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Question 1:

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

Answer:

In multicellular organisms like humans, all the body cells are not in direct contact with the surrounding environment. Therefore, every cell of the body will not get oxygen as per need by the process of diffusion from the environment. Therefore diffusion is insufficient to meet the oxygen requirements of multicellular organisms.

Question 2:

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

Answer:

The main criteria used to decide whether something is alive are breathing and respiration. However, living beings also show growth and movement.

Question 3:

What are outside raw materials used by an organism ?

Answer:

Any organism uses organic molecules as raw material. Heterotrophs use food and autotrophs use carbon dioxide, minerals, water and all organisms use oxygen (for respiration) as raw materials.

Question 4:

What processes would you consider essential for maintaining life ?

Answer:

Processes essential for maintaining life are :

- (i) Nutrition
- (ii) Respiration
- (iii) Transportation
- (iv) Excretion

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Question 1:**What are the differences between autotrophic nutrition and heterotrophic nutrition ?****Answer:**

Autotrophic nutrition	Heterotrophic nutrition
(i) In this mode of nutrition an organism makes or synthesizes its own food.	(i) In this mode of nutrition an organism cannot make or synthesize its own food
Organisms use simple inorganic materials like carbon dioxide and water and synthesise their food in presence of sunlight.	(ii) Organisms cannot make their own food from simple inorganic matter and depend on other organisms for their food.
(iii) All green plants and some algae undergo this mode of nutrition.	(iii) All the animals, most bacteria and fungi undergo this mode of nutrition.

Question 2:**Where do plants get each of the raw materials required for photosynthesis ?****Answer:**

- (i) Carbon dioxide : Plants get carbon dioxide from the environment/atmosphere through stomata.
- (ii) Water : Plants absorb water from the soil through roots and transport to

leaves.

(iii) Sunlight : Plants get sunlight from the sun.

(iv) Chlorophyll : It is present in chloroplast found in green leaves and green parts of plants.

Question 3:

What is the role of the acid in our stomach ?

Answer:

Role of acid in our stomach is :

(i) To make acidic medium which is necessary for the activation of the enzyme pepsin.

(ii) To kill bacteria which the food may contain.

Question 4:

What is the function of digestive enzymes ?

Answer:

The food we eat is complex in nature, i.e., it contains complex molecules. Digestive enzymes break down these complex molecules into smaller simpler molecules so that they can be absorbed by the walls of the intestine.

Question 5:

How is the small intestine designed to absorb digested food ?

Answer:

The small intestine is designed to provide maximum area for absorption of digested food and its transfer into the blood for its circulation into the body. For this the inner lining of the small intestine has numerous finger-like projections called villi. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

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Question 1:

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

Answer:

Aquatic organisms use oxygen dissolved in surrounding water. Since air dissolved in water has fairly low concentration of oxygen, the aquatic

organisms have much faster rate of breathing.

Terrestrial organisms take oxygen from the oxygen-rich atmosphere through respiratory organs. Hence, they have much less breathing rate than aquatic organisms.

Question 2:

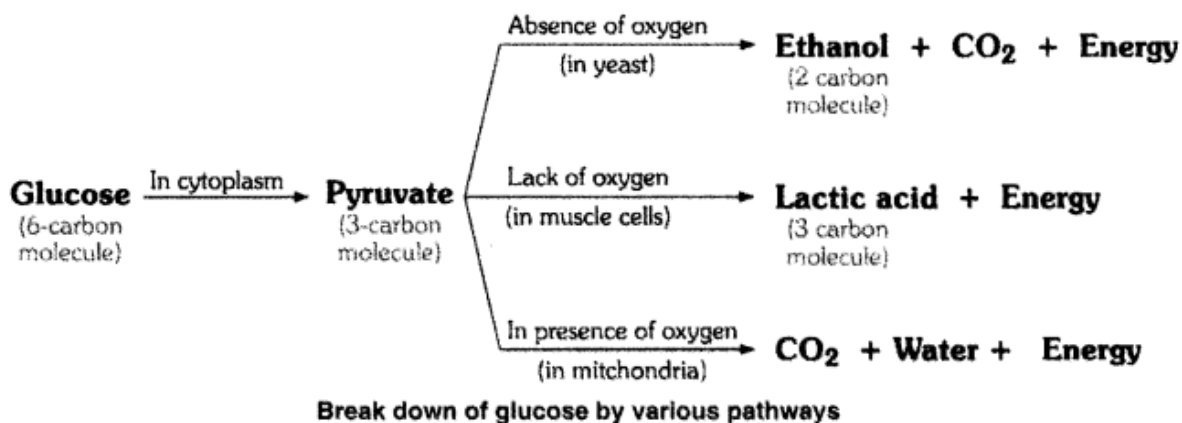
What are the different ways in which glucose is oxidised to provide energy in various organisms ?

Answer:

First step of breakdown of glucose (6 carbon molecules) takes place in the cytoplasm of cells of all organisms. This process yields a three carbon molecule compound called pyruvate.

Further break down of pyruvate takes place in different ways in different organisms.

- (i) Anaerobic respiration : The anaerobic respiration in plants (like yeast) produces ethanol and carbon dioxide as end products.
- (ii) Aerobic respiration : In aerobic respiration break down of pyruvate takes place in presence of oxygen to give rise three molecules of carbon dioxide and water. The release of energy in aerobic respiration is much more than in anaerobic respiration.
- (iii) Lack of oxygen : Sometimes, when there is lack of oxygen especially during physical exercise, in our muscles, pyruvate is converted into lactic acid (3 carbon molecule compound). Formation of lactic acid in muscles causes cramp.



Question 3:

How is oxygen and carbon dioxide transported in human beings ?

Answer:

- (i) Transport of oxygen : Haemoglobin present in the blood takes up the oxygen from the air in the lungs. It carries the oxygen to tissues which are deficient in oxygen before releasing it.
- (ii) Transport of carbon dioxide : Carbon dioxide is more soluble in water. Therefore, it is mostly transported from body tissues in the dissolved form in our blood plasma to lungs. Here it diffuses from blood to air in the lungs.

Question 4:

How are the lungs designed in human beings to maximise the area for exchange of gases ?

Answer:

Within the lungs, the air passage divides into smaller and smaller tubes, called bronchi which in turn form bronchioles. The bronchioles terminate in balloon-like structures, called alveoli. The alveoli present in the lungs provide maximum surface for exchange of gases. The alveoli have very thin walls and contain an extensive network of blood vessels to facilitate exchange of gases.

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Question 1:

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

Answer:

The transport system (circulatory system) in human beings mainly consists of heart, blood and blood vessels.

- (i) Function of heart : The heart receives deoxygenated blood from the body parts and pumps it to lungs for enriching with oxygen. It receives purified blood from lungs and pumps it around the body.
- (ii) Function of blood : Blood transports oxygen, carbon dioxide, digested food, hormones and nitrogenous waste like urea. It also protects the body from diseases and regulates the body temperature.
- (iii) Function of blood vessels : The blood pushed by the heart flows through the blood vessels (arteries, veins and capillaries) and also comes back to the heart through them.

Question 2:

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

Answer:

Separation of oxygenated and deoxygenated blood allows good supply of oxygen to the body. This system is useful in animals that have high energy requirement. Mammals and birds constantly need oxygen to get energy to maintain their body temperature constant.

Question 3:

What are the components of the transport system in highly organised plants?

Answer:

In highly organised plants there are two conducting tissues xylem and phloem.

Xylem consists of vessels, tracheids and other xylem tissues. The interconnected vessels and tracheids form a continuous system of water conducting channels reaching all parts of the plant. Xylem carries water and minerals.

Phloem conducts soluble products of photosynthesis from leaves to different parts of the plant body.

Question 4:

How are water and minerals transport in plants ?

Answer:

The roots of a plant have hair called root hair.

The root hair are directly in contact with the film of water in between the soil particles. Water and dissolved minerals get into the root hair by the process of diffusion. The water and minerals absorbed by the root hair from the soil pass from cell to cell by osmosis through the epidermis, root cortex, endodermis and reach the root xylem.

The xylem vessels of the root of the plant are connected to the xylem vessels of its stem.

Therefore the water containing dissolved minerals enters the root xylem vessels into stem xylem vessels. The xylem vessels of the stem branch into the leaves of the plants. So, the water and minerals carried by the xylem vessels in the stem reach the leaves through the branched xylem vessels

which enter from the petiole (stalk of the leaf) into each and every part of the leaf. Thus the water and minerals from the soil reach through the root and stem to the leaves of the plants. Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots. The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration.

Question 5:

How is food transported in plants ?

Answer:

The movement of food in phloem (or translocation) takes place by utilizing energy. The sugar (food) made in leaves is loaded into the sieve tubes of phloem tissue by using energy from ATP. Water now enters the sieve tubes containing sugar by the process of osmosis due to which the pressure in the phloem tissue rises. This high pressure produced in the phloem tissue moves the food to all parts of the plant having less pressure in their tissues. This allows the phloem to transport food according to the needs of the plant.

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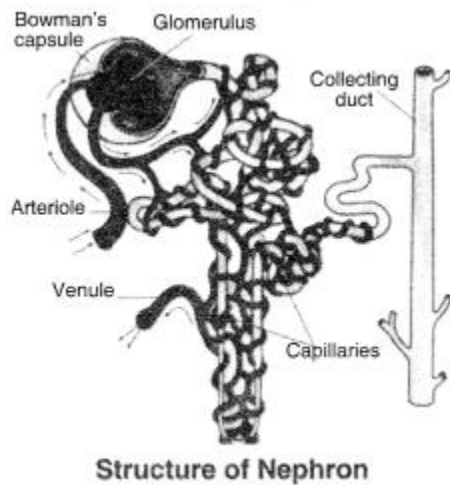
Question 1:

Describe the structure and functions of nephrons.

Answer:

Structure of nephron : Each nephron is composed of two parts. First one is a cup-shaped bag at its upper end which is called Bowman's capsule. The Bowman's capsule contains a bundle of blood capillaries which is called glomerulus. One end of the glomerulus is attached to the renal artery which brings the impure blood containing the urea waste into it. These impurities are filtered. The other part of the nephron is coiled. In this part, the substances like sugar (glucose), amino acid, ions and excess water which are required by the body, are reabsorbed. The substance remained in the nephron is mainly urine containing dissolved urea in water which is expelled

from the body through urethra from time to time.



Functions of nephron : Filtration of blood takes place in Bowman's capsule from the capillaries of glomerulus. The filtrate passes into the tubular part of the nephron. This filtrate contains glucose, amino acids, urea, uric acid, salts and water.

Reabsorption : As the filtrate flows along the tubule, useful substances such as glucose, amino acids, salts and water are selectively reabsorbed into the blood by capillaries surrounding the nephron tubule.

Urine : The filtrate which remained after reabsorption is called urine. Urine contains dissolved nitrogenous waste like urea and uric acid, excess salts and water. Urine is collected from nephrons to carry it to the ureter from where it passes into urinary bladder.

Question 2:

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

Answer:

- (i) The plants get rid of gaseous products-through stomata in leaves and lenticels in stems.
- (ii) The plants get rid of stored solid and liquid waste by the shedding off leaves, peeling off bark and felling off fruits.
- (iii) The plants get rid of wastes by secreting them in the form of gums and resins.
- (iv) Plants also excrete some waste substances into the soil around them.

Question 3:

How is the amount of urine produced regulated ?

Answer:

The amount of urine is regulated by kidney. It depends on the quantity of excess water and wastes dissolved in water.

- (i) Quantity of water : When water is abundant in the body tissues, large quantities of dilute urine is excreted out. When water is less in quantity in the body tissues, a small quantity of concentrate urine is excreted.
- (ii) Quantity of dissolved wastes : Dissolved wastes, especially nitrogenous wastes, like urea and uric acid and salts are excreted from the body. When there is more quantity of dissolved wastes in the body, more quantity of water is required to excrete them. Therefore, the amount of urine produced increases.
- (iii) Hormones : The amount of urine produced is also regulated by certain hormones which control the movement of water and Na^+ ions in and out of the nephrons.

Chapter End Questions

Question 1:

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

- (i) nutrition
- (ii) respiration
- (iii) excretion
- (iv) transportation

Answer:

- (iii) Excretion

Question 2:

The xylem in plants are responsible for

- (i) transport of water
- (ii) transport of food
- (iii) transport of amino acids
- (iv) transport of oxygen

Answer:

- (i) Transport of water

Question 3:

The autotrophic mode of nutrition requires

- (i) carbon dioxide and water
- (ii) chlorophyll
- (iii) sunlight
- (iv) all of the above

Answer:**((iv) All of the above****Question 4:****The breakdown of pyruvate to give carbon dioxide, water and energy takes place in**

- (i) cytoplasm
- (ii) mitochondria
- (iii) chloroplast
- (iv) nucleus

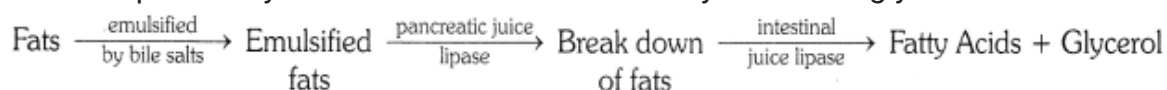
Answer:**(ii) Mitochondria****Question 5:****How are fats digested in our bodies ? Where does this process take place ?****Answer:**

Digestion of fats takes place in the small intestine.

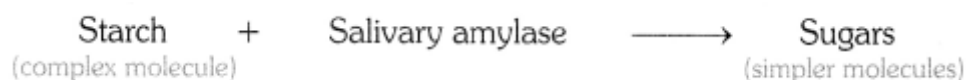
Bile juice secreted by the liver poured in the intestine along with pancreatic juice.

The bile salts present in the bile juice emulsify the large globules of fats. Therefore, by emulsification large globules break down into fine globules to provide larger surface area to act upon by the enzymes.

Lipase enzyme present in the pancreatic juice causes break down of emulsified fats. Glands present in the wall of small intestine secrete intestinal juice which contains lipase enzyme that converts fats into fatty acids and glycerol.

**Question 6:****What is the role of saliva in the digestion of food ?****Answer:**

Saliva contains salivary amylase enzyme that breaks down starch into sugars like maltose.



Saliva keeps the mouth cavity clean and moistens the food that help in chewing and breaking down the big pieces of food into smaller ones.

Question 7:

What are the necessary conditions (or autotrophic nutrition and what are its by-products ?

Answer:

Distilled water does not conduct electricity because it does not contain any ionic compound (like acids, bases or salts) dissolved in it.

Rainwater, while falling to the earth through the atmosphere, dissolves an acidic gas carbon dioxide from the air and forms carbonic acid (H_2CO_3).

Carbonic acid provides hydrogen ions, H^+ (aq) and carbonate ions, CO_3^{2-} to rainwater. Hence, due to the presence of carbonic acid which provides ions to rainwater, the rainwater conducts electricity.

Question 8:

What are the differences between aerobic and anaerobic respiration ? Name some organisms that use the anaerobic mode of respiration.

Answer:

Aerobic respiration	Anaerobic respiration
1. It takes place in the presence of oxygen.	1. It takes place in the absence of oxygen.
2. Complete breakdown of food occurs in aerobic respiration.	2. Partial breakdown of food occurs in anaerobic respiration.

3. The end products in aerobic respiration are carbon dioxide and water.	3. The end products in anaerobic respiration may be ethanol and carbon dioxide (as in yeast plants) or lactic acid (as in animal muscles).
4. Aerobic respiration produces a considerable amount of energy.	4. Much less energy is produced in anaerobic respiration.

Some organisms which use anaerobic respiration are yeast, bacteria etc.

Question 9:

How are the alveoli designed to maximise the exchange of gases ?

Answer:

- (i) The alveoli are thin walled and richly supplied with a network of blood vessels to facilitate exchange of gases between blood and the air filled in alveoli.
- (ii) Alveoli have balloon-like structure. Hence, provide maximum surface for exchange of gases.

Question 10:

What would be the consequences of a deficiency of haemoglobin in our bodies?

Answer:

Due to the deficiency of haemoglobin in blood, its oxygen carrying capacity decreases. As a result the production of energy by oxidation will become slower. Therefore, one would fall sick and would feel fatigue most of the time.

Question 11:

Describe double circulation in human beings. Why is it necessary ?

Answer:

In our heart blood enters twice and is also pumped out twice from the heart. The deoxygenated blood from the body is brought to the right atrium through vena cava from where it is sent to right ventricle. From right ventricle, the blood is pumped to the lungs for oxygenation through pulmonary artery. The oxygenated blood from lungs again enters the left atrium of the heart through pulmonary veins. From left atrium it is sent to left ventricle, from where this oxygenated blood is pumped to different parts of the body through the arteries. In this way the blood flows through the heart twice, that's why it is called 'double circulation'.

Necessity of double circulation: The right side and the left side of the human heart are useful to keep deoxygenated and oxygenated blood from mixing. This type of separation of oxygenated and deoxygenated blood ensures a highly efficient supply of oxygen to the body. This is useful in case of humans who constantly need energy to maintain their body temperature.

Question 12:

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

Answer:

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Xylem	Phloem
1. Xylem conducts water and dissolved minerals from roots to leaves and other parts.	1. Phloem conducts prepared food material from leaves to other parts of plant in dissolved form.
2. In xylem, the transport of material takes place through vessels and tracheids which are dead tissues.	2. In phloem, transport of material takes place through sieve tubes with the help of companion cells, which are living cells.

3. In xylem upward movement of water and dissolved minerals is mainly achieved by transpiration pull. It is caused due to suction created by evaporation of water molecules from the cells of a leaf.

3. In translocation, material is transferred into phloem tissue using energy from ATP. This increases the osmotic pressure that moves the material in the phloem to tissues which have less pressure

Question 13:

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

Answer:

Alveoli	Nephron
1. Alveoli are functional unit of lungs.	1. Nephrons are functional unit of kidney.
2. A mature lung has about 30 crore alveoli.	2. A kidney has about 10 lakh nephrons.
3. Alveoli provide a wide surface for gaseous exchange.	3. The surface area of a nephron is not much more.

4. The exchange of O ₂ and CO ₂ takes place through the network of capillaries in alveoli.	4. The Bowman's capsule in nephron regulates the concentration of water and salts.
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