Life Processes (a) Nutrition

Check Point 01

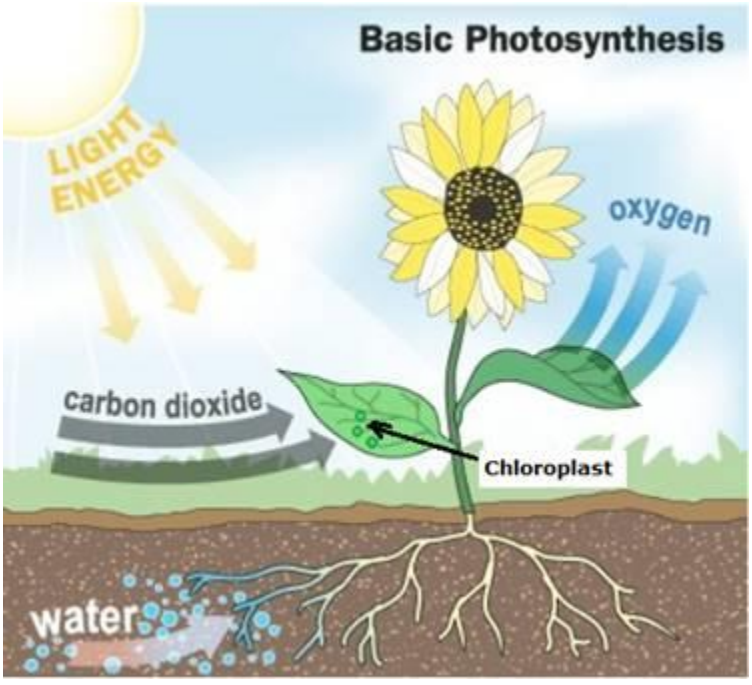
Q. 1. Identify the mode of nutrition where sunlight is used along with CO_2 and water to prepare food.

Answer: In photosynthesis, sunlight is used along with water, CO_2 and chlorophyll to prepare food. The mode of nutrition here is autotrophic. Example of autotrophic organisms is green plants that make their own food and do not depend on any organism for their nutrition.

Q. 2. State the photosynthetic reaction and where does it occur?

Answer: The process of photosynthesis occurs in green parts of a plant, basically leaves. The presence of chlorophyll (green pigment) is necessary for photosynthesis to occur and chlorophyll is present in leaves as green dots.

The process of the photosynthetic process is depicted here:

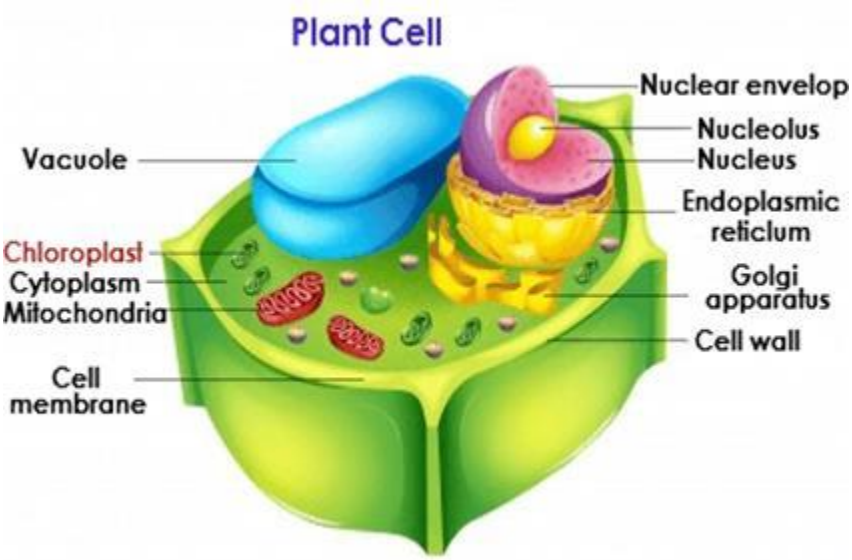


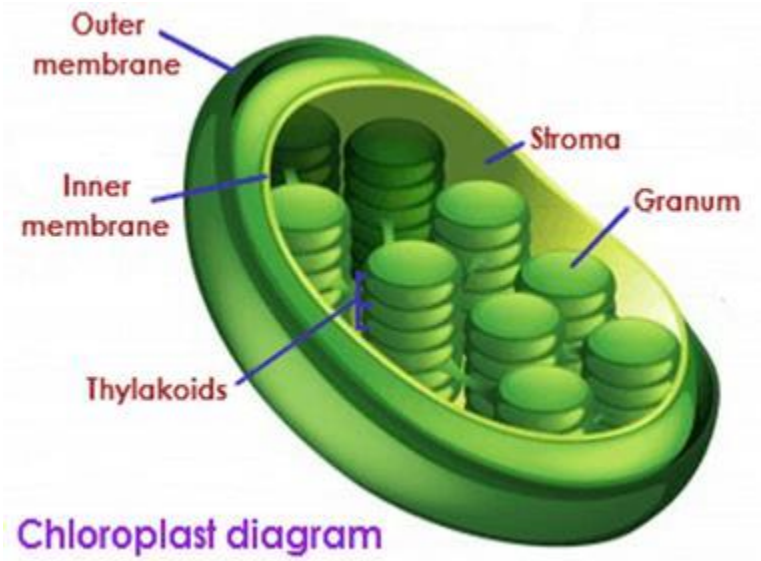
$$6CO_2 + 6H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} C_6H_{12}O_6 + 6O_2$$

(Glucose)

Q. 3. Which organelle acts as the site of photosynthesis?

Answer: The chloroplast acts as the site of photosynthesis. It is a cell organelle that is covered by a double membrane and it contains chlorophyll. It is present in green tissues of plants, especially leaves. Chloroplasts absorb sunlight to conduct photosynthesis.





Q. 4. Name the raw materials which are essential to carry out the process of photosynthesis in plants.

Answer: The raw materials needed to carry out photosynthesis are water (absorbed through roots), CO_2(diffused in from the air through stomata). In addition to these, chlorophyll (green pigment present in chloroplasts) and sunlight are also required. Without these materials, photosynthesis cannot occur.

Check Point 02

Q. 1. What type of nutrition occurs in fungi?

Answer: Fungi are heterotrophic organisms. They depend on other organisms to obtain nutrition. They show the saprobic mode of nutrition or saprotrophic nutrition. They break down the food material outside their body by secreting digestive enzymes and absorb nutrition from it.

Q. 2. How do parasitic organisms derive their nutrition?

Answer: Parasitic organisms like tapeworms, leeches, orchids, etc obtain nutrition from other living organisms (plants or animals) called as host, without killing them. Parasites may live on the outside or inside the body of its host. They cause harm to the body of the host.

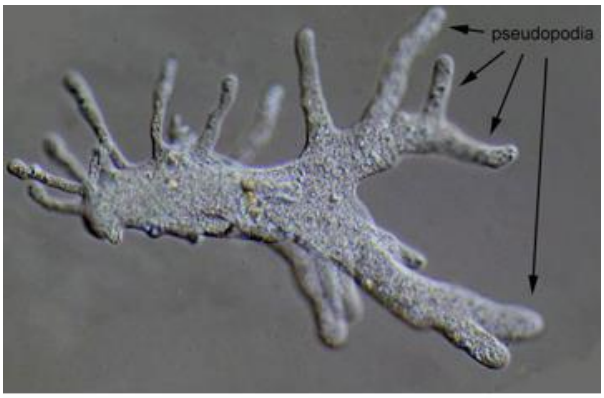
BLOOD SUCKING LEECH

Q. 3. Explain the term ingestion.

Answer: Ingestion refers to the consumption of food, water and other substances through the mouth into the gut. Ingestion is a general term used for taking in any substance into the digestive system.

Q. 4. What are pseudopodia?

Answer: Pseudopodia (singular: pseudopodium) are temporary finger-like elongated protrusions of cell surface of unicellular organisms (Amoeba) used for feeding and locomotion. They are formed by cytoplasmic streaming (streaming movement of cytoplasm). It is also called as false foot.



PSEUDOPODIA OF AMOEBA

Check Point 03

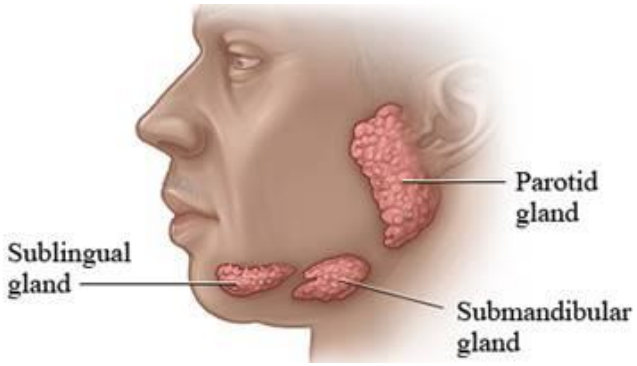
Q. 1. State the location of salivary glands.

Answer: There are 3 major salivary glands.

Parotid gland - largest salivary gland located in front of the ears, one on each side.

Sublingual gland – smallest salivary gland located beneath the tongue.

Submandibular gland – located beneath the floor of the mouth.

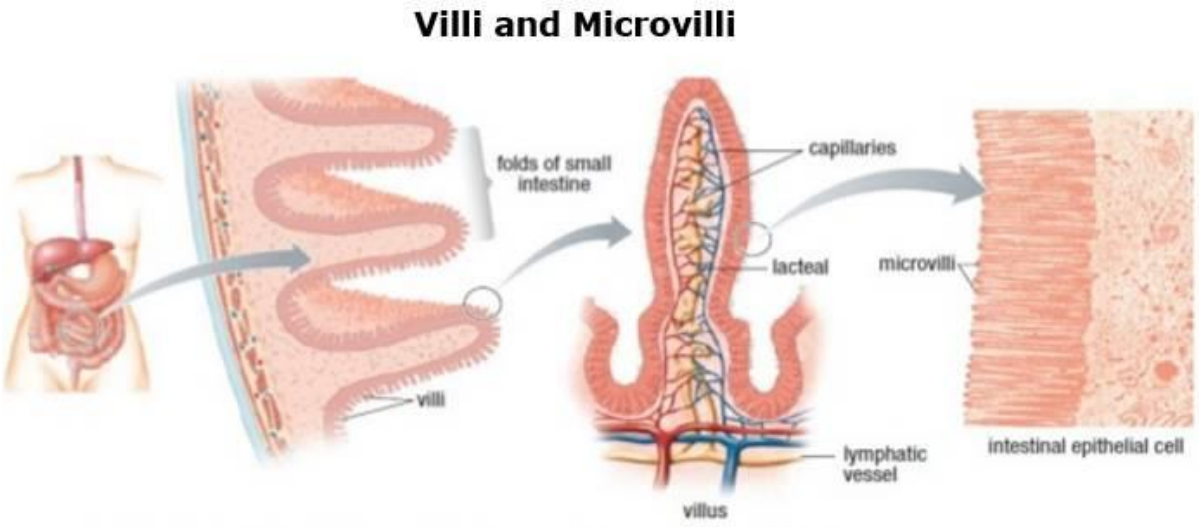


Q. 2. Why carnivores have shorter small intestine?

Answer: Carnivores have shorter small intestine, as compared to herbivores. Carnivores consume only flesh of other animals whereas herbivores consume plant products, which contain cellulose and fibre. Meat is relatively easier to digest and provide more energy. Cellulose and other plant products take longer to be digested. Hence, carnivores possess shorter small intestine.

Q. 3. How do villi increase the surface area?

Answer: Villi are small finger-like projections present in the inner lining of the small intestine. They increase the surface area of small intestine by providing more area for efficient absorption of nutrients. The presence of villi and micro-villi gives a brush border appearance. Villi also possess blood vessels and lacteals (lymphatic vessels).

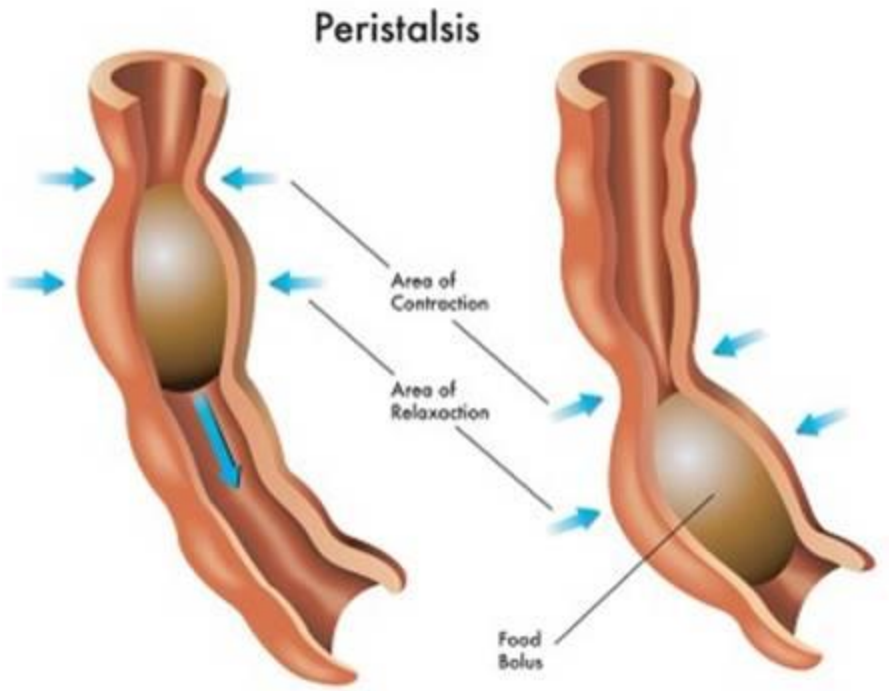


Q. 4. Where is bile juice produced?

Answer: Bile juice (dark green-yellow pigment) is produced by the liver. It helps in the digestion of lipids (fats) in small intestine. It emulsifies (breaks down) larger fat globules into smaller ones so that enzymes can act efficiently on fat globules.

Q. 5. Explain the significance of peristalsis.

Answer: The food that we eat must pass along the digestive system in a regulated manner so that it is processed properly. Peristalsis refers to the involuntary rhythmic wave-like contractions and relaxations of the smooth muscles of alimentary canal. This process is responsible to push the food forward along the gut. It aids in the smooth movement of food through different digestive organs.



Chapter Exercise

Q. 1. Which raw materials are responsible for the release of O_2, in photosynthesis?

Answer: Water and carbon-dioxide are the two raw materials responsible for the release of oxygen during photosynthesis. Water is absorbed from soil through the roots and CO_2 diffuses from the air into the plant through stomata. These raw materials are then converted into energy-yielding glucose molecules.

Q. 2. What happens to extra glucose or carbohydrate in an animal body?

Answer: In an animal body, extra glucose or carbohydrate is stored in the liver as well as in skeletal muscles in the form of **glycogen.** Glucose is converted to glycogen (starch-like carbohydrate) in liver. When the body is in need of energy, glycogen is converted back into glucose.

Q. 3. Name an energy rich carbohydrate stored in large quantities in liver and muscle cells.

Answer: Glycogen is an energy rich carbohydrate that is stored in large quantities in the liver and skeletal muscles of the body. It is a branched-chain polymer of glucose. It serves as a reserve source of energy.

Q. 4. What is mainly digested by stomach of man?

Answer: The digestion of proteins occurs in the stomach. It is facilitated by digestive enzymes (pepsin, hydrochloric acid). HCl provides acidic medium while pepsin acts on proteins and breaks them into smaller peptides.

Q. 5. How does most CO_2, reach the photosynthesising cells of a green leaf?

Answer: Most CO_2 reach the photosynthesising cells of green leaves through diffusion. Stomata (tiny pores) present of leaf surface and stem facilitates gaseous exchange between the plant cells and the surrounding. CO_2 move into the cells through these small pores.

Q. 6. Name two molecules produced by the digestion of starch and fat respectively.

Answer: The digestion of starch (complex carbohydrate) produces glucose and maltose (simple sugars).

Fats are broken down to produce molecules of glycerol and fatty acids.

Q. 7. What will happen if the liver of a person gets damaged?

Answer: If the liver of a person get damaged, fat digestion would be affected. As a result, liver will not produce bile efficiently and the emulsification of fats will stop.

Q. 8. Draw a graph which shows the effects of temperature on the rate of photosynthesis.

Answer: The rate of photosynthesis increases with the increase in temperature, only upto a certain limit. For every 10° rise, the rate is almost doubled. The plants show maximum photosynthesis at optimum temperature. It is between 20-30° C. Further increase in temperature leads to decrease in the rate of photosynthesis as the enzymes get denatured at high temperature and do not work efficiently.

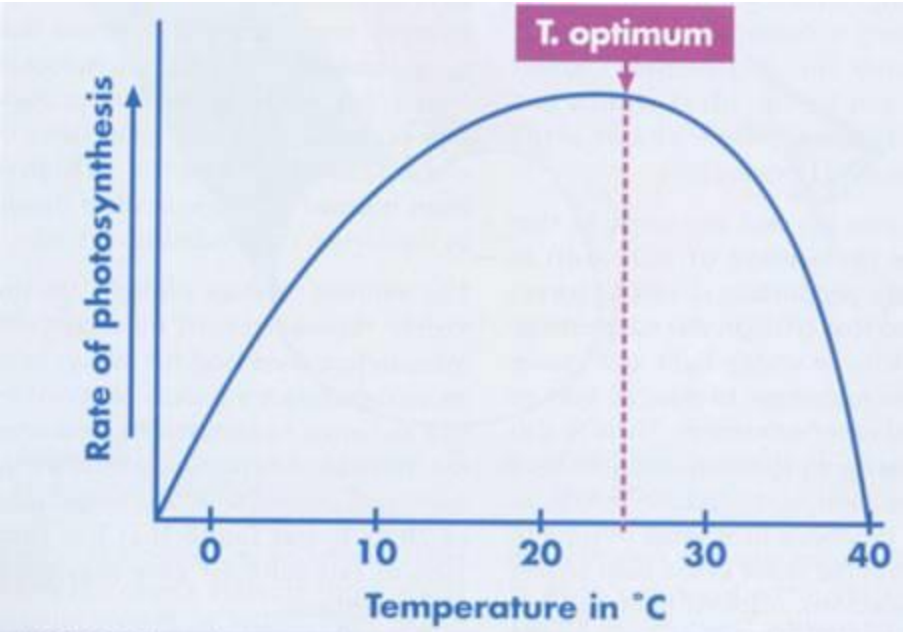


FIGURE 6: Effect of temperature on photosynthesis.

Q. 9. Stomata of desert plants remain closed during the day. Explain how and when they take up CO_2 to perform photosynthesis?

Answer: Desert plants close their stomata during the day to prevent transpiration and loss of water. To perform photosynthesis, CO_2 is necessary. They take up CO_2 during the night through stomata and store it in their photosynthesising cells in the form of an intermediate until the day. And when sunlight is available, they perform photosynthesis to make their food. This is called as **CAM** (Crassulacean acid metabolism) photosynthesis.

Q. 10. (i) Write the reaction that represents the chemical changes which take place during photosynthesis.
(ii) State the function of chlorophyll.

Answer: (i) This reaction represents the process of photosynthesis.

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

During photosynthesis, 1 molecule of glucose (carbohydrate) and 6 molecules of oxygen are produced using the raw materials water (6 molecules) and carbon dioxide (6 molecules) in the presence of chlorophyll and light energy. Here, reduction of CO_2 occurs.

(ii) The presence of chlorophyll is necessary for photosynthesis to occur. Its most important function is to absorb energy from incoming light and transfer this absorbed energy to the reaction centres (part of photo-system)

Q. 11. Which feature(s) help the plants to make food by the process of photosynthesis?

Answer: The leaves containing the green pigment chlorophyll (present in chloroplast) helps the plant to perform photosynthesis by trapping light energy. The plant absorbs CO_2 through stomata and reduces it to glucose. The presence of chloroplasts and stomata helps the plants to make food.

Q. 12.A. Give the steps involved in photosynthesis.

Answer: The process of photosynthesis involves a few events that may not occur immediately after one another. There might be a time lag between them.

•The chlorophyll present in chloroplasts absorbs energy from sunlight.

•This light energy is then converted into chemical energy which is used for making food.

•The water molecules split to give hydrogen and oxygen.

•Finally, CO_2 absorbed is reduced to form glucose (carbohydrate).

Q. 12.B. Write the difference between nutrition in plants and animals.

Answer: Plants and animals have a completely different mode of nutrition. Plants are autotrophic organisms that are capable of making their own food by performing photosynthesis using 2 raw materials (water + CO_2).

They need light energy to make their own food. Plants do not depend on any organism to obtain nutrition. On the other hand, animals are heterotrophic organisms that depend on other organisms (plants and other animals) to fulfill their nutrition requirements. They cannot make their own food.

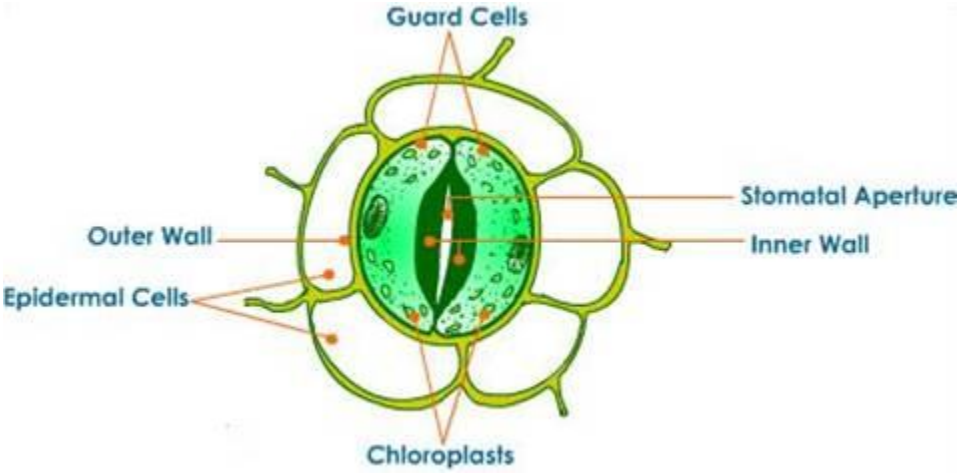
Q. 13.A. Draw a labelled diagram of stomata. List two functions of stomata.

Answer: Stomata are tiny pores present on the surface of leaves and stems of plants. It performs the following function:

•It facilitates the exchange of gases between plant and its surroundings. It is through stomata that plant release oxygen and take up carbon dioxide.

•It helps the plant to get rid of excess water through transpiration. The stomata also close down to prevent loss of water. Thus, it regulates the water content in plant cells.

The figure for stomata is given below:



Q. 13.B. What are the raw materials required for photosynthesis to occur? Write the chemical equation of the process.

Answer: The raw materials needed to carry out photosynthesis are water (absorbed through roots), CO_2(diffused in from the air through stomata).

In addition to these, chlorophyll (green pigment present in chloroplasts) and sunlight are also required to make food. Without these materials, photosynthesis cannot occur. The reaction involved is given below.

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

Q. 14. Explain the digestion of chapati in human beings. Draw a diagram depicting human alimentary canal.

Answer: i. Chapati is a complex carbohydrate. The digestion of carbohydrates begins in the mouth.

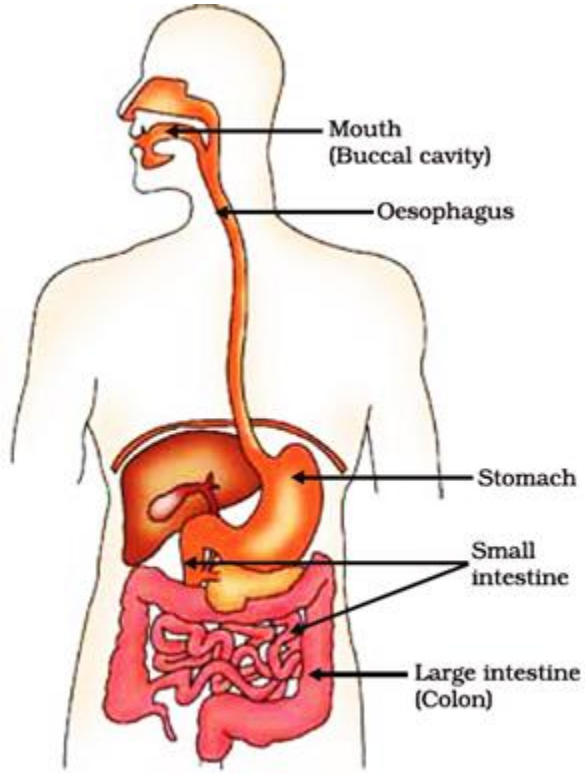
ii. The starch present is acted upon by salivary amylase (secreted by salivary glands) and is broken down to simpler sugars (e.g. maltose).

iii. It is then passed along the gut by peristaltic movements. It then reaches the stomach and gets mixed up with the gastric juices. But no digestion of carbohydrates occurs in stomach.

iv. The food is then passed into the small intestine, where major digestion of carbohydrates takes place.

v. The intestine receives enzymes from pancreas and liver. The pancreatic amylase further breaks downs the sugars into glucose to be absorbed easily. Thus, the digestion of chapati is completed.

vi. The diagram is given below:



ALIMENTARY CANAL OF HUMAN

Q. 15. The general requirement for energy and materials is common to all living organisms. Living beings need plants and trees in order to survive, as most of their needs are met by them.

Read the passage and answer the questions.

(i) Do plants also depend on some source for food production? Explain.
(ii) How do we derive nutrition for survival? How does this nutrition vary among different organisms?
(iii) What do we learn concerning the increased cutting of trees and removal of the green cover?

Answer: (i) Yes, plants depend on solar energy to produce food. They require energy from sunlight to perform photosynthesis. If sunlight is not available, they will not be able to make their own food.

(ii) We (humans) are heterotrophic organisms. We obtain nutrition from plant and animal resources. We use plant products as food. All organisms require nutrition, but they use different strategies. Some organisms consume food by breaking down it into smaller parts. Unicellular organisms like Amoeba use pseudopodia to gather food.

(iii) Removal of green cover (deforestation) leads to serious problems. It has a negative impact on our environment and our lives. As we are directly dependent on plants and trees for our food, our survival will be at risk. Deforestation leads to climatic changes. It is a major cause for global warming. Moreover, animals are also badly affected. Their habitats are destroyed.

Q. 16. Reading about the digestive glands and their action, a student got confused about some facts. Given below are some questions, concerning the facts.

(i) Why cannot we digest raw green plants in our alimentary canal?
(ii) Why are digestive enzymes present in an inactive form in the body when we can require their action any time?
(iii) HCL is an acid which kills bacteria ingested with food, but does not harm the walls of stomach. Why?
(iv) What values do you think the student conveys from his questions?

Answer: (i) Raw green plants contain fibre and cellulose. Our digestive system does not secrete any enzyme capable of digesting cellulose. Cellulose is digested by enzyme cellulose present in ruminating animals like cow. Also, our oesophagus serves only as a pathway to transport food from mouth to stomach. It does not possess any digestive gland. Hence, no secretion of enzymes occurs.

(ii) Although we may require enzyme action any time, they must be produced in an inactive form. Enzymes are capable of digesting a variety of bio molecules (proteins, fats, etc). If produced in active form, they may act upon the body cells and tissues and digest them leading to degeneration of body tissues.

(iii) Although HCl provides a highly acidic medium in our stomach, but it does not harm the walls of the stomach. The mucus-secreting cells (goblet cells) present in the inner lining of stomach secretes mucus and lines the wall of stomach with a mucus layer. Thus, prevents it from the action of HCl.

(iv) The student has a thirst for knowledge. He is curious to know about the human body and what happens to the food that we eat.

Challengers

Q. 1. In photosynthesis, which substances are used up, which are produced and which are necessary, but remain unchanged after the reaction?

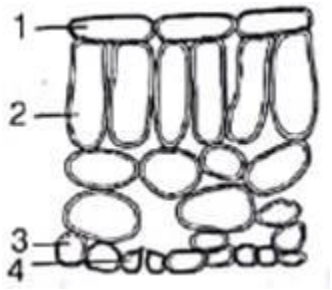
Used up	Produced	Remain
(a) Carbon dioxide	Water	Oxygen
(b) Chlorophyll	Carbon dioxide	Water
(c) Oxygen	Starch	Cellulose
(d) Water	Oxygen	Chlorophyll

A. (a)
B. (b)
C. (c)
D. (d)

Answer: In photosynthesis, water and carbon dioxide are used as raw materials to produce glucose and release out oxygen. This process occurs in the presence of green pigment chlorophyll present in leaves of the plant, which remains unchanged after the reaction.

Q. 2. The diagram shows the arrangement of cells inside the leaf of a green plant. (No cell contents are shown).

Which cells normally contain chloroplasts?



A. 1 and 2
B. 1 and 4
C. 2 and 3
D. 2 and 4

Answer: Chloroplasts are usually present in mesophyll cells of leaves placed near the upper epidermis. Guard cells surrounding the stomata also possess chloroplasts.

Q. 3. Choose the forms in which most plants absorb nitrogen:

I. Proteins
II. Nitrates and nitrites

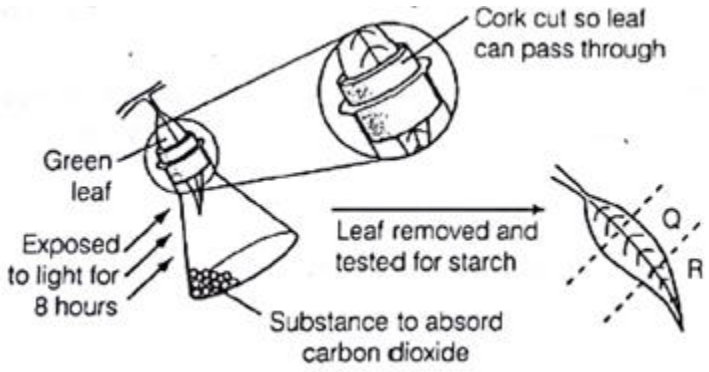
III. Urea
IV. Atmospheric nitrogen

Choose the correct option.

A. I and II
B. II and III
C. III and IV
D. I and IV

Answer: Most plants absorb nitrogen in the form of nitrates, nitrites and urea. They cannot use up atmospheric nitrogen as it is un-reactive. This nitrogen needs to be converted into absorbable forms by certain nitrogen-fixing bacteria so that they can be taken up by plants.

Q. 4. A plant is kept in the dark for two days. A leaf is used in an experiment to investigate the effect of two factors on photosynthesis as shown in the diagram.



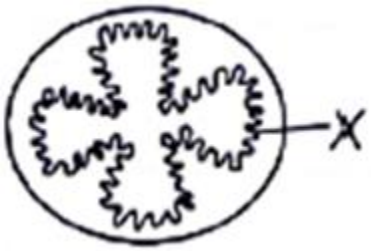
What are the colours of Q and R, when the leaf is tested for starch, using iodine solution?

Q	R
(a) Blue/black	Brown
(b) Brown	Brown
(c) Blue/black	Blue/black
(d) Brown	Blue/black

A. (a)
B. (b)
C. (c)
D. (d)

Answer: For photosynthesis to occur, both sunlight and CO_2 are required. The plant forms glucose (later on converted to starch) through photosynthesis. The part Q of leaf was covered and not exposed to light and part R was kept in absence of CO_2. Thus, both parts of leaf did not form starch and gave a negative test for starch. (**Note** - iodine solution gives a positive test for starch and turns blue-black in colour)

Q. 5. The diagram represents a section through the small intestine.



What is the role of the structure labelled X?

A. They help to move the food along
B. They make a large surface area for absorption
C. They protect against bacteria
D. They move mucus over the surface

Answer: The presence of villi and microvillus in the inner lining of small intestine increases the surface area for absorption. They allow more area for the enzymes to work efficiently.

Q. 6. When a person eats some egg white, proteins and water enter the stomach. Which substances are found leaving the stomach and leaving the small intestine?

Leaving the Stomach	Leaving the Small Intestine
(a) Amino acids and water	Amino acids and water
(b) Fatty acids, glycerol and water	Fatty acids, glycerol and water
(c) Protein and water	Fatty acids and glycerol
(d) Protein, amino acids and water	Water

A. (a)
B. (b)
C. (c)
D. (d)

Answer: Egg white contains only protein, and no fat. The digestion of proteins occurs in stomach and proteins are converted into amino acids. So amino acids will be found

leaving the stomach. The absorption of amino acids occurs in small intestine. So, only water will be found leaving the small intestine.

Q. 7. In which order do these events occur in human nutrition?

A. Digestion → ingestion → absorption → assimilation
B. Digestion → ingestion → assimilation → absorption
C. Ingestion → digestion → absorption → assimilation
D. Ingestion → digestion → assimilation → absorption

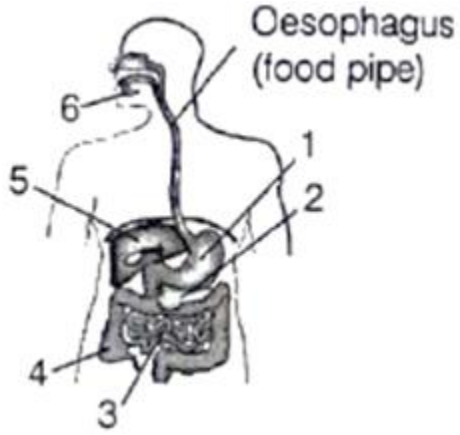
Answer: •Ingestion – consumption/taking in of food

•Digestion – breaking up of food particles into small fragments

•Absorption – absorption of broken down food particles into the blood

•Assimilation – soluble food molecules move to different organs to provide energy through blood

Q. 8. The diagram shows the human gut. Which numbered structures secrete digestive enzymes?



A. 1, 2, 3 and 4
B. 1, 2, 3 and 6
C. 2, 3, 4 and 5
D. 2, 3, 5 and 6

Answer: Digestive enzymes are secreted by salivary glands (salivary amylase), stomach (pepsin), pancreas (amylase, lipase) and small intestine (trypsin). Liver produces bile juice and it only emulsifies (breaks down) fats and does not digest them.

Q. 9. Only two of the following statements accurately describe what happens in the mouth.

1. Amylase breaks down large starch molecules into smaller maltose molecules.
2. Chewing increases the surface area of food for digestion
3. Saliva emulsifies fats into smaller droplets.
4. Teeth breakup large insoluble molecules into smaller soluble molecules.

Which statements are correct?

A. 1 and 2
B. 2 and 3
C. 3 and 4
D. 1 and 4

Answer: Chewing increases the surface area of food. Large food particles are broken down into small fragments. Salivary amylase secreted by salivary glands acts on carbohydrates (starch) present in food and converts it into maltose. Saliva does not act on fats.

Life Processes (b) Respiration

Check Point 01

Q. 1. What are respiratory substrates? Give one example.

Answer: Respiration is the process in which complex food particles breaks down into simpler ones through the process of oxidation to release enormous energy.

Substances which undergo respiration to release energy are known as respiratory substrates.

Example : Some respiratory substrates are glucose, proteins etc

Q. 2. Where does aerobic respiration occur? How many molecules of ATP are released during it?

Answer: Respiration on the basis of presence or absence of oxygen can be of two types: aerobic respiration and anaerobic respiration. Aerobic respiration occurs in the presence of oxygen while anaerobic occurs in the absence of oxygen.

Site of aerobic respiration is mitochondria.

During aerobic respiration 38 ATPs get released in complete oxidation of one glucose molecule.

Q. 3. The end product of a process is ethanol and carbon dioxide with the release of energy. Name this process and write the pathway involved in the reaction.

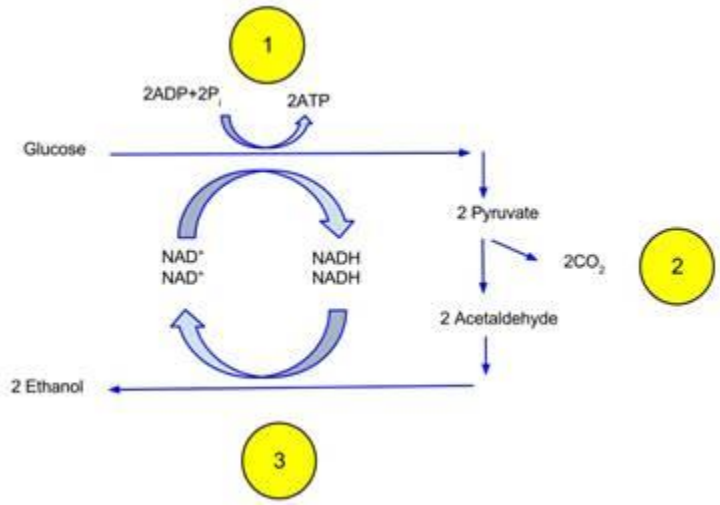
Answer: During aerobic respiration, the product is CO_2 & H_2O. While during anaerobic respiration, the product can be either lactic acid or ethanol+CO_2 on the basis of enzyme involved.

If the product is ethanol &CO_2, the process is termed as **Fermentation.**

Initially glucose gets converted into **pyruvic acid** (by the process of glycolysis-common in both aerobic & anaerobic respiration). In fermentation, this pyruvic acid produces ethanol & carbon-dioxide in the presence of enzyme **alcohol dehydrogenase.** This fermentation process is also used for industrial production of alcohol.

Q. 4. State the function of ATP.

Answer: ATP is an acronym of Adenosine Tri Phosphate. It is formed by the addition of 3 phosphate groups to adenosine (adenine+ pentose sugar). It is a highly energetic compound and thus is used to save energy in the chemical form. Thus it is called the energy currency of the cell.



Q. 5. Where does anaerobic respiration occur in human body?

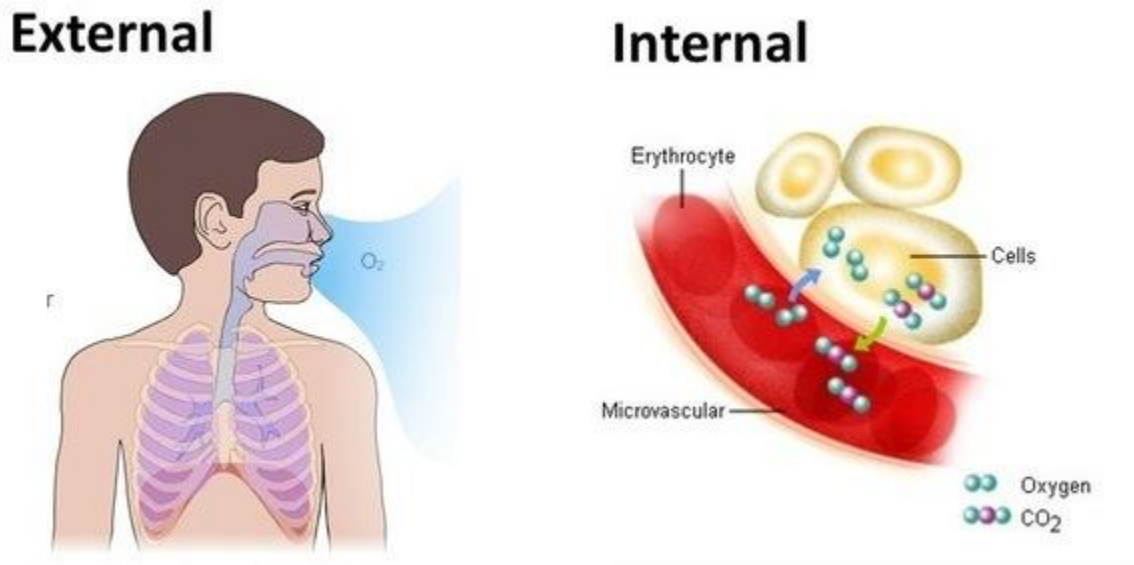
Answer: Usually human body performs only aerobic respiration. But in certain conditions (like **heavy exercises**), when body needs enormous amount of energy but oxygen supply is not enough, our body gets bounded to perform anaerobic respiration. It occurs in our **muscle cells** where due to anaerobic respiration, **lactic acid** gets produced.

You might have experienced pain in arms or legs after doing some **heavy physical exercise or work.** It is because of accumulation of lactic acid in muscle cells.

Check Point 02

Q. 1. What is the difference between external and internal respiration.

Answer: **External respiration** is an alternate term used for **breathing.** It includes inhalation of O_2 & exhalation of CO_2. While **internal respiration** occurs inside the body between blood and tissues where there is transfer of oxygen from blood to each and every tissue of body to fulfil its demand.



Q. 2. List the factors on which diffusion in the plants depends.

Answer: **Diffusion** is a phenomenon explaining movement of substances from its **higher concentration to its lower concentration.** In plants, diffusion of gases occurs. Factors affecting diffusion are:-

(i) Concentration gradient:- More steeper the concentration gradient, greater will be the diffusion.

(ii) Temperature:- Diffusion rate increase with increase in the temperature because speed of ions increases.

(iii) Size of molecules:- Molecules with smaller size can diffuse easily as compared to molecules with larger size.

Q. 3. What happens with CO_2 and O_2 in plants during daytime?

Answer: During day time, both **respiration and photosynthesis occurs** in plant. Both respiration & photosynthesis are **opposite processes.** In respiration, there is an intake of O_2 and release of CO_2, while in photosynthesis CO_2 is taken inside and O_2 is released. But the rate of photosynthesis is much higher than the rate of respiration. Due to this reason, release of O_2 is also much higher than release of CO_2.

Q. 4. What are lenticels?

Answer: Lenticels are **pores** present on the **woody bark of a tree** stem. Usually a stem is covered with a tough layer of suberin. The places where suberin is absent, some pores are develop. These pores are called as Lenticels. They help in the exchange of gases.

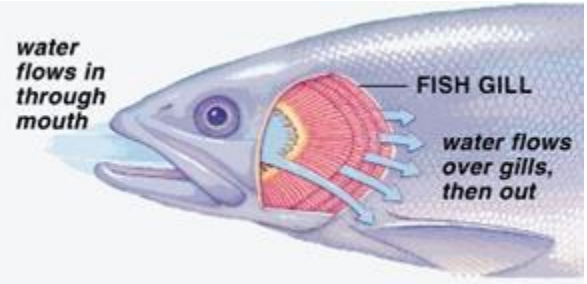
Check Point 03

Q. 1. Respiratory surface of animals must always be moist. Why?

Answer: The respiratory surface of animals must always be moist **for better diffusion of gases.** Both oxygen and carbon-dioxide gets dissolved in water quickly and their diffusion becomes **easier & quicker.** This is the reason for moist respiratory surfaces.

Q. 2. Why does the rate of breathing in aquatic animals is faster than others?

Answer: In aquatic animals, the respiration process involves the usage of **oxygen dissolved in water.** As the amount of oxygen dissolved in water is much less than the amount of O_2 available on land, aquatic animals have higher breathing rate.



Q. 3. What is the essential feature of respiratory organ of different terrestrial animals?

Answer: The essential feature of respiratory organs of terrestrial animals is that **they must be protected under layers of tissue** so as to avoid any shock or damage. They must also be supplied with a large number of blood vessels for easy and fast exchange of gases.

Q. 4. The surface across which breathing in animals occurs is very fine and delicate. How do the organisms protect their body by such surfaces?

Answer: In almost all the organisms the breathing surface is very fine and delicate for easy and fast exchange of gases. Since they are very delicate they must be protected from external environmental conditions. So for protection these structures are covered well in a l**ayer of tissues.** Like in human beings the exchange of gases take place

through alveoli which are present in the lungs which are further protected from environment by **ribs** and diaphragm.

Q. 5. In which organisms the cell membrane acts as the respiratory surface?

Answer: The organism in which the cell membrane acts as a respiratory surface is **Amoeba.** In amoeba, the unicellular animal, the exchange of gases takes place through the cell membrane or the plasma membrane. The cell membrane of amoeba absorbs oxygen from the surrounding area and release carbon dioxide by the process of **diffusion.**

Check Point 04

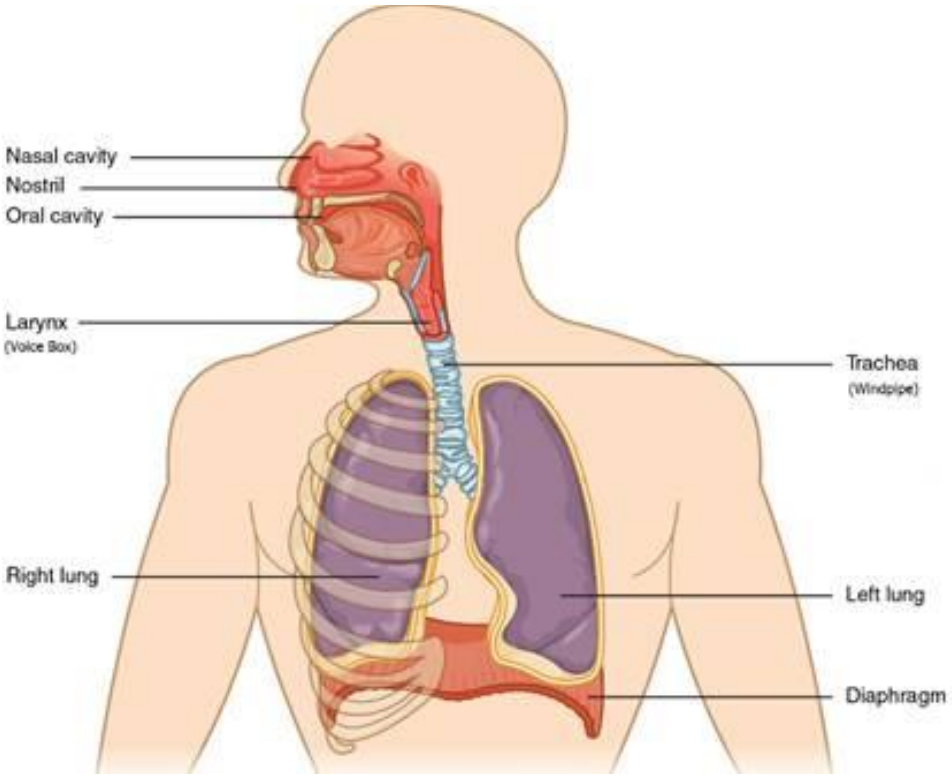
Q. 1. In human beings, where does the gaseous exchange take place?

Answer: In humans, lungs are the major respiratory organ. Internally, lungs are divided into numerous sac like structures called as **alveoli.** These alveoli (sing. alveolus) are **thin walled** and are the major site for exchange of gases. They take up carbon dioxide from the deoxygenated blood and fill it with oxygen.

Q. 2. (i) How does the air necessary for breathing enter the body of a human being?
(ii) What other function is performed by this part of our respiratory system?

Answer: (i) Oxygen enters the body in the mouth and nose, passes through the larynx and the trachea.

As shown in the diagram given below:



(ii) Nose - The nose is the primary organ of smell and also functions as part of the body's respiratory system.

Mouth – Mostly the breathing is done through nose i.e. nasal cavity. But, it can be done through oral cavity as well.

Q. 3. Why do we need a respiratory pigment to perform respiration?

Answer: Respiratory pigments play a very important role in the body of an organism. It **helps in the transportation of respiratory gases to the various body organs.**

Respiratory pigment present in humans is haemoglobin. It is a red color pigment present in our blood. It helps in transporting oxygen from lungs to various body tissues and also helps in the removal of carbon-dioxide from cells.

Q. 4. Name the respiratory pigment present in human beings. Which major air pollutant has high affinity for this pigment?

Answer: Haemoglobin is the respiratory pigment present in the human beings. It helps in the transportation of respiratory gases; mainly O_2 & some amount of CO_2 also.

Carbon monoxide (CO) has a great affinity with haemoglobin. Increase in amount of CO in body can even cause the death of organism due to suffocation (insufficient blood supply).

Q. 5. (i) Name the substance which is oxidised in body during respiration.

(ii) Why lungs are divided into very small sac-like structures?

Answer: (i) The substances which gets oxidised during respiration are known as **respiratory substrates.** Examples of some respiratory substrates are glucose, proteins, fatty acids etc.

(ii) Lungs are divided into small sac like structures called alveoli. These alveoli increase the surface area of lungs **for better gaseous exchange.**

Chapter Exercise

Q. 1. What is common between respiration and transpiration process in plants?

Answer: Both in respiration and transpiration stomata are active. The only difference is that in respiration stomata helps in exchange of gases, while in transpiration, it helps in evaporation of water.

Q. 2. Write the events that occur during the process of breathing in humans.

Answer: Breathing in humans is divided into 2 steps

(i) Inhalation:- diaphragm contracts and move downwards, rib cage moves outward with the help of intercostal muscles. Thus the size of thoracic cavity increases, its pressure gets reduced and air rushes in.

(ii) Exhalation:- diaphragm gets relaxed and move outwards, rib cage moves inward with the help of intercostal muscles. Thus the size of thoracic cavity decreases, its pressure gets increased and air rushes out.

Q. 3. What will happen if a human being starts taking air with mouth instead of nose?

Answer: When we inspire, the air moves through our nasal passage where the presence of nasal hairs and mucus **prevents the entry of harmful** substances into the body with this air. Moreover, they also **reduce the temperature** of air.

If we start taking air from the mouth instead of nose, all these harmful substances will enter into our body and may cause disease.

Q. 4. Write any two differences between the different ways of oxidation of glucose in organisms.

Answer: The difference between the different ways of oxidation of glucose in organism are as follows:

Aerobic respiration	Anaerobic respiration
Occurs in the presence of oxygen	Occurs in the absence of oxygen
A large amount of energy is released	Very less amount of energy is released
Product are CO_2 & H_2O	Product can be lactic acid or ethanol & CO_2.

Q. 5. Fermentation process in yeast is useful in food industry. Support this statement with examples.

Answer: **Fermentation** is a name given to anaerobic respiration in which the product is ethanol and CO_2.

Fermentation in **yeast** is very helpful for food industry as it helps in the formation of **alcohol & bread.** A fungi named Saccharomyces cerevisiae also called as bakers' yeast & brewers' yeast is extensively used commercially for the production of alcohol and bread.

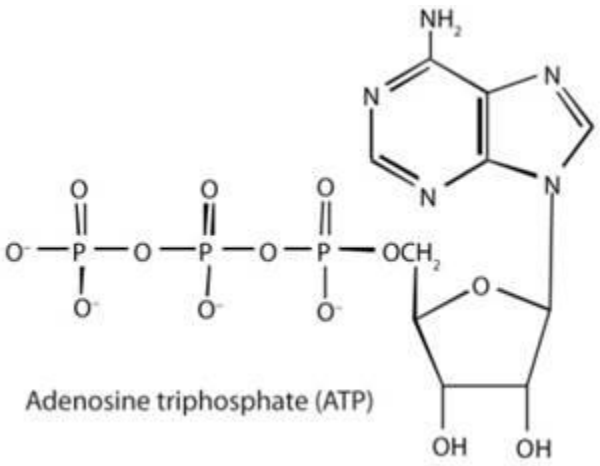
Q. 6. Compare between the process of respiration in plants during night and day time.

Answer: **Respiration** occurs at the same rate in both day & night. But the difference is because of photosynthesis. During day time both respiration & photosynthesis occurs in plant. Both **respiration & photosynthesis are opposite processes.** In respiration, there is an intake of O_2 and release of CO_2, while in photosynthesis CO_2 is taken inside and O_2 is released. But the rate of photosynthesis is much higher than the rate of respiration. Due to this reason, release of O_2 is also much higher than release of CO_2. Since there is no net release of CO_2, it seems that no respiration occurs in plant.

Q. 7. ATP produced in respiration is stored in mitochondria. How is it produced?

Answer: ATP - **Adenosine Tri Phosphate.** It is called the **energy currency of cell** because it helps in the storage of energy in chemical form.

ATP is released by a process called as **Oxidative Phosphorylation** which occurs in mitochondria during respiration. When oxidation of food occurs, it releases energy in the form of ATP.



Adenosine triphosphate (ATP)

Q. 8. 'Aerobic respiration produces more ATP than anaerobic respiration'. Justify this statement.

Answer: **Aerobic respiration** is that type of respiration in which respiration occurs in the **presence of oxygen** while **anaerobic respiration** occurs in the **absence of oxygen.** Aerobic respiration is more fruitful then anaerobic respiration. It is so because in aerobic respiration much more ATPs are released than anaerobic respiration

Number of ATPs released in aerobic respiration = **38 molecules of ATP**

Number of ATPs released in anaerobic respiration= **2 molecules of ATP**

So a huge difference in ATP release in aerobic & anaerobic respiration can be observed.

Q. 9. Tabulate adaptations of terrestrial respiration in human being.

Answer: Different respiratory adaptations of human beings are as follows:

• The **respiratory surface,** which helps in exchange of gases must be very thin for easy and fast exchange of gases.

• The respiratory surface must be **richly supplied with blood vessels** for exchange of gases.

• The thin and delicate respiratory structures must be **well protected** under layers of tissues so as to protect them from the external environment.

Q. 10. Each and every respiration organ is structurally specialised in its function. Justify with examples.

Answer: Each and every respiration organ is designed by the nature in a specialised way. This all is done in order to maximise its functional capability.

For e.g. - **Nostrils have mucous lining** and hair so that it can prevent entry of harmful bacteria in the body.

Trachea gets divided into **bronchi & bronchioles** to supply air to each & every part of lungs.

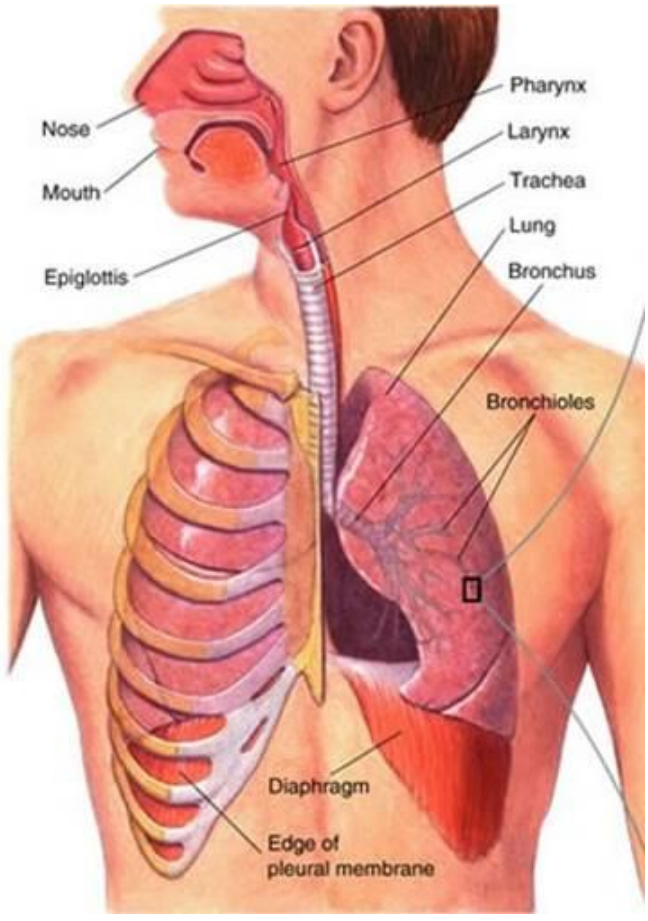
Lungs have numerous sac like structure called as **alveoli** which increases the surface area of lungs so that better **exchange of gases** can take place.

Alveoli are very thin walled in order to promote better and easier diffusion of gases.

Q. 11. Write the pathway of oxygen travelling from atmosphere into the human body.

Answer: Oxygen enters the body through **nostrils,** then it passes through the **nasal passage** and come in the **pharynx.** Now the oxygen travels into **trachea via larynx.** Trachea gets divided into left and right **bronchi** which further gets divided into **bronchioles.** Bronchioles get terminated into **alveolar sacs.**

Nostrils → nasal passage → pharynx → larynx → trachea → bronchi → bronchioles → alveoli



Q. 12. Diffusion pressure cannot deliver oxygen all over the body in bigger animals'. Comment on this statement.

Answer: Diffusion is a process of movement of substances from its **higher concentration to its lower** concentration. The pressure which is responsible for creating the diffusion ability of a molecule is called as **diffusion pressure.**

This diffusion pressure plays a major role in exchange of gases in plants and in smaller animals but fails in bigger animals. It is so because in bigger animals not every body part faces the external environment. That is why they cannot take part in the diffusion process. Due to this reason, diffusion pressure is unable to deliver O_2 to all over the body of bigger animals.

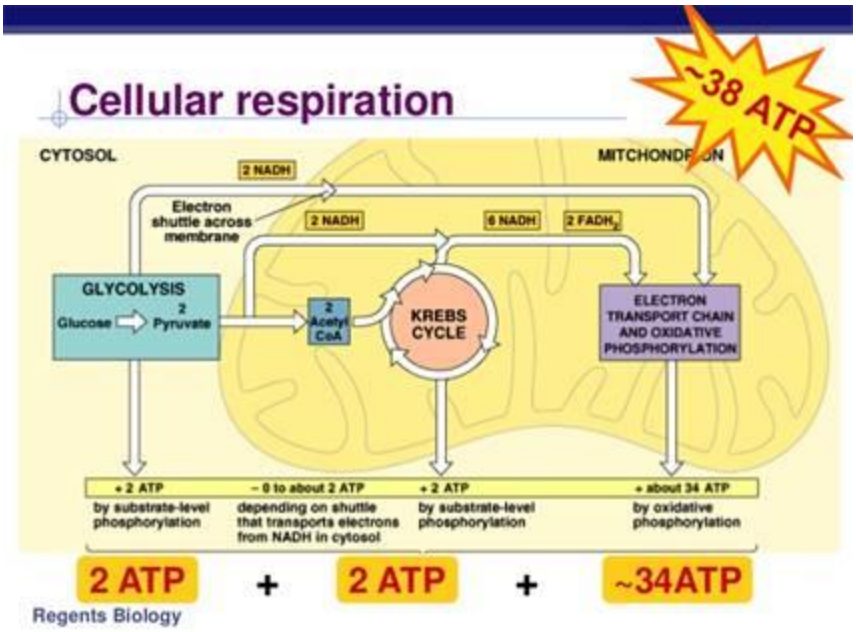
Q. 13. Distinguish between aquatic and terrestrial respiration.

Answer: The difference between aquatic and terrestrial respiration is as follows:

Aquatic respiration	Terrestrial respiration
Occurs in organisms living in water	Occurs in land organisms
Involve oxygen which is dissolved in water	Does not involved dissolved oxygen
Main respiratory organ is gills	Main respiratory organ is generally lungs
Gills are tough and spiny	Lungs are moist, slippery and soft
Breathing rate is comparatively higher	Breathing rate is comparatively lower

Q. 14. With a schematic diagram, explain the overall process of respiration in animals.

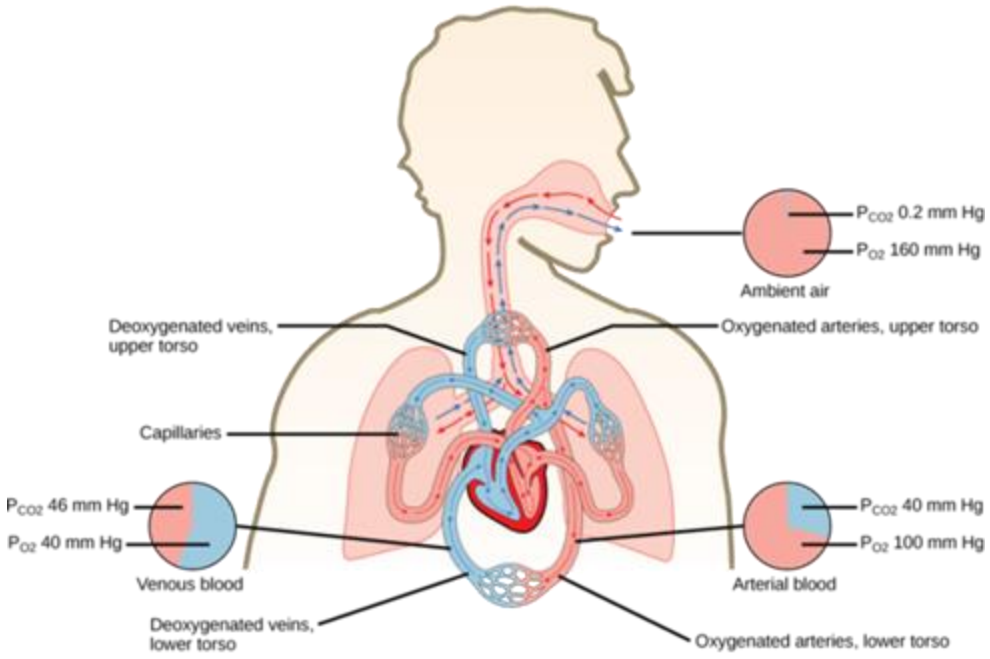
Answer: Respiration is a **cellular process** which occurs in each and every cell of body. It starts with **glycolysis**- a reaction in which breakdown of glucose occurs. Glucose gets converted into pyruvic acid. The process of glycolysis takes place in cytoplasm. Now this pyruvic acid enters into mitochondria via link reaction in which it gets converted into acetyl-CoA. Now this acetyl-CoA enters in the mitochondria where it performs **kreb's cycle** in mitochindrial matrix. All the ATP and NADH2 and FADH2 produced till now performs **ETS cycle** (Electron transport chain) which is located in the mitochondrial membranes. Finally it undergoes oxidative phosphorylation and ATPs are released.



GLYCOLYSIS(in cytoplasm) → LINK REACTION(in cytoplasm) → KREB CYCLE(mitochondrial matrix) → ELECTRON TRANSPORT SYSTEM(mitochondrial membrane) → OXIDATIVE PHOSPHORYLATION(mitochondrial membrane)

Q. 15. Breathing cycle is an essential process for the exchange of gases'. Justify this statement.

Answer: **Breathing** involves intake of oxygen and release out of CO_2 from the body. If this process does not occur in the body, there will be no exchange of gases. Imagine a situation when we stop breathing, that is there will be no intake of oxygen and no release out of CO_2. In that situation, oxygen supply will be stopped in our body and there will be continuous accumulation of CO_2 inside the body. This can be fatal and the person may die because of **suffocation.** That is why it is said that breathing cycle is an essential process for the exchange of gases.



Q. 16. If a person holds his breath after expiration for about 25 sec, would there be occurrence of any exchange of respiratory gases in the lungs during this period? Explain.

Answer: If a person holds his breath for 25 seconds after expiration, even then **exchange of respiratory gases** would occur in lungs. It is so because, even after we exhale, some amount of air remains in the lungs. This volume of air is called as **residual volume** which has a quantity of about **1200ml.** So even if a person hasn't inhale the air for 25 seconds, then also this residual volume will continue gaseous exchange in lungs for some time. But if this period last some more longer, then this can be lethal.

Q. 17. Raman kept a plant in his room. Adequate light was provided and the plant was extensively watered. Instead of flourishing the plant died. Raman asked his teacher for an explanation for the same.

Read the passage and answer the following questions.

(i) Even though the plant was watered, it soon died. Give reason.

(ii) How do plants respire? Name the organelle responsible for gaseous exchange in
(a) Herbaceous plants
(b) Woody plants

(iii) What values does Raman have in your opinion?

Answer: (i) The plant died because of **excessive watering.** Excessive watering causes water logging in the plant which blocks the proper supply of gases into it. That is the reason for plant's death.

(ii) Plants respire through the gaseous exchange occurring in stomata via **diffusion process.**

(a) In herbivorous plants, gaseous exchange occurs via **stomata**.
(b) In woody plants, gaseous exchange occurs via **stomata and lenticels.**

(iii) Raman has a good heart as he tried to grow a plant in his room and decided to take its care. But he is little careless and his carelessness has killed the plant. So he should little be more careful.

Q. 18. After being taught about respiration in living organisms, aditi got confused as to how organisms like earthworm respire. As these organisms lack any special organs for respiration and breathing.

(i) How does earthworm respire when no specialised system is present in them?
(ii) Mention the major function of respiratory pigment.
(iii) What values do you observe in Aditi?

Answer: (i) Earthworms do not have any specialised organ for respiration. Instead they respire through their **moist skin.**

(ii) Respiratory pigments play a very important role in the body of an organism. It helps in the transportation of respiratory gases to the various body organs.

(iii) Aditi is a keen **observer.** She applied her academic knowledge which she has gained from her books into practical life which is very good.

Challengers

Q. 1. Which process occurring in human body does not involve energy from respiration?

A. contraction of heart muscle
B. Diffusion of oxygen from the alveoli into the blood
C. Digestion of bread
D. Maintaining a constant body temperature

Answer: **Contraction of heart,** digestion and homeostasis (maintaining a constant body temperature) requires a lot amount of energy while diffusion is a passive process which occurs according to the concentration gradient. Thus it do not require energy expenditure.

Q. 2. Assertion (A) In the day time, CO_2 generated during respiration is used up for photosynthesis.

Reason (R) There is no CO_2 release during day.

A. Both A and R are true and R is the correct explanation of A.
B. Both A and R are true, but R is not the correct explanation of A
C. A is true, but R is false
D. A is false, but R is false

Answer: In **respiration,** O_2 is taken in and CO_2 is released while in **photosynthesis,** CO_2 is used up and O_2 is released. Both photosynthesis and respiration occurs in plant during daytime. But the rate of photosynthesis is much more than rate of respiration. Thus there is no net release of CO_2.

Q. 3. Which substances are produced by anaerobic respiration in yeast?

	Carbon dioxide	Alcohol	Lactic Acid	Water
(a)	✓	✓	×	×
(b)	✓	×	✓	×
(c)	×	✓	×	✓
(d)	×	×	✓	✓

A. (a)
B. (b)
C. (c)
D. (d)

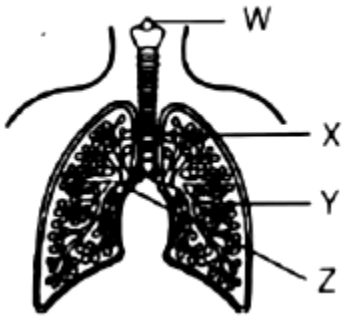
Answer: In **anaerobic respiration,** the product can be either **lactic acid or ethanol + CO_2** on the basis of enzyme involved. Yeast contains the enzyme alcohol dehydrogenase which helps in the formation of alcohol. Due to this reason, fermentation will occur in yeast which will result in the formation of alcohol and CO_2.

Q. 4. The following changes take place in an athlete's body during a 100m race. Which change occurs first?

A. Increased availability of oxygen to muscles.
B. Increased breathing rate.
C. Increased carbon dioxide concentration in the blood
D. Increased production of carbon dioxide by muscles

Answer: Running is a **heavy energy** requiring process. Thus while running a 100m race, there will be a great need of energy to muscles. Thus they will start performing respiration at much higher rate. Due to this reason, there will be **increased release of CO_2** by muscles.

Q. 5. The diagram shows part of the human gas exchange system.



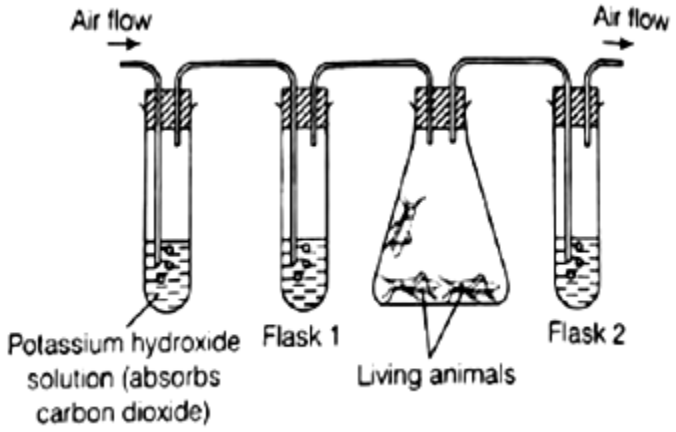
What are W, X, Y and Z?

	Bronchus	*Bronchiole*	*Larynx*	*Trachea*
(a)	W	X	Z	Y
(b)	X	Z	Y	W
(c)	Y	W	X	Z
(d)	Z	Y	W	X

A. (a)
B. (b)
C. (c)
D. (d)

Answer: Larynx (voice box) is present at the opening of trachea. Then the air goes into **trachea**-passage for air to lungs. Near the entry of trachea into lungs, it gets divided into **bronchi** (sing. bronchus) which further gets divided into **bronchioles.**

Q. 6. An experiment is set up as shown. Flasks 1 and 2 contain lime water. Air is pumped through the flasks.



What is the appearance of lime water flasks 1 and 2 after a period of ten minutes?

	Flask 1	*Flask 2*
(a)	Clear	Clear
(b)	Clear	White/Cloudy
(c)	White/Cloudy	Clear
(d)	White/Cloudy	White/Cloudy

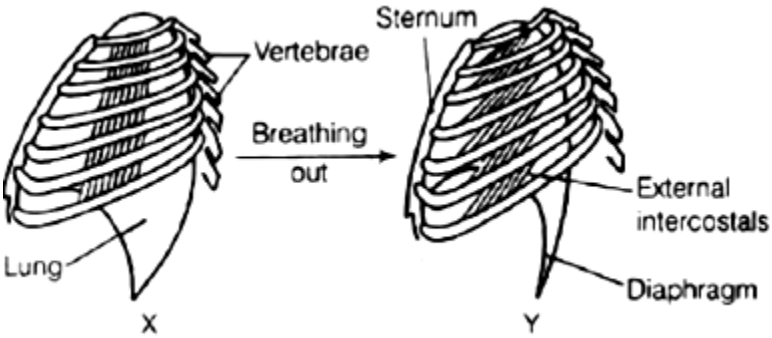
A. (a)
B. (b)
C. (c)
D. (d)

Answer: Lime water turns milky in the presence of CO_2.

In flask-1, the air containing CO_2 enters into the flask, but due to the presence of KOH all the CO_2 gets absorbed by it. So, there will be no change in the lime water.

While flask 2 is connected with a flask containing live animals which means that these animals will respire and will release CO_2. This CO_2 **will turn the lime water present in flask-2 milky.**

Q. 7. The diagram shows the ribs and some of the muscles used in breathing.



Which muscles relax in moving from position x to position y?

	Diaphragm	*External Intercostals*
(a)	No	No
(b)	No	Yes
(c)	Yes	No
(d)	Yes	Yes

A. (a)
B. (b)
C. (c)
D. (d)

Answer: While moving from position-x to position-y, the lungs are exhaling out the air. When lungs exhale out the air, both **diaphragm & external intercostal muscles** relax.

Q. 8. Which is the correct sequence of air passage during inhalation?

A. Nostrils → Larynx → Pharynx → Trachea → Lungs
B. Nasal Passage → Trachea → Pharynx → Larynx → Alveoli
C. Larynx → Nostril → Pharynx → Lungs
D. Nostrils → Pharynx → Larynx → Trachea → Alveoli

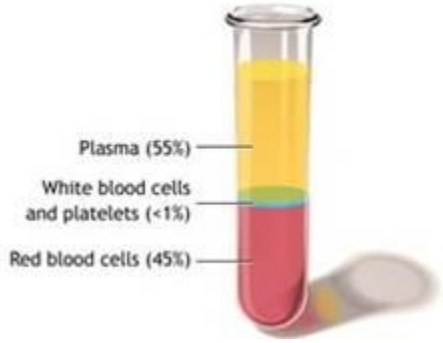
Answer: Air enters in our body through **nostrils** (external most portion of nose). From there it goes into **pharynx** (passage of air) and then into **larynx** (voice box). Then air comes into **trachea** and from here it reaches **alveoli** of lungs via bronchi and bronchioles.

Life Processes (c) Transportation

Check Point 01

Q. 1. Give one function of plasma.

Answer: Plasma is a straw colored liquid which comprises of almost 55% of the blood. It is a very important as it allows the medium to blood corpuscles to move freely in the body. Plasma constitutes water which is about 90-92% and nearly 6-8% proteins like fibrinogen, globulins and albumins and remaining some ions like Na^+, Cl^- etc.

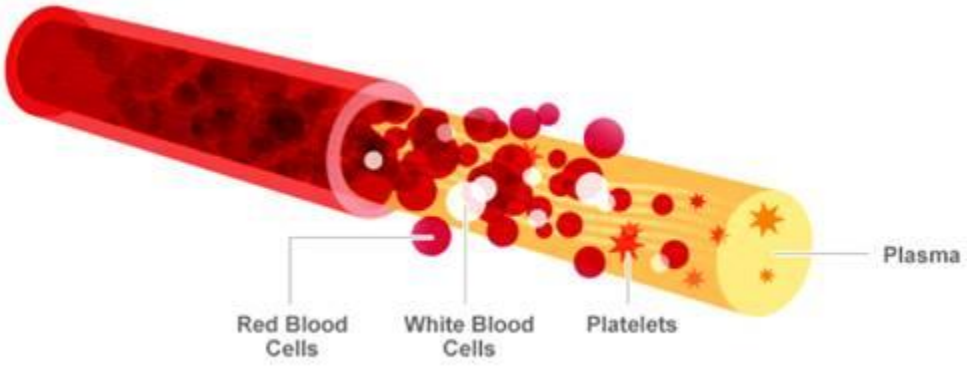


Q. 2. What are the main components of blood?

Answer: Blood is a very important connective tissue and has two main components which are:

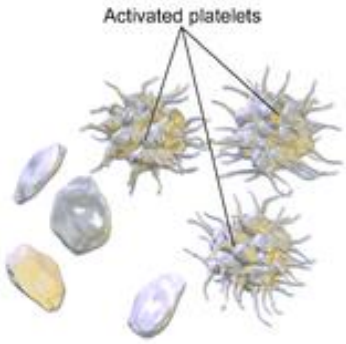
i) Plasma: It is the fluid part which is about 55% of the total blood. It is a straw colored liquid, viscous in nature. Plasma comprises of about 90-92% of water and 6-8% proteins.

ii) Formed elements: Blood cells/ corpuscles all the formed elements constitutes about 45% of the total blood. It include the red blood cells (erythrocytes), white blood cells (leucocytes) and the platelets (thrombocytes). Out of these platelets are not the proper cells but the cell fragments which play a major role in the process of blood clotting.



Q. 3. Name the type of cells that helps in blood clotting.

Answer: Platelets are the cells which help in coagulation clotting of blood. Platelets are also known as thrombocytes and instead of being proper cells they are the cell fragments which are produced by megakaryocytes. They are 1.5 lakh to 3.5 lakh per cubic millimeter of blood.



Platelets

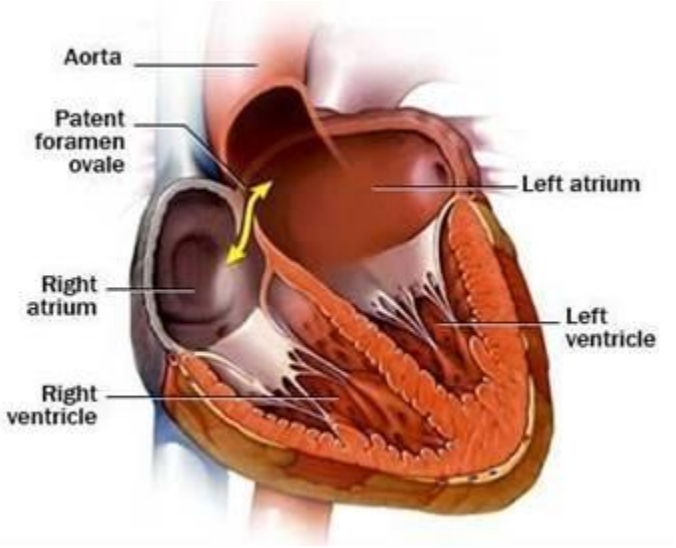
Q. 4. Platelets stop the blood at injury site by clotting it. How?

Answer: Blood platelets or thrombocytes are the cell fragments produced by megakaryocytes. During any injury, platelets release a substance called thromboplastin. This thromboplastin helps in the formation of a complex enzyme thrombokinase which converts prothrombin into active thrombin. This thrombin converts soluble fibrinogen into insoluble fibrin. This fibrin forms a network at the site of injury which traps the blood & form clot.

Check Point 02

Q. 1. Suggest a suitable reason for the heart having four separate chambers.

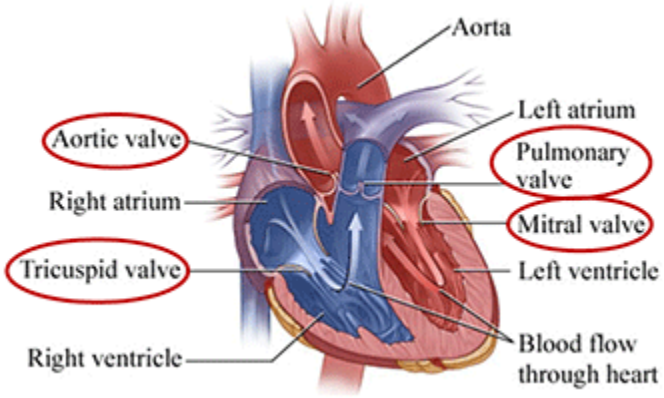
Answer: Human heart has four chambers that is two auricles and two ventricles. Auricles are the small chambers whereas ventricles are the bigger ones. Our heart has four chambers so as to prevent the mixing of oxygenated and deoxygenated blood. This increases the working efficiency of organism.



Q. 2. Valves are present in between the auricles and ventricles of the heart. Give one reason.

Answer: Human heart has various types of valves present in between the different chambers. Bicuspid valve is present between the left atrium and ventricle whereas tricuspid valve is present in between the right auricle and the right ventricle.

Semilunar valve is present between right ventricle & pulmonary artery and left ventricle & aorta. The important role of these valves is to prevent the backflow of blood from the ventricles to the auricles.



Q. 3. Name an animal having two-chambered heart.

Answer: Fishes have two chambered heart. The heart includes one auricle and one ventricle. But two chambereed heart is less efficient because in two chambered heart mixing of oxygenated and deoxygenated blood occurs. That is why two chambered & three chambered heart evolved into four chambered heart in humans as it prevents mixing of oxygenated and deoxygenated blood.

Q. 4. Name the instrument used to measure blood pressure.

Answer: Sphygmomanometer is a device to monitor blood pressure in humans. It has a cuff which is tied on the arm of the patient and then the blood pressure is monitored by observing the rise and fall in the mercury level.

Q. 5. What is the color of lymphatic vessels?

Answer: Lymph is a colorless liquid which is released out of the tissues. It is so because lymph contains only WBCs and not RBCs. Since the WBCs are colorless, lymph is also colorless. It has the same mineral composition as that of the plasma.

Check Point 03

Q. 1. Why do we need a proper transportation system in plants?

Answer: We need a proper transportation system in almost all the organisms whether be it plant or animals. Roots take up water which is required by the whole plant body. In the same way food is produced by the leaves which is to be distributed to the whole plant, therefore, a proper transportation system is needed to fulfill all the requirements of the plant.

Q. 2. Name the conducting structures present in plants.

Answer: Xylem and phloem are the conducting structures which are present in plants. Xylem is responsible for transportation of water and minerals whereas phloem is responsible for translocation of food.

Q. 3. What is the significance of transpiration in plants?

Answer: The process of movement of water in the plants through xylem and its **evaporation through leaves** or stem is known as transpiration. It is done through stomata during the daytime. It is important as it creates a pull which is known as transpirational pull in the xylem which is responsible for uptake of water. It also produces a cooling effect on plants and maintains the temperature of plant. Moreover is also prevents water logging in the plant.

Q. 4. Define translocation.

Answer: Movement of carbohydrates (sugars) produced by the leaves of the plant in the whole plant body through phloem is known as translocation. It is an important process as other parts of the plant which do not synthesize food also gets access to food produced by leaves.

Q. 5. Name the cells involved in translocation.

Answer: Translocation is the process of movement of carbohydrates (which act as food) produced by the leaves which is to be distributed to different parts of the plant. The process of translocation takes place in the phloem cells. Thus the cell involved would be companion cells, sieve elements & parenchymatous tissue.

Chapter Exercise

Q. 1. What stops blood from flowing backwards through the heart?

Answer: The valves present between the auricles and ventricles and between the ventricles and pulmonary artery and aorta prevent backflow of blood. Bicuspid or mitral

valve is present in between left auricle and left ventricle. Tricuspid valve is present in between right auricle and right ventricle. Semilunar valves are present in between right ventricles & left ventricle and pulmonary artery & aorta respectively.

Q. 2. The blood leaving the tissues becomes richer in a component. Name it.

Answer: The blood leaving the tissues becomes very rich in the carbon dioxide content. When the oxygenated blood reaches the tissues, it gives oxygen to the tissues and take up the carbon dioxide emitted from them and takes it back to the heart.

Q. 3. When the right atrium contracts, blood flow from it to which part of the heart?

Answer: The contraction of the right atrium results in to flow of blood from right atrium to the right ventricle. The flow of blood is guarded by the tricuspid valve which prevent the backflow of blood into the right atrium.

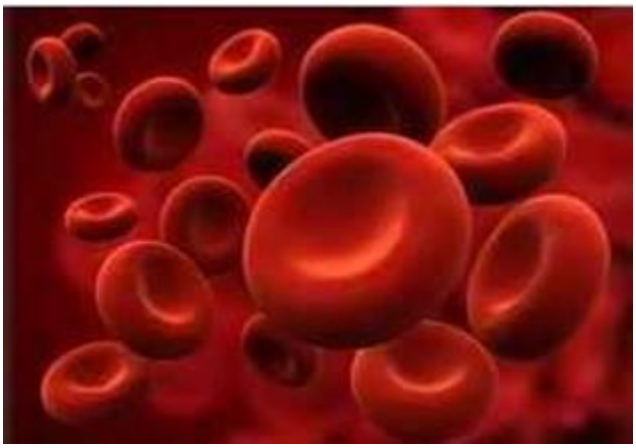
Q. 4. What is the systolic and diastolic pressure of a normal man?

Answer: When the muscles of heart contract it leads to systole and the relaxation of heart muscles after systole is known as diastole. The systolic and diastolic pressure of a normal man is 120/80 mmHg. In this, 120 mmHg represents the systolic pressure whereas 80 mmHg represents the diastolic pressure.

Q. 5. Give any four major roles played by RBCs.

Answer: Four major roles played by RBC ae-

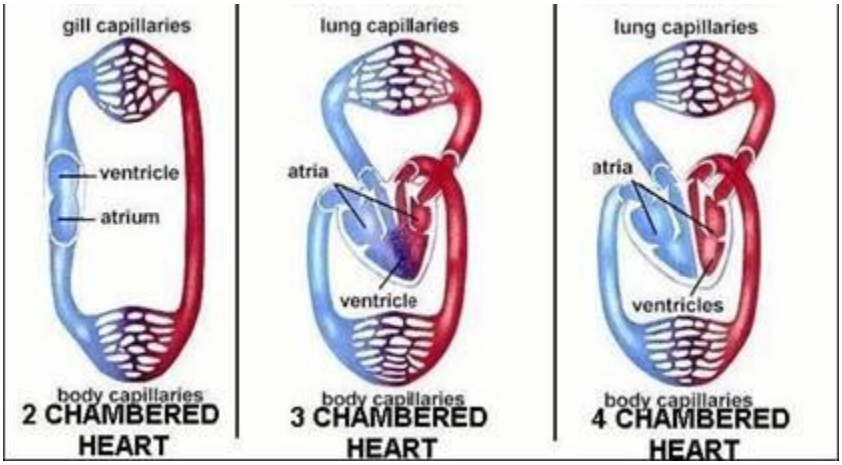
(i) it contains a respiratory pigment called as Haemoglobin.
(ii) transportation of oxygen in the body
(iii) removal of carbon-dioxide from tissues.
(iv) contains an enzyme carbonic anhydrase which is very important for CO_2 transport.



Q. 6. What is the difference between blood circulation fishes and birds?

Answer: There are major differences in the blood circulation of fishes & birds.

Heart in fishes is 2-chambered while heart in birds is 3-chambered. In fishes the blood enters in the heart only during one whole circulation a single time while in birds it enters twice during one complete circulation. In fishes, both oxygenated & deoxygenated blood gets mixed and then circulated to the whole body, while in birds both oxygenated & deoxygenated remains separated and thus more efficient.



Q. 7. Write a common feature between the following.

(i) Xylem and phloem
(ii) Haemoglobin and chlorophyll

Answer: i) Xylem and phloem

Xylem and phloem are the conducting tubes present in the plant which are responsible for the transportation of different materials required by the plant body.

ii) Haemoglobin and chlorophyll

Both of them are the colored pigments just present in different organisms. Haemoglobin is present in animals whereas chlorophyll is present in plants.

Q. 8. Enumerate the difference between translocation and transpiration.

Answer: Translocation: The process of movement of carbohydrates (which act as food) produced by the leaves which is to be distributed to different parts of the plant is known as translocation. The process of translocation takes place in the phloem cells.

Transpiration: The process of movement of water in the plants through xylem and its evaporation through leaves or stem is known as transpiration. It is done through

stomata during the daytime. It is important as it creates a pull which is known as transpirational pull in the xylem.

Q. 9. Blood is a fluid connective tissue. Explain.

Answer: Firstly, blood is mesodermal origin just the way all other connective tissues are. Secondly, blood connects different parts of the body, transporting minerals, nutrients, hormones and collecting waste from different parts. Hence, blood is known as a fluid connective tissue.

Q. 10. Platelets help in clotting of blood at injured side. Draw a flow diagram of this process.

Answer: Platelets help in clotting of blood. There are 13 different factors which affect the clotting mechanism. A clot is a reddish brown scum made up of fibre like structures known as fibrins. The important steps in clotting mechanism can be explained below:-

Step-1:- release of thromboplastin from injured tissues & platelets

Step-2:- This thromboplastin helps in the formation of a complex enzyme thrombokinase.

Step-3:- this thrombokinase converts prothrombin into active thrombin

Step-4:- This thrombin converts soluble fibrinogen into insoluble fibrin.

Step-5:- This fibrin forms a network at the site of injury which traps the blood & form clot.

Q. 11. Blood does not clot in the blood vessels. Give reason.

Answer: The basophils (a type of WBC) and mast cells present in our body (a part of formed elements) secrete an anti-coagulant known as Heparin. This anti-coagulant do not let the blood clot inside the blood vessels.

Q. 12. How is double circulation different from single circulation?

Answer: In the single circulation the deoxygenated blood from the whole body of the animal spammed into the heart. From the heart it goes to the gills and the oxygenated blood is pumped back into the body. This kind of circulation takes place in fishes. Whereas in double circulation the deoxygenated blood is collected from the body, goes to the lungs for the process of oxygenation and then this oxygenated blood comes back to the heart. The heart pumps back this oxygenated blood into the body tissues. In this type of circulation, as the blood passes through the heart two times, it is known as double circulation. It takes place in birds & mammals like human beings.

Q. 13. Name a circulatory fluid in the human body other than blood. State its functions. How does it differ from blood?

Answer: Another type of circulatory fluid in the human body is the lymph. Lymph is a colorless liquid which is formed out of blood plasma.

Q. 14. Explain how deoxygenated blood travel from body to lung for purification. Draw well-labeled diagram in support of your answer.

Answer: The deoxygenated blood is collected from the body tissues through the veins which further combine to form vena cava. This vena cava pours deoxygenated blood collected from the body tissues into the right auricle of heart. From right auricle it goes to right ventricle and from here the blood is pumped into the pulmonary artery which takes the deoxygenated blood from heart to the lungs. In the alveoli of lungs the blood is oxygenated. This oxygenated blood is pumped into the pulmonary veins which pours the blood into the left auricle. From here the oxygenated blood is poured into the left ventricle. The left ventricle pushes the blood into the aorta which pumps the oxygenated blood into the body tissues and supply oxygen through the tissues for various body functions.

Q. 15. Plants absorb water from the soil. How does this water reach to the top of the tree? Explain in detail.

Answer: i. The soil is the richest source of raw materials for the plant like nitrogen, phosphorous, water and other minerals. Water is essential for all physiological activities of the plant. The absorption of all these substances occurs through a part of the plant called roots.

ii. The plant transport system moves raw materials from roots and energy from leaves. This is done by two independent conducting tubes called xylem which transports water and minerals from the soil and phloem transports the food from leaves to other parts of plants. vessels tracheids of xylem tissue, stem, leaves, and roots form a continuous water conducting channel reaching to all parts of the plant.

iii. The difference of concentration of ions in roots and soil, help water to enter roots from the soil to eliminate this difference (caused by root cells take up ions from soil). This maintains the steady movement of water upwards via roots.

iv. But this pressure is not enough to supply water to heights.

v. Water lost through leaves (or any aerial part of the plant) called transpiration causes a suction which pulls water from xylem cells of roots. Thus, transpiration helps in the absorption and upward movement of water and minerals from soil via roots and reach the top. Also, it helps to regulate the temperature of the plant.

Q. 16.A. How does food prepared by leaves is utilized by roots? Explain.

Answer: The food for plants is prepared by the green leaves by the process of photosynthesis. In this process the plant uses carbon dioxide and produce sugars in the presence of sunlight. Every part of plant body like the roots and stem also require food for its functioning so the food prepared by the leaves must be transported to different parts of the plant. The process of transportation of carbohydrates (sugar) produced by the leaves to other parts of the plant is known as translocation. It is done through Phloem tissues. The movement of carbohydrates in phloem is bidirectional.

Q. 16.B. Water is absorbed by roots and lost through leaves. How does this happen?

Answer: Water is absorbed by the root of the plant but has to be transported to different parts of the plant like leaves and stem. It is done through xylem tissues. The flow of water and minerals in xylem is unidirectional that is from roots to leaves. The process of movement of water in the plants through xylem and its evaporation through leaves or stem is known as transpiration. It is done through stomata during the daytime. It is important as it creates a pull which is known as transpirational pull because of which the water moves from the roots to the leaves.

Q. 17. Amit studied transportation in plants. He wanted to observe the process of transpiration and placed a plant in bright sunlight. He noted down his observations. Next day he asked his teacher few questions about his observations. Read the above passage and answer the following questions.

(i) What is the role of transpiration in plants?

(ii) Explain how the transpiration rate is affected by
(a) decreasing the humidity of the surrounding air.
(b) increasing the temperature of the surrounding

(iii) What values do you observe in Amit?

Answer: (i) Transpiration is the process of movement of water in the xylem tissues and its evaporation through the aerial structures of the plant like leaves and stem. It causes a transpirational pull which help in the movement of water from the roots to the leaves.

(ii)(a) When humidity is decreased, transpiration is increased

(b) By increasing the temperature of the surroundings, we tend to increase the rate of evaporation of water droplets through the leaves by the process of transpiration. On increasing temperature, rate of transpiration also increases.

(iii) Amit is very interested in science subject. He believes in applying practical knowledges into real life experience.

Q. 18. Sumay studied about blood circulation in humans. He wanted to observe the flow of blood and was about to cut his finger a bit. He suddenly stopped realizing that this could be fatal. Read the above passage and answer the following questions.

(i) Why is the color of blood red?
(ii) Why does unclotted blood comes out from site of injury when platelets are present in the body?
(iii) Low count of which blood cells can make us vulnerable to infections?
(iv) What values do you think Sumay have?

Answer: (i) The color of the blood is red because of the presence of haemoglobin. Haemoglobin is a pigment which is found in the red blood cells. Even the color of RBCs is because of the presence of haemoglobin in them. It is useful as four molecules of oxygen combine to one molecule of Haemoglobin and thus help in oxygen transport.

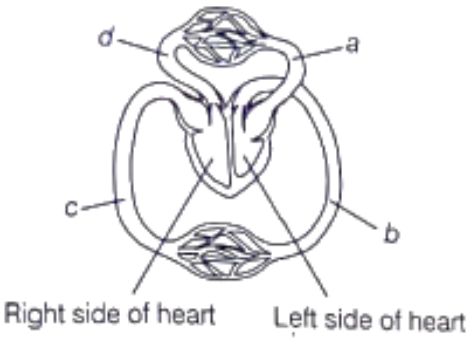
(ii) Blood do not clot in our blood vessels because of the presence of a natural anti coagulant Heparin which is released by the basophils and the mast cells in our body. Hence, unclotted blood comes out from the site of injury even when platelets are present.

(iii) There are three types of blood cells found in human beings. They are: red blood cells, white blood cells and the platelets. Different types of cells have different function. The type of blood cells which protect us from various kinds of infections in our body are the White Blood Cells or the Leucocytes. They are phagocytic in nature and hence, eat up the infection causing agent.

(iv) Sumay must be very serious before doing anything. But at least he realized it before doing anything dangerous.

Challengers

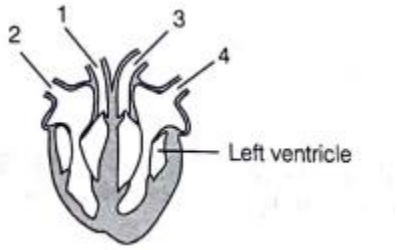
Q. 1. The diagram represents a part of human circulatory system. Where is the blood pressure highest?



A. (a)
B. (b)
C. (c)
D. (d)

Answer: The part of the diagram labeled as b will have the highest blood pressure in the whole circulatory system. The part labeled as b represents aorta. It is the largest artery which supplies the oxygenated blood from the left ventricle of heart to the body tissues. It has the highest pressure as the left ventricle has to pump the blood to all the body parts.

Q. 2. The diagram shows a vertical section through the heart.



What are the functions of the numbered blood vessels?

	Carries blood to body	Carries blood to lungs	Carries blood from lungs	Carries blood from body
(a)	1	2	3	4
(b)	1	3	4	2
(c)	2	4	3	1
(d)	3	1	4	2

A. (a)
B. (b)
C. (c)
D. (d)

Answer: 1- pulmonary artery

2- vena cava

3- aorta

4- pulmonary vein

Q. 3. What is the correct route for blood flow in a human?

A. Left atrium → Left ventricle → Lungs → Right ventricle → Right atrium
B. Left atrium → Left ventricle → Right ventricle → Right atrium → Lungs
C. Right atrium → Right ventricle → Left ventricle →Left atrium → Lungs
D. Right atrium → Right ventricle → Lungs → Left atrium → Left ventricle

Answer: The deoxygenated blood collected from different body parts is poured into the right auricle. From right auricle it moves to the right ventricle and through the pulmonary artery this is deoxygenated blood is pumped into the lungs where it is oxygenated. Then this oxygenated blood is transported to the left Atrium and then moves to the left ventricle from where it is pumped into the whole body.

Q. 4. Which of the following is not a purpose of transpiration?

A. Supplies water for photosynthesis
B. Helps in translocation of sugar in plants
C. Cools leaf surface
D. Transport minerals from the soil to all the parts of the plant

Answer: The process of movement of water in the plants through xylem and its evaporation through leaves or stem is known as transpiration. Transpiration supplies water for photosynthesis, cools the leaves surface through evaporation, and the transpirational pull helps in transportation of minerals from the roots to the leaves. But it never helps in the translocation of sugars. Translocation is the process of movement of food from the leaves to the different parts of the plant through phloem.

Q. 5. The table shows the characteristics of blood in one blood vessel of the body.

Oxygen Concentration	Carbon dioxide Concentration	Pressure
High	Low	High

Which blood vessel contains blood with these characteristics?

A. Aorta
B. Pulmonary artery
C. Pulmonary vein
D. Vena cava

Answer: Aorta is the only blood vessel which transports the oxygenated blood from the heart to different parts of the body. As the blood is oxygenated and this blood vessel the oxygen concentration is high, carbon dioxide concentration is low and the blood

pressure is very high so as to supply the oxygenated blood to different parts of the body.

Q. 6. What are the functions of the Xylem?

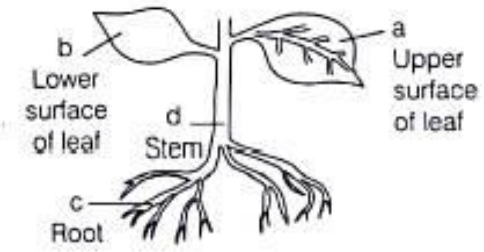
	Carrying Sugars	Carrying Water	Carrying mineral ions	Giving Support
(a)	✓	X	X	✓
(b)	✓	✓	X	X
(c)	X	✓	✓	X
(d)	X	✓	✓	✓

Key â = a function of xylem, X= not a function of xylem.

A. (a)
B. (b)
C. (c)
D. (d)

Answer: Xylem helps in transportation of water & mineral in the plant body and it also provides support.

Q. 7. The diagram shows part of a flowering plant. Where does the most transpiration take place?



A. (a)
B. (b)
C. (c)
D. (d)

Answer: Lower surface of leaf has more stomata than upper surface. That is why maximum transpiration occurs.

Q. 8. Which chambers of human heart contain oxygenated blood?

A. Left atrium and left ventricle
B. Left atrium and right ventricle
C. Right atrium and left ventricle
D. Right atrium and right ventricle

Answer: The deoxygenated blood is collected from different parts of the body and transported into the right atrium from which it moves to the right ventricle from where it is transported to the lungs for oxygenation. This oxygenated blood now comes to the left atrium and from here it is poured into the left ventricle. Therefore, the left part of the heart that is the left atrium and left ventricle contains the oxygenated blood.

Life Processes (d) Excretion

Check Point 01

Q. 1. How do unicellular organisms perform excretion?

Answer: Excretion refers to the removal of waste matter from the body. The unicellular organisms remove the waste products from their body by the process of simple diffusion which is defined as the movement of a substance from a region of higher concentration to a region of lower concentration through a membrane.

Q. 2. Excretion is different in multi-cellular organisms as compared to unicellular organisms. How?

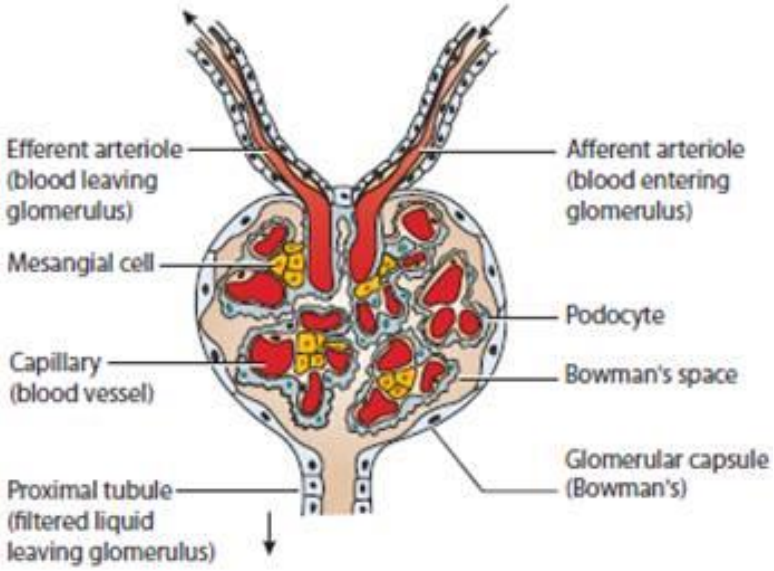
Answer: In unicellular organisms, excretion is performed by a single cell by the process of diffusion through the body surface. Whereas, in multi-cellular organisms, different life processes are performed by different cells and organ-systems (nervous system, excretory system, circulatory system, etc). Multi-cellular organisms use specialised organs such as lungs, kidneys, nephrons, skin, malphigian tubules, etc to eliminate waste products from their body.

Q. 3. Write the location of kidneys in human body.

Answer: Kidneys are bean-shaped organs meant for excretion. In human body, they are located in the upper abdominal area. The two kidneys are present opposite to each other, one on each side of the backbone.

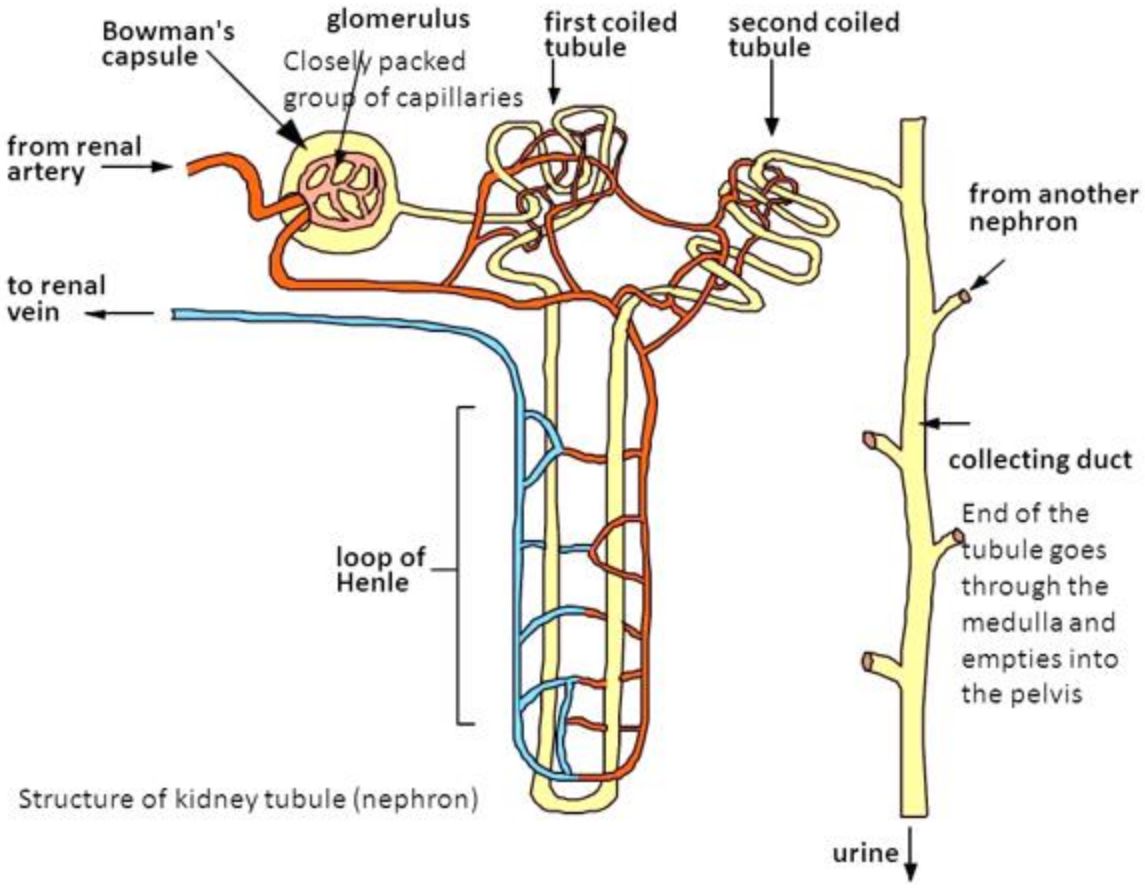
Q. 4. What is glomerulus?

Answer: Glomerulus is a tiny spherical structure present in nephrons (functional unit of a kidney). It is formed by the cluster of very thin-walled blood capillaries that are involved in filtration of blood to form urine. Each of this clustered group of capillaries is associated with a cup-shaped tube that collects the filtered urine.



Q. 5. Name the fundamental unit of kidney. Why is it called so?

Answer: The basic functional and filtration unit of a kidney is called a nephron. It is composed of renal corpuscle (Bowman's capsule + glomerulus) and renal tubules. It is called so because it is actively involved in filtration of blood to produce urine. It removes waste products and excess substances from blood and forms urine.



STRUCTURE OF A NEPHRON

Q. 6. The process of ultra-filtration is essential in urine formation, where does this step occur in nephron?

Answer: In a nephron, ultra-filtration occurs in the renal corpuscle (glomerulus + Bowman's capsule). Glomerular filtration of blood is also known as ultra-filtration. It is a non-selective process and filtration is so fine that every component of plasma (water, glucose, amino acids, urea, etc) except proteins pass into the Bowman's capsule. The epithelium of renal corpuscle has tiny filtration slits (also called slit pores) that help in ultra-filtration. This process ensures that only waste products and excess water are removed from the body and it also helps to concentrate the urine.

Q. 7. Second stage of urine formation is called selective re-absorption. Why?

Answer: The second stage of urine formation, tubular re-absorption, is called selective re-absorption because some substances such as glucose, amino acids, urea, salts and excess water are selectively reabsorbed back into the blood as urine is being filtered along the tubes. All components of plasma are not re-absorbed but only a few of them, hence, selective re-absorption.

Q. 8. ‘The urge to urinate can be controlled.’ Give reason.

Answer: The urine is stored in urinary bladder, which is a muscular sac composed of smooth muscles that are able to relax and contract. The pressure built inside the expanded bladder due to storage of urine leads to the urge to urinate. As the activity of urinary bladder is under the control of nervous system, the urge to urinate can be controlled.

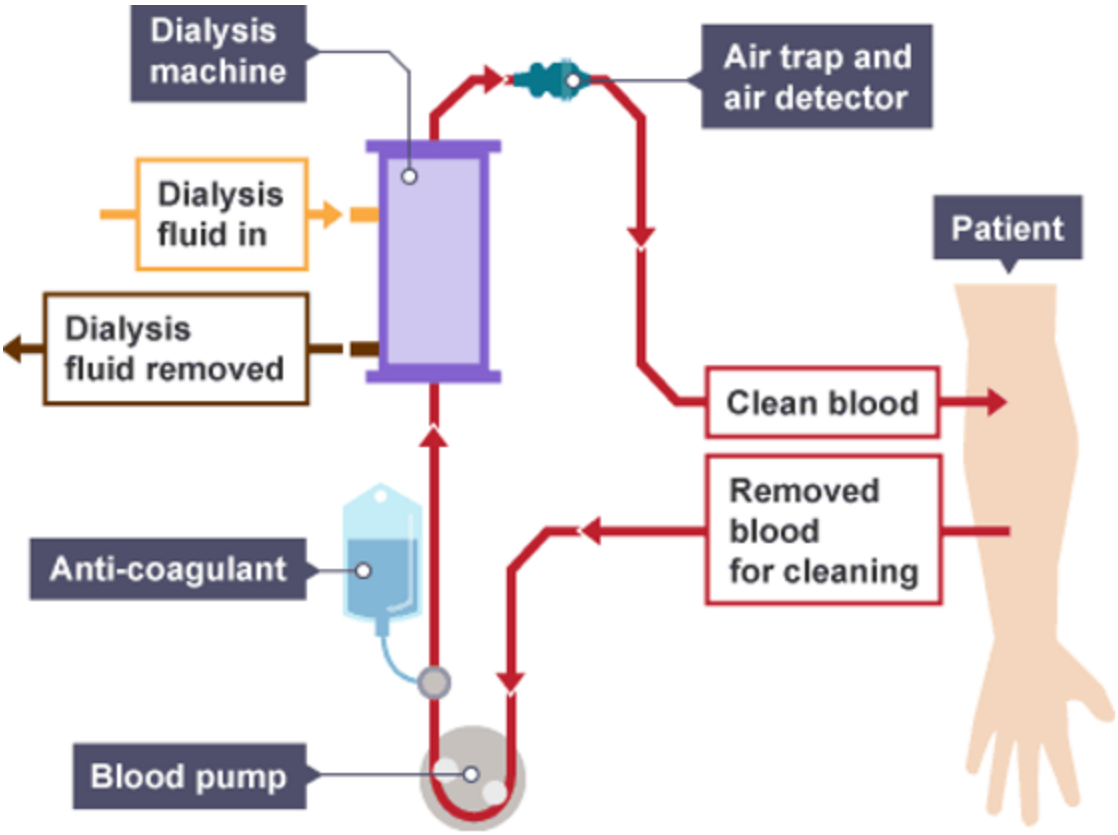
Check Point 02

Q. 1. When do we need artificial kidneys?

Answer. In case of kidney failure, an artificial kidney is needed. The kidneys lose the ability to remove the nitrogenous waste products from the body or their activity is highly reduced. They fail to perform their vital function. There are many reasons for kidney failure such as injury, infection and reduced blood flow that lead to accumulation of wastes in our body. Hence, an artificial kidney can be used.

Q. 2. Explain the term dialysis.

Answer: Dialysis is the process of removing nitrogenous wastes and excess water from the body by using a clinical device, called as artificial kidney and a dialyzing fluid. It serves as a substitute for normal functioning of the kidneys. It is required when the kidneys stop functioning properly or are damaged.



DIALYSIS

Q. 3. State one difference between artificial kidney and natural kidney?

Answer:

Natural kidney	Artificial kidney
Natural kidneys have the capacity of re-absorption to maintain osmotic balance in the body.	Artificial kidneys do not have the capacity of re-absorption to maintain osmotic balance in the body.

Q. 4. In the artificial kidneys, the tubes are all with semi-permeable lining. Why?

Answer: In artificial kidneys, all tubes are semi-permeable and made of cellophane. These tubes are selectively permeable and allow only certain substances to pass through them. The semi-permeable nature allows only the nitrogenous waste products and water to pass through the tubes and does not allow the blood cells and proteins to pass through it.

Check Point 03

Q. 1. Name any two waste products secreted by plants.

Answer: Plants produce many waste products such as gases and water. They eliminate excess water through transpiration. Plants also produce gaseous waste products – oxygen during photosynthesis (yes, oxygen can be considered a waste product for plants) and carbon dioxide during respiration.

Q. 2: Some plants excrete wastes through stomata, others through hydathodes. Name the processes occurring in them.

Answer: When water is lost in the form of vapours through the stomata present on leaves, it is called **transpiration.** Some plants lose excess water in the form of liquid droplets from the margins of leaves, through **hydathodes.** This process is called as **guttation.** Hydathodes are structurally modified pores present on leaf margin.

THE PROCESS OF GUTTATION

Q. 3. How do stems of a plant help in excretion of gases?

Answer: Stems of plants also possess stomata through which diffusion of gases occur. The oxygen from air diffuses into the stem for respiration through stomata and similarly, carbon dioxide diffuses out into the air. The stems of woody plants possess lenticels (large raised pores) to facilitate the exchange of gases, thereby help in excretion.

LENTICELS

Q. 4. How does excess of water removed by the plants?

Answer: Plants lose excess water through stomata, lenticels and cuticle. The two processes involved are transpiration and guttation. When water is lost in the form of vapours through the stomata present on the aerial parts of plants, it is called **transpiration.** It occurs by pulling of water. It occurs only in daytime. When excess water is lost in the form of liquid droplets from the margins of leaves, through hydathodes, it is called **guttation.** It occurs by pushing of water towards leaf margins. It occurs only at night. Hydathodes are structurally modified pores present on leaf margin.

Q. 5. In what forms, apart from water, do plants excrete out liquid waste?

Answer: Apart from water, plants excrete out a number of liquid waste products into the soil around them. It includes essential oils, organic acids, aromatic oils, tannins, resins, latex and sap. Resins and gums are stored in old xylem of plants. Most of these wastes are useful to humans.

Q. 6. Name one useful plant waste used to make tyres.

Answer: The latex is exuded as a waste product from plants. The tyres are made from the latex of rubber tree (Hevea brasiliensis).

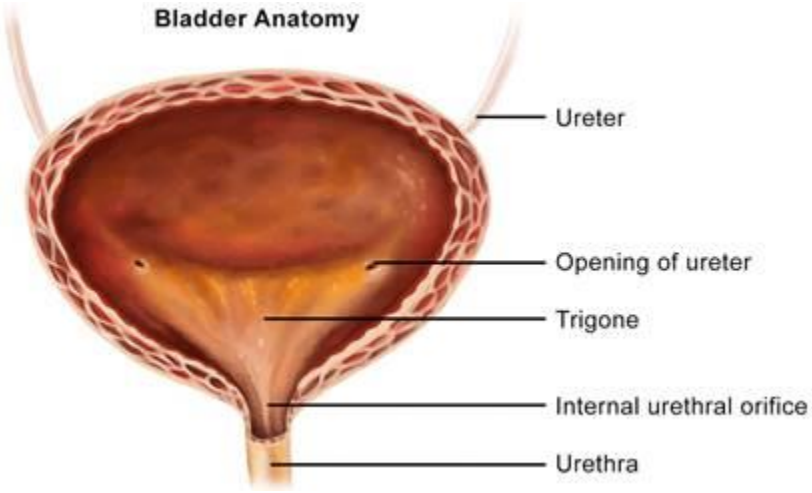
Chapter Exercise

Q. 1. Name the excretory organs in unicellular organisms.

Answer: The unicellular organisms (such as amoeba) have no specialized organs for excretion. They excrete out wastes by simple diffusion through their plasma membrane (general body surface) into their surroundings.

Q. 2. Where is the urine produced by kidneys gets stored?

Answer: The urine is produced by the kidneys and is then passed to the urinary bladder, where it gets stored. The urinary bladder is a pear-shaped hollow muscular sac composed of smooth muscles that are able to expand.



Q. 3. What are the major constituents of urine?

Answer: The urine is made up of a number of constituents. It is an aqueous solution mainly composed of water (95%). It also consists of some organic and inorganic compounds. Other constituents include small amounts of urea, creatinine and some dissolved ions such as sodium, potassium and chloride.

Q. 4. State the process by which chemicals from the blood enter the dialysing fluid?

Answer: The chemicals (toxic waste products) from the blood enter the dialyzing fluid through the process of diffusion when blood is passed along the tubes.

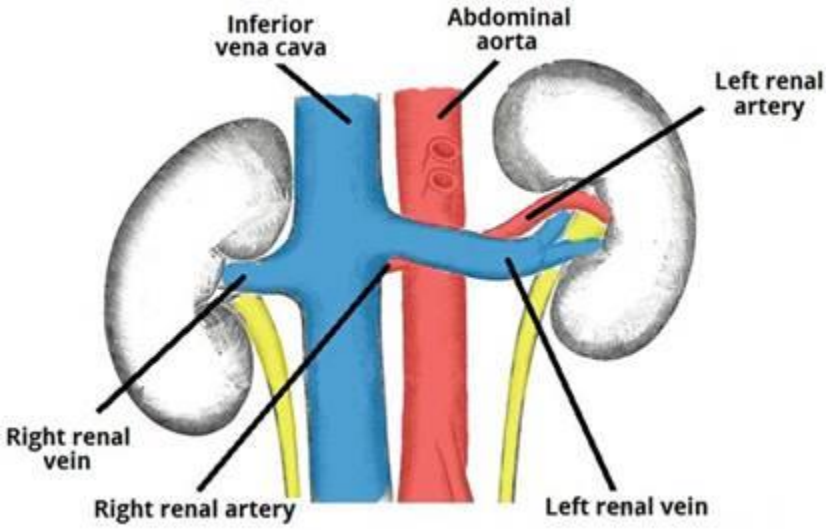
Q. 5. Name the substance which is present in the blood, but not in the urine of a healthy person?

Answer: Normally, glucose is present in the blood, but not in urine of a healthy person. All of the filtered glucose is re-absorbed into the bloodstream by the kidneys through tubular re-absorption. The presence of glucose in urine **(glycosuria)** indicates that the person has diabetes.

Q. 6. Tabulate two differences between renal artery and renal vein.

Answer:

RENAL ARTERY	RENAL VEIN
1. Renal artery is thick, muscular and strong possessing a narrow lumen with no valves.	1. Renal vein is thinner and possess a wide lumen with valves to prevent backflow of blood.
2. It carries oxygenated blood from the heart to the kidneys.	2. It carries de-oxygenated blood from the kidneys back to the heart.
3. Blood flows with high pressure.	3. Blood flows with low pressure.



Q. 7. What is osmoregulation? Name the organs of osmoregulation in:

(i) Human
(ii) Amoeba

Answer: Osmoregulation refers to the regulation of water and salt concentration across the membranes within the body fluid to maintain the required osmotic pressure. It serves to maintain the dissolved ions concentration of body fluid.

(i) The main osmoregulatory organs in humans are **kidneys.** They also function to filter blood.

(ii) Amoeba possesses **contractile vacuoles** as osmoregulatory organs. It serves to regulate the water content of the cell. These vacuoles help the amoeba to survive in hypertonic as well as hypotonic environment.

Q. 8. Explain how the blood system carries waste products from liver to the kidneys?

Answer: The circulatory system also serves to remove waste products from the body. Certain wastes such as excess water, urea, uric acid and carbon dioxide are

transported from the liver to the kidneys, where the blood is filtered. The urea is produced in liver and released into the bloodstream. It is then transported to the kidneys by blood to be excreted out in urine. These waste products are exchanged through diffusion as blood is being filtered by kidneys.

Q. 9. Explain the principle of haemodialysis.

Answer: Haemodialysis serves as a substitute for kidney. It works on the principle of **diffusion.** The nitrogenous wastes (urea), creatinine and potassium ions diffuse out into the dialyzing fluid across the semi-permeable membranes along the concentration gradient (from high concentration to low concentration). It corrects electrolyte imbalance and removes waste from the body.

Q. 10. How do plants get rid of their excretory products?

Answer: Plants produce a number of waste products and use different mechanisms to get rid of them. Excess water is eliminated by transpiration and guttation. Oxygen (a by-product of photosynthesis) and carbon dioxide (produced during respiration) moves out through stomata. Some waste products are stored in plant parts like leaves that later fall off. Plants also excrete some waste products into the surrounding soil. Certain wastes are accumulated as resins or gums in old xylem tissue. All these methods help the plants to get rid of their excretory products.

Q. 11. What is the difference between excretion and defecation? Explain the process of excretion in humans.

Answer: Excretion is the removal of nitrogenous waste products of metabolism that are formed in the body, such as urine and carbon dioxide through kidneys and lungs. It is a part of excretory system.

Defecation (discharge of faeces) refers to the removal of undigested food and other waste material from the alimentary canal through the anus. It is a part of digestive system. It marks the end of digestion.

Human excretory system

● It consists of a pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

● Urine is produced in the kidneys and passed to the urinary bladder through the ureters.

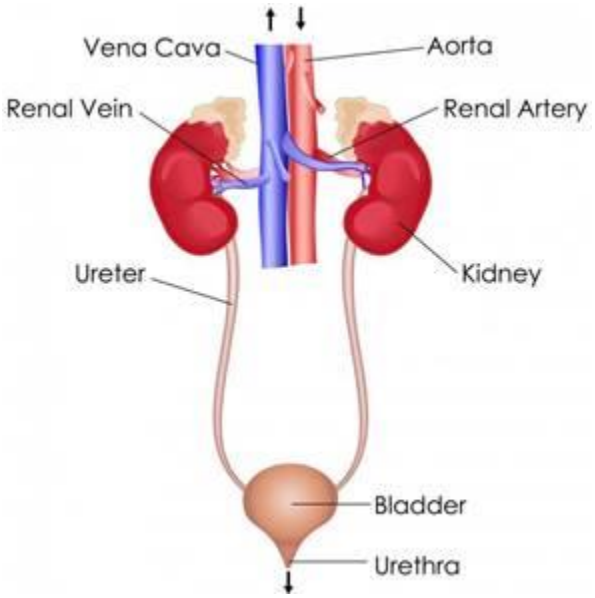
● It is then excreted out of the urinary bladder via urethra.

● Each kidney possesses about a million nephrons (basic functional unit) that are responsible to filter out blood and produce urine.

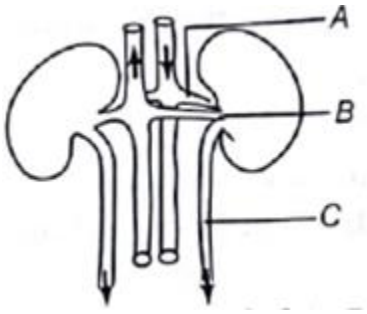
● The three processes involved are filtration, re-absorption and secretion.

● Certain substances such as glucose and amino acids are re-absorbed while other waste products are excreted out in the form of urine, which is carried by ureters from the kidney to the urinary bladder.

● Thus, help to concentrate the urine.



Q. 12. The given diagram shows parts of the urinary system of a mammal.



Identify the structures labelled A, B and C.

Answer: A. Renal artery – It supplies oxygenated blood from the heart to the kidney.

B. Renal vein – It carries deoxygenated blood from the kidney back to the heart.

C. Ureters – Paired tubes connecting kidneys to the urinary bladder. They transport urine from the kidneys to the bladder.

Q. 13. Outline the functioning of kidney dialysis machine?

Answer: ● The dialysis machine serves as artificial kidney.

● It is used for patients with damaged or dysfunctional kidneys.

● It filters blood and removes waste products and excess fluid from the body.

● It works on the principle of diffusion.

● It consists of semi-permeable tubes (made of cellophane) and a special dialyzing fluid.

● A small incision is made on the arm and a tube is connected. The blood is passed along the tubes placed in dialyzing fluid that filter waste products from the blood through diffusion.

● The filtered blood is transported back into the body.

Q. 14. Ritu learned that excretion removes harmful metabolic wastes, i.e. nitrogenous wastes from the body. Different processes are employed in varied organisms depending on body's organisation.

Read the passage and answer the following questions.

(i) Why can't diffusion be carried out as excretory process in multicellular organisms?
(ii) Aquatic animals usually excrete ammonia as excretory waste. Give reason.
(iii) List the values observed in Ritu.

Answer: (i) The multi-cellular organisms have a very complex body organization. They possess many different organ-systems to perform the basic life processes, such as respiration, excretion, etc. Also, the cells and tissues of these organisms are not in direct contact with the environment. Moreover, diffusion is quite a slow process. So, excretion cannot be performed through diffusion.

(ii) Ammonia is a toxic nitrogenous waste and is highly soluble in water. The removal of ammonia requires a large amount of water. Aquatic animals are ammonotelic as they need not conserve water. The conversion of ammonia into less toxic metabolite (urea, uric acid) is highly energy intensive. Therefore, aquatic animals prefer not to expend energy in conversion of ammonia.

(iii) Ritu possesses a number of values. She seems to be attentive, vigilant, observant and zealous. She has a curiosity for learning.

Q. 15. Rohan studied excretion in plants. He observed that the oxygen we breathe is actually a waste product of photosynthesis in plants. He wondered about other waste products and their uses. He was also bothered about the increased

deforestation which disturbs the O_2-CO_2 balance of the environment. Read the above passage and answer the questions following.

(i) How do plants release gaseous wastes from their body?
(ii) Apart from oxygen, what other waste products are released by plants? Give two examples along with their use.

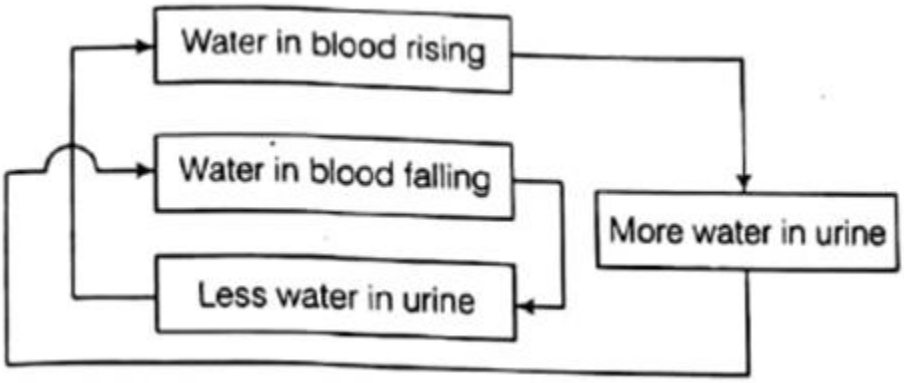
Answer: (i) Plants use different methods to perform excretion. They produce mainly two gaseous waste products, namely oxygen (produced during photosynthesis) and carbon dioxide (produced during respiration). The leaves of plants possess tiny pores called stomata and stems possess lenticels through which O_2 and CO_2 are diffused out of the plant body.

(ii) Apart from oxygen, plants produce a number of waste products such as excess water, essential oils, aromatic oils, tannins, resins, gums, organic acids, latex, etc. Almost all of these products are useful to human.

Gums and resins are used for varnishes and adhesives. Essential oils are used in cosmetics and soap making.

Challengers

Q. 1. Observe the figure given below which represents the control of water concentration in the blood.



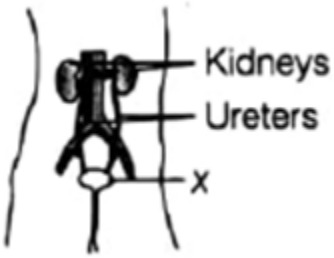
This is a negative feedback

A. It decreases the amount of water in the blood.
B. It increases any change occurring in the amount of water in the blood.
C. It reverses any change occurring in the amount of water in the blood.
D. It increases the amount of water in the blood.

Answer: This is a negative feedback to reverse any change occurring in water concentration in blood. This system regulates and maintains required water amount in

blood by excreting out excess water in the form of urine. If the amount of water in blood is reduced, more concentrated urine is formed to conserve water.

Q. 2. The diagram given below shows the human excretory system.

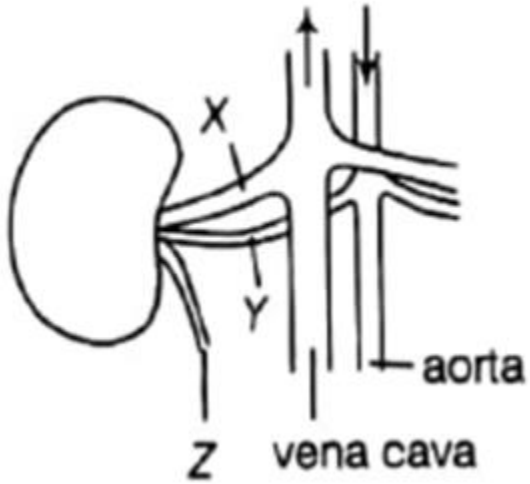


Identify the function of part labelled as x

A. To excrete urea
B. To produce urea
C. To produce urine
D. To store urine

Answer: The labeled part is the urinary bladder, which is a pear-shaped muscular sac composed of smooth muscle. It is connected to the kidneys via ureters. It is meant for storing urine until it is released out through urethra.

Q. 3. In the figure given below the structures associated with human kidneys are marked (X,Y and Z). The relative concentrations of urea in these structure is



A. X is sometimes higher than Y
B. Y is always higher than Z
C. Y is always lower than Z
D. Z is sometimes lower than X

Answer: The structures are labeled as:

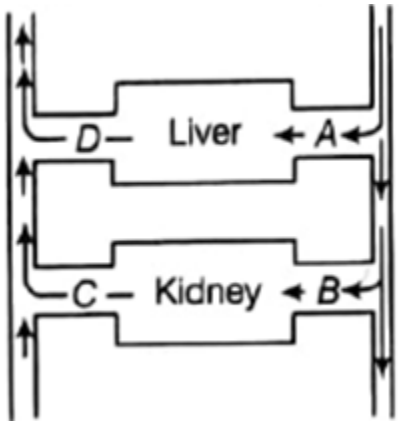
X – Renal vein

Y – Renal artery

Z - Ureter

The renal artery (Y) carries oxygenated blood to the kidneys from the heart. This blood contains negligible amounts of waste products (such as urea). On the other hand, the ureters (Z) transport urine from the kidneys to the urinary bladder. The urine contains comparatively high amounts of urea to be excreted out. Thus, the relative concentration of urea in Y is always lower than that in Z.

Q. 4. The diagram given below represents the liver, kidney and some associated blood vessels. Identify the vessel from the labelled parts A-D in which the blood will contain the lowest concentration of urea?



A. A
B. B
C. C
D. D

Answer: The urea is formed by the urea-cycle in the liver, and not in the kidneys. The blood vessel coming out from the kidney will contain the lowest concentration of urea (although kidneys contain only a small amount of urea to maintain osmolarity). And the blood vessel coming out from the liver will contain the highest concentration of urea.

Q. 5. A healthy woman consumes a litre of water at once.

(i) How will be the internal environment of her body affected by this?
(ii) A corrective measure to bring the arising condition to normal state is?

Select the correct option for (i) and (ii) from those given below

(i)	(ii)
(a) Plasma becomes diluted	Concentration of the urine formed
(b) Osmotic pressure of the plasma decreases	Increase in the volume of urine formed.
(c) The body cells undergoes shrinkage	Less water is reabsorbed by the kidneys
(d) Osomotic pressure of the plasma increases	Formation of dilute urine occure.

A. (a)
B. (b)
C. (c)
D. (d)

Answer: Consuming high amount of water leads to increased water concentration in blood. As a result, osmotic pressure of the plasma decreases because excess water must be eliminated to maintain normal functioning of the body. Decreased osmotic pressure of the plasma tends to push out excess water from the circulatory system.

Consequently, more volume of urine is produced and the person has frequent urination.

Q. 6. Which substances will be present in the glomerular filterate from the kidneys of a mammal?

	Glucose	*Protein*	*Salts*
(a)	✓	✓	×
(b)	×	✓	✓
(c)	✓	×	✓
(d)	×	×	✓

Key ✓ = present, × = absent

A. (a)
B. (b)
C. (c)
D. (d)

Answer: The process of glomerular filtration, also called ultra-filtration occurs in the renal corpuscle (glomerulus + Bowman's capsule) through numerous tiny filtration slits present in the basement membrane of renal corpuscle. This filtration is so fine that every component of plasma, except proteins (as they are large in size) pass into the

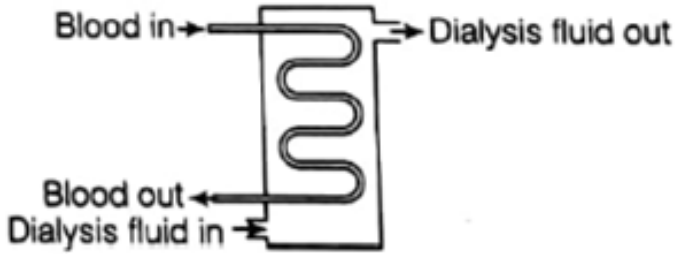
Bowman's capsule. Therefore, the filtrate from the kidneys of a mammal contains glucose and salts, but not proteins.

Q. 7. Most often during a kidney disorder, the colour of urine changes from yellow to others. A patient is secreting dark coloured urine which turns to blue or black later. This is due to the presence of which of the following?

A. Homogentisic acid
B. Methaemoglobin
C. Corpoporphyrin
D. Both A and B

Answer: The accumulation of Homogentisic acid (phenolic acid) causes alkaptonuria (a rare inherited disease that causes the urine to turn black when comes in contact with air). This accumulated acid is excreted out in urine giving it a dark colored appearance. Alkaptonuria is caused by the deficiency of an enzyme (homogentisic dioxygenase).

Q. 8. The figure given below is representing the dialysis machine for removing nitrogenous wastes in patient with a kidney failure.



Which substances out of the following in the dialysis fluid should be at a lower concentration than in the blood of patient?

A. Glucose and urea
B. Glucose and amino acids
C. Salts and urea
D. Glucose and salts

Answer: The kidney is dysfunctional in the patient; nitrogenous wastes will not be excreted out from his body. As a result, salts and urea will get accumulated in the blood. The dialysis fluid is meant for filtering the blood, so it contains no nitrogenous wastes. As compared to blood, urea and salts should be at a lower concentration in the dialysis fluid.