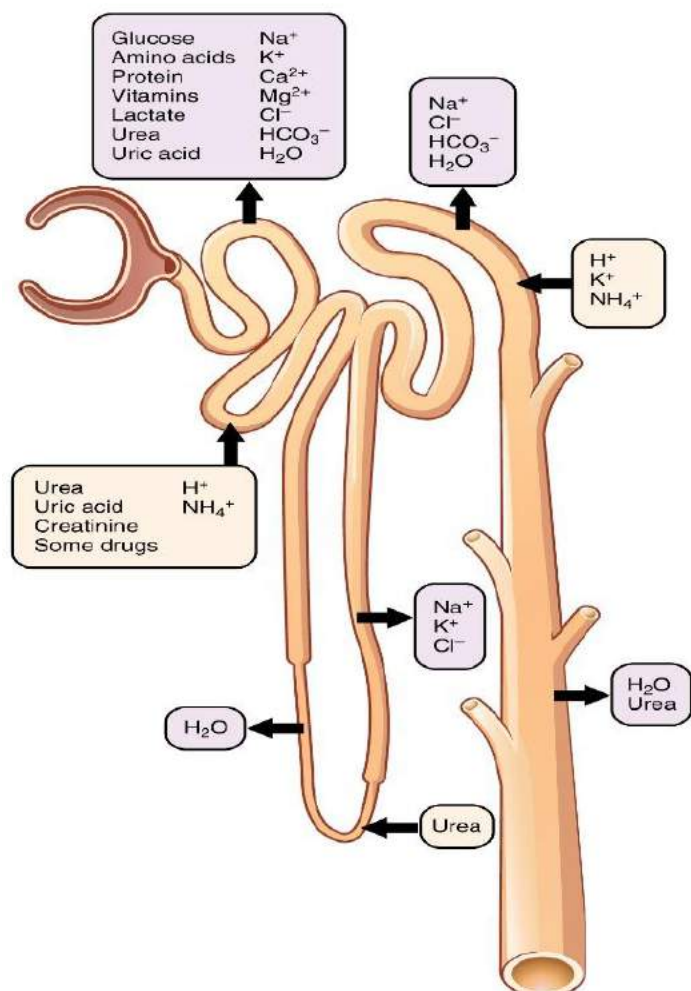
Main components of Nephrons are

Glomerulus

Bowman's capsule

Long renal Tube

Structure of Nephron





**Functioning of Nephron**

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with 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 in 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. Collecting duct collects urine from many nephrons.
- The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra.

**2. What are the methods used by plants to get rid of excretory products?****Solution:**

Plants can get rid of excess water by transpiration.

For other wastes, plants use the fact that many of their tissues consist of dead cells, and that they can even lose some parts such as leaves. Many plant waste products are stored in cellular vacuoles. Waste products may be stored in leaves that fall off.

Other waste products are stored as resins and gums, especially in old xylem. Plants also excrete some waste substances into the soil around them.

**3. How is the amount of urine produced regulated?****Solution:**

Amount of urine produced depends on the amount of excess water and dissolved waste present in the body. Other factors may be environment and ADH hormone which regulates the production of urine.

## QUESTIONS

## PAGE NUMBER 113

**1. The kidneys in human beings are a part of the system for**

- (a) nutrition
- (b) respiration.
- (c) excretion.
- (d) transportation

**Solution:**

Answer is D excretion

The excretory system of human beings (Fig. 6.13) includes a pair of kidneys, a pair of ureters, a urinary bladder and a urethra. Kidneys are located in the abdomen, one on either side of the backbone. Urine produced in the kidneys passes through the ureters into the urinary bladder where it is stored until it is released through the urethra.

**2. The xylem in plants are responsible for**

- (a) transport of water .
- (b) transport of food.
- (c) transport of amino acids.
- (d) transport of oxygen.

**Solution:**

In plants Xylem is responsible for transport of water hence the answer is a)

**3. The autotrophic mode of nutrition requires**

- (a) carbon dioxide and water.
- (b) chlorophyll.
- (c) sunlight.
- (d) all of the above.

**Solution:**

Autotrophic mode of nutrition requires carbon-di-oxide, water, chlorophyll and sunlight from the preparation of food hence the answer is d) all of the above.

**4. The breakdown of pyruvate to give carbon dioxide, water and energy takes place in**

- (a) cytoplasm.

(b) mitochondria.

(c) chloroplast.

(d) nucleus

**Solution:**

The breakdown of pyruvate to give carbon dioxide, water and energy takes place in mitochondria. Hence the answer is (b) mitochondria

**5. How are fats digested in our bodies? Where does this process take place?**

**Solution:**

- The small intestine is the place for complete digestion of carbohydrates, fats and proteins. It receives the secretions of the liver and pancreas for this purpose.
- The food coming from the stomach is usually acidic in nature and it has to be made alkaline so that pancreatic enzymes can act on it. Bile juice produced in the liver accomplish this process.
- Fats are usually present in the intestine in the form of larger globules, which makes it difficult for enzymes to act on them. The bile salts helps in breaking down larger globules into smaller globules. The pancreas helps in secreting pancreatic juice, which contains enzymes like trypsin for digesting proteins and lipase for breaking down emulsified fats.
- The walls of the small intestine contains glands, which secretes intestinal juice. The enzymes present in it finally converts the proteins to amino acids, complex carbohydrates into glucose and finally fats into fatty acids and glycerol.

**6. What is the role of saliva in the digestion of food?**

**Solution:**

Food we intake is complex in nature, if it is to be absorbed from the alimentary canal then it has to be broken into smaller molecules. This process is mainly done with the help of biological catalysts called enzymes. The saliva contains an enzyme called salivary amylase that breaks down starch, which is a complex molecule to give sugar. The food is mixed thoroughly with saliva and moved around the mouth while chewing the muscular tongue. Hence saliva plays a pivotal in digestion and absorption of food.

**7. What are the necessary conditions for autotrophic nutrition and what are its byproducts?****Solution:**

- The energy and carbon requirements of the autotrophic organism is obtained by the process of photosynthesis.
- It is defined as the process by which autotrophs take in substances from the outside surroundings and convert them into stored forms of energy.
- This substance is taken in the form of carbon dioxide and water, which is converted into carbohydrates in the presence of sunlight and chlorophyll.
- The main purpose of carbohydrates is to provide energy to the plant. The carbohydrates are not utilized immediately; but they are stored in the form of starch, which serves as an internal energy reserve.
- The stored energy can be used as and when required by the plant.

**8. What are the differences between aerobic and anaerobic respiration? Name some organisms that use the anaerobic mode of respiration?****Solution:****Aerobic respiration**

- The process takes place in the presence of free oxygen
- The products of aerobic respiration are  $\text{CO}_2$ , water and energy.
- The first step of aerobic respiration (glycolysis) takes place in cytoplasm while the next step takes place in mitochondria.
- The process of aerobic respiration takes place in all higher organisms.
- In this process complete oxidation of glucose takes place.

**Anaerobic respiration**

- The process takes place in the absence of the free oxygen.
- The products of anaerobic respiration are ethyl alcohol,  $\text{CO}_2$  and a little energy.
- Even in anaerobic respiration, the first step takes place in cytoplasm while the next step takes place in mitochondria.
- In this process the glucose molecules is incompletely broken down.

- The process of anaerobic respiration takes place in lower organism like yeast, some species of bacteria and parasites like tapeworm.

**9. How are the alveoli designed to maximize the exchange of gases?****Solution:**

- The lung is an important part of the body. The passage inside the lungs divides into smaller and smaller tubes, which finally terminate in balloon-like structures, called as alveoli.
- The alveoli provide a surface where the exchange of gases can take place. The walls of the alveoli usually contains an extensive network of blood vessels. We know that, when we breathe in, we lift our ribs, flatten our diaphragm and chest cavity becomes larger.
- Because of this action, air is sucked into the lungs and fills the expanded alveoli.
- The blood brings the essential carbon dioxide from rest of the body and supply it to alveoli; the oxygen in the alveolar air is taken up by the blood in the alveolar blood vessels to be transported to the all other cells of the body. During normal breathing cycle, when air is taken in and let out, the lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and carbon dioxide to be released.

**10. What would be the consequences of a deficiency of hemoglobin in our bodies?****Solution:**

Hemoglobin is a protein responsible for transportation of oxygen to the body cells for cellular respiration. Deficiency of Hemoglobin can affect the oxygen carrying capacity of RBC'S. This lead to lack of oxygen in our body cells. Hemoglobin deficiency leads to a disease called as anemia.

**11. Describe double circulation of blood in human beings. Why is it necessary?****Solution:**

Double circulation means, in a single cycle blood goes twice in the heart. The process helps in separating oxygenated and deoxygenated blood to maintain a constant body temperature.

The double circulatory system of blood includes

- Pulmonary circulation
- Systemic circulation.

**Pulmonary circulation:**

The right ventricle pumps deoxygenated blood into the lungs where it is oxygenated. The oxygenated blood is brought back to the left atrium, from there it is pumped into the left ventricle and finally blood goes into the aorta for systemic circulation.

**Systemic circulation:**

The oxygenated blood is pumped to various parts of the body from the left ventricle. The deoxygenated blood from different parts of the body passes through vena cava to reach right atrium. The right atrium transfers the blood into right ventricle.

**12. What are the differences between the transport of materials in xylem and phloem?**

**Solution:**

Transport of materials in Xylem	Transport of materials in phloem
Xylem tissue helps in the transport of water and minerals.	Phloem tissue helps in the transport of food
Water is transported upwards from roots to all other plant parts.	Food is transported in both upward and downward directions.

**13. Compare the functioning of alveoli in the lungs and nephrons in the kidneys with respect to their structure and functioning.**

**Solution:**

Alveoli	Nephrons
Structure	Structure
(i) Alveoli are tiny balloon-like structures present inside the lungs.	(i) Nephrons are tubular structures present inside the kidneys.
(ii) The walls of the alveoli are one cell thick and it contains an extensive	(ii) Nephrons are made of glomerulus, Bowman's capsule, and a long renal tube.

network of blood capillaries.	
<b>Function</b>	<b>Function</b>
(i) The exchange of O <sub>2</sub> and CO <sub>2</sub> takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli.	(i) The blood enters the kidneys through the renal artery. The blood is entered here and the nitrogenous waste in the form of urine is collected by collecting duct.
(ii) Alveoli are the site of gaseous exchange.	(ii) Nephrons are the basic filtration unit.