NCERT Solutions for Class 10 Science Chapter 5 – Life Processes

Intext Questions with Solutions of Class 10 Science Chapter 5 – Life Processes

1.

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

Ans: Diffusion is inadequate to satisfy the oxygen demands of multicellular organisms such as humans, as this process is inherently slow and would require considerable time to reach every cell in the body, which is extensive and intricate, with each cell necessitating oxygen.

2.

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

Ans: The primary criteria used to determine whether something is alive are breathing and respiration. However, living beings exhibit development and movement.

3.

What are outside raw materials used for by an organism?

Ans: Food, water, and oxygen are external raw elements utilized by an organism. The quantities, sources, and types of these raw materials differ among distinct species and are mostly utilized for essential tasks within their bodies. They also supply energy to the body to execute numerous functions.

4.

What processes would you consider essential for maintaining life?

Ans: The maintenance of life depends on vital functions like breathing, digestion, excretion, circulation, and transportation.

5.

What are the differences between autotrophic nutrition and heterotrophic nutrition?

Ans:

Autotrophic nutrition	Heterotrophic nutrition
(i) In this mode of nutrition, an organism synthesizes its own food.	(i) In this mode of nutrition, an organism is unable to produce or synthesize its own food.
(ii) Organisms utilize basic inorganic substances such as carbon dioxide and water to synthesize their food in the presence of sunlight.	(ii) Organisms are unable to synthesize their own food from simple inorganic substances and rely on other organisms for sustenance.
(iii) All green plants and certain algae utilize this mode of nutrition.	(iii) All animals, the majority of bacteria, and fungi utilize this mode of nutrition.

6.

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

Ans:

i. Carbon dioxide: Plants get carbon dioxide from the air through little holes in their leaves called stomata.
ii. Water: Plants get water from the ground through their roots and transport it to their leaves.
iii. Sunlight: The sun shines on plants.
iv. Chlorophyll: This is what makes plants green. It is present in the chloroplasts of green leaves and other green parts of plants.

7.

What is the role of the acid in our stomach?

Ans: The stomach's HCl breaks down food particles and makes the environment acidic. Pepsinogen, which breaks down proteins, turns into pepsin when it is in an acidic environment. HCl in the stomach also protects against several germs that can make you sick.

8.

What is the function of digestive enzymes?

Ans: The breakdown of complex food molecules into simpler ones that the body's cells can readily absorb is one of the vital tasks carried out by the digestive enzymes. These enzymes also serve as biocatalysts, speeding up the breakdown of complex foods by increasing the rate of reaction. The body contains a variety of digestive enzymes, including lipase, amylase, trypsin, and pepsin.

9.

How is the small intestine designed to absorb digested food?

Ans: The small intestine's layout maximizes the amount of space available for the absorption of broken-down food and its subsequent passage into the bloodstream for the body's circulation. The small intestine's inner lining contains several projections that resemble fingers, known as villi, for this purpose. Each and every cell in the body receives the absorbed food thanks to the abundant blood arteries that supply the villi.

10.

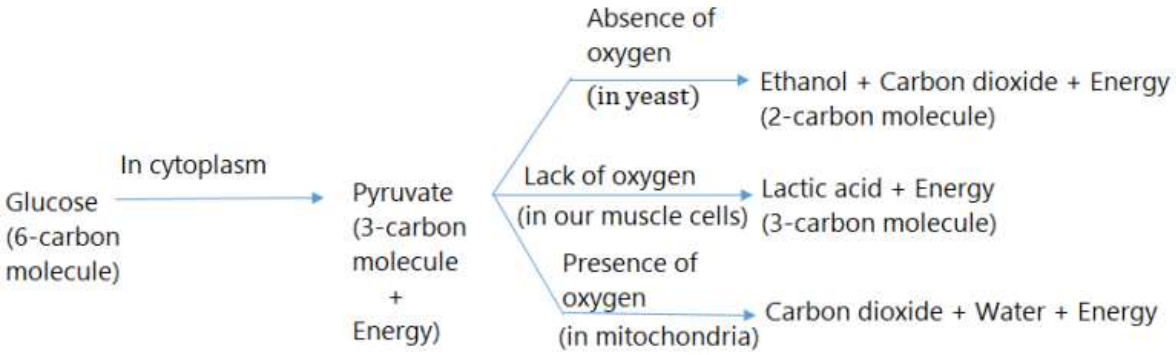
What advantage over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Ans: The abundance of oxygen in the environment gives terrestrial organisms an edge over watery ones. Aquatic species breathe air that has been dissolved in the water, whereas terrestrial organisms breathe air that is present in the atmosphere surrounding them. As a result, the air contains a significantly higher concentration of oxygen than the water.

11.

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

Ans: Glycolysis is the mechanism that initially breaks down glucose in the cytoplasm into two three-carbon molecules termed pyruvate. various processes in various organisms lead to further degradation.



12.

How is oxygen and carbon dioxide transported in human beings?

Ans:

i. Transport of oxygen: Hemoglobin in the blood picks up oxygen from the air in the lungs. It brings oxygen to tissues that don't have enough of it before letting it go.
ii. Transport of carbon dioxide: Carbon dioxide dissolves better in water. So, it usually gets from body tissues to the lungs in the form of dissolved blood plasma. It moves from blood to air in the lungs here.

13.

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

Ans:

- The lungs are very important to the body. Inside the lungs, the passageway splits into smaller and smaller tubes that end in structures that look like balloons. These are called alveoli.
- In the alveoli, there is an area where gases can move back and forth. There is usually a large network of blood arteries on the walls of the alveoli. We know that when we breathe in, our stomach flattens out, our ribs rise, and our chest gets bigger.
- To do this, air is sucked into the lungs, which fills up the alveoli that have grown.
- The blood brings carbon dioxide from the rest of the body to the alveoli and feeds it. The alveolar air contains oxygen, which is taken up by the blood in the alveolar blood vessels and sent to all the body's cells. Because the lungs always hold some air after taking it in and letting it out during regular breathing, there is enough time for oxygen to be absorbed and carbon dioxide to be released.

14.

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

Ans: The heart, blood, and blood arteries make up the majority of the human circulatory system, or transport system.

i. The heart's function is to pump blood that has lost oxygen from various body sections to the lungs so that it can be enriched with oxygen. It circulates the body after receiving purified blood from the lungs.
ii. Blood's role: Blood carries hormones, carbon dioxide, oxygen, digested food, and nitrogenous waste, such as urea. It also controls body temperature and shields the body from illness.
iii. Blood vessel function: The blood that the heart pumps through the arteries, veins, and capillaries also returns to the heart via these blood vessels.

15.

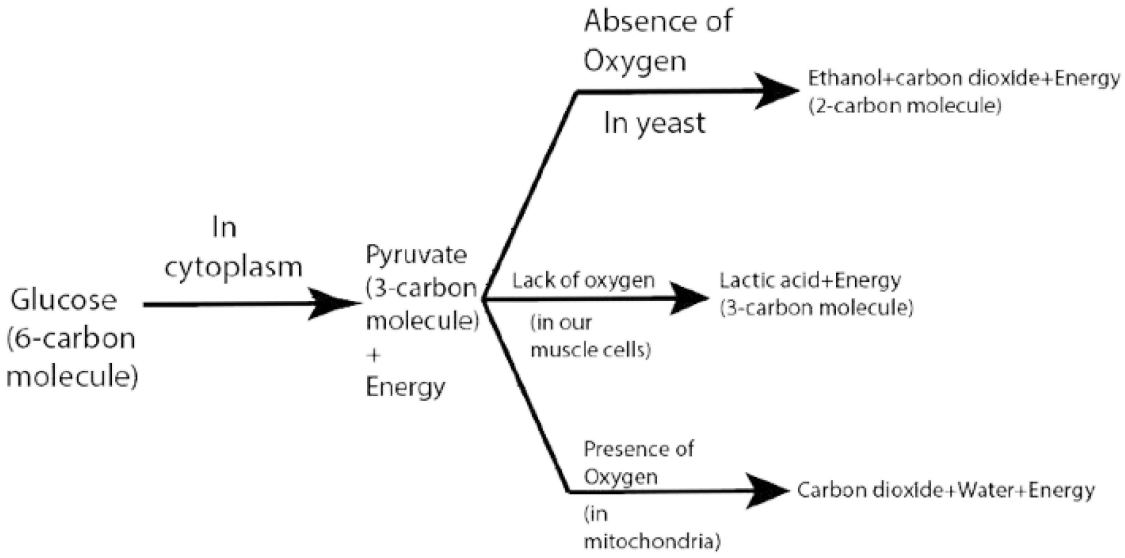
Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans: Warm-blooded creatures like birds and mammals maintain a consistent body temperature regardless of their surroundings. In order for warm-blooded animals to produce more energy to maintain a stable body temperature, this procedure necessitates a large amount of oxygen for increased cellular respiration. Warm-blooded animals must so distinguish between oxygenated and deoxygenated blood in order to maintain the effectiveness of their circulatory systems.

16.

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

Ans: Xylem and phloem are the two conducting tissues found in highly ordered plants. Tracheids, vessels, and other xylem tissues make up xylem. All areas of the plant are reached by the continuous network of water-conducting channels formed by the connected vessels and tracheids. Water and minerals are carried by xylem.
Soluble products of photosynthesis are transported from leaves to other plant sections by phloem.



17.

How are water and minerals transported in plants?

Ans: The roots of a plant possess structures known as root hairs.
The root hairs are in direct touch with the water film between the soil particles. Water and dissolved minerals enter the root hair through the process of diffusion. The water and minerals taken by the root hair from the soil traverse from cell to cell by osmosis through the epidermis, root cortex, endodermis, and ultimately reach the root xylem.
The xylem vessels of the plant's root are interconnected with the xylem vessels of its stem. Consequently, the water infused with dissolved minerals ascends from the root xylem vessels into the stem xylem vessels. The xylem vessels of the stem diverge into the leaves of the plants. The xylem vessels in the stem transport water and minerals to the leaves via branched xylem vessels that extend from the petiole into all regions of the leaf. Consequently, water and minerals from the soil are transported by the root and stem to the leaves of the plants. The evaporation of water molecules from leaf cells generates a suction that draws water from the xylem cells in the roots. The evaporation of water as vapor from the aerial portions of the plant is referred to as transpiration.

Movement of water during transpiration in a tree.

18.

How is food transported in plants?

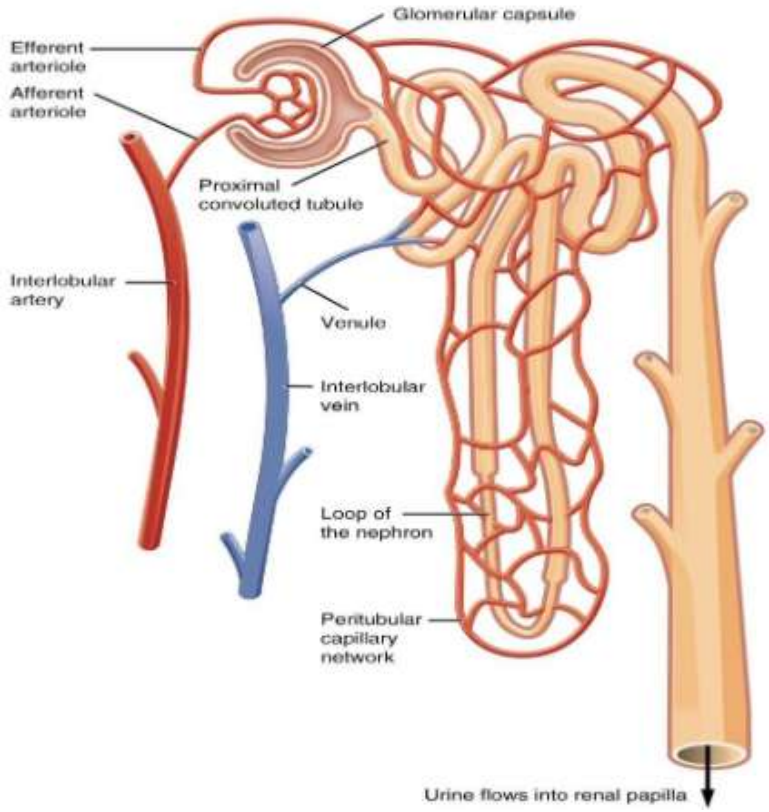
Ans: A specialized organ known as the phloem transports food within plants. Phloem is responsible for transferring nutrients from the plant's leaves to other areas of the plant. The transport of food in phloem occurs through the utilization of energy derived from ATP. This elevates osmotic pressure within the tissue, resulting in the movement of water. This pressure facilitates the movement of material in the Phloem towards tissues exhibiting lower pressure. This facilitates the transportation of food materials according to requirements. For instance, sucrose.

19.

Describe the structure and functioning of nephrons.

Ans:

Structure Of Nephron: Each nephron has two sections. First is Bowman's capsule, a cup-shaped sack on top.
The Bowman's capsule has glomerulus, a blood capillary bundle. The renal artery carries impure blood with urea waste into the glomerulus. Those contaminants are filtered. The other nephron coils. The body needs glucose, amino acids, ions, and excess water, which are reabsorbed here. The nephron retains urine with dissolved urea in water, which is released through the urethra periodically.



Nephron functions: Bowman's capsule filters blood from glomerulus capillaries. Filtrate enters the tubular nephron. The filtrate comprises glucose, amino acids, urea, uric acid, salts, and water. As filtrate passes throughout the tubule, capillaries around the nephron tubule preferentially resorb glucose, amino acids, salts, and water into the blood.
The filtrate left after reabsorption is urine. Urea, uric acid, salts, and water are in urine. Urine is collected from nephrons and sent to the ureter and bladder.

20.

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

Ans: Through transpiration, plants can eliminate surplus water.

Plants employ the fact that many of their tissues are made up of dead cells and that they may even shed some sections, like leaves, to get rid of other waste. Cellular vacuoles hold a variety of plant waste products. Leaves that fall off can be used to hold waste.

Particularly in aged xylem, other waste materials are retained as gums and resins. Additionally, plants release certain waste products into the surrounding soil.

21.

How is the amount of urine produced regulated?

Ans: The kidney controls the amount of urine produced. The amount of waste and surplus water dissolved in the water determines this.

1. Water content: Large amounts of diluted urine are expelled from the body when there is an abundance of water in the tissues. A tiny amount of concentrated urine is expelled when the body's tissues contain less water.
2. Amount of dissolved wastes: The body excretes dissolved wastes, particularly nitrogenous wastes like urea, uric acid, and salts. The body needs more water to expel dissolved wastes when there are more of them in the body. Urine production consequently rises.
3. Hormones: Certain hormones that govern the flow of water and Na+ ions into and out of the nephrons also affect the volume of urine generated.

Exercise Questions with Solutions of Class 10 Science Chapter 5 – Life Processes

1.

The kidneys in human beings are a part of the system for
(a) nutrition. (c) excretion.

(b) respiration. (d) transportation.

Ans: (c) Excretion

2.

The xylem in plants are responsible for
(a) transport of water. (c) transport of amino acids.
(b) transport of food. (d) transport of oxygen.

Ans: (a) Transport of water

3.

The autotrophic mode of nutrition requires
(a) carbon dioxide and water. (b) chlorophyll.
(c) sunlight. (d) all of the above.

Ans: (d) All of the above

4.

The breakdown of pyruvate to give carbon dioxide, water and energy takes place in
(a) cytoplasm. (c) chloroplast.
(b) mitochondria. (d) nucleus.

Ans: (b) Mitochondria

5.

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

Ans:

- Carbs, lipids, and proteins are fully digested in the small intestine. It gets liver and pancreatic secretions for this.
- Acidic stomach food must be alkaline for pancreatic enzymes to work. Liver-produced bile juice does this.
- Fats in the intestine are frequently in bigger globules, making enzyme action difficult. Bile salts break down big globules. Pancreatic juice contains trypsin for protein digestion and lipase for emulsified fat digestion.
- Small intestine walls include glands that release digestive juice. Finally, its enzymes convert proteins to amino acids, complex carbs to glucose, and lipids to fatty acids and glycerol.

$$\text{Fats} \xrightarrow[\text{by bile salts}]{\text{emulsified}} \text{Emulsified fats} \xrightarrow[\text{lipase}]{\text{pancreatic juice}} \text{Break down of fats} \xrightarrow[\text{juice lipase}]{\text{intestinal}} \text{Fatty Acids + Glycerol}$$

6.

What is the role of saliva in the digestion of food?

Ans: The salivary glands in the mouth produce the watery substance known as saliva. Saliva's actions begin when food is moistened, which creates a meal bolus that is easy to swallow. Saliva then aids in the process of food digestion, which begins in the mouth. Saliva contains an enzyme called amylase that helps break down starch into maltose and dextrin.

7.

What are the necessary conditions for autotrophic nutrition and what are its byproducts?

Ans: Essential requirements for autotrophic nutrition include:

i. The presence of chlorophyll within the living cells.
ii. Provision of water supply to green plants or plant cells.

iii. Adequate exposure to sunlight.
iv. There must be an adequate availability of carbon dioxide.

The by-product of autotrophic nutrition is oxygen.

8.

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

Ans:

Aerobic respiration	Anaerobic respiration
1. It occurs in the presence of oxygen.	1. It occurs in an anaerobic environment.
2. Complete catabolism of food transpires during aerobic respiration.	2. In anaerobic respiration, food undergoes partial decomposition.
3. The final products of aerobic respiration are carbon dioxide and water.	3. The byproducts of anaerobic respiration can include ethanol and carbon dioxide (as observed in yeast) or lactic acid (as found in mammalian muscles).
4. Aerobic respiration generates a substantial quantity of energy.	4. Anaerobic respiration generates far less energy.

9.

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

Ans: The air sacs that are found inside the lungs as tiny pouches or sac-like structures are called alveoli. They take the shape of balloon-like structures that expand the surface area available for breathing in blood capillaries. The lungs have more than a million alveoli, which expands the surface area available for gas exchange. This enhances the gas exchange in the lungs by bringing a lot of air into touch with the air within.

10.

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

Ans: A protein called hemoglobin is in charge of carrying oxygen to the body's cells so that they can respire. RBCs' ability to carry oxygen can be impacted by a hemoglobin shortage. As a result, our body cells were deficient in oxygen. Anaemia is a condition caused by a lack of hemoglobin.

11.

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

Ans: The heart receives blood twice and pumps it out of the heart twice as well. Blood that is deoxygenated is carried from the body to the right atrium by the vena cava; from there, it is sent to the right ventricle. The blood is pumped from the right ventricle to the lungs for oxygenation through the pulmonary artery. The pulmonary veins are responsible for the transportation of oxygenated blood from the lungs to the left atrium of the heart. Oxygenated blood is sent to the left atrium, from whence it is sent to the left ventricle. After that, this oxygenated blood is pumped to various regions of the body via the arteries. As a result of this process, the blood goes through the heart on two separate occasions, which is why this process is referred to as "double circulation."

Necessity of double circulation: In order to prevent oxygenated blood from becoming mixed with deoxygenated blood, the right and left sides of the human heart are both necessary. This particular method of separating oxygenated blood from deoxygenated blood guarantees that the organism receives a very effective supply of oxygen. This is helpful in the case of humans, whose bodies require a steady supply of energy in order to maintain their temperature.

12.

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

Ans:

Transport of Materials in Xylem	Transport of Materials in Phloem
1. Xylem transports water and dissolved minerals from the roots to the leaves and other regions.	1. Phloem transports assimilated nutrients from the leaves to various areas of the plant in a dissolved state.
2. In xylem, the conveyance of substances occurs via vessels and tracheids, which are non-living structures.	2. In phloem, the movement of substances occurs via sieve tubes assisted by partner cells, which are viable cells.
3. In xylem, the ascension of water and dissolved minerals is mostly facilitated by transpiration pull. It is induced by the suction generated from the evaporation of water molecules from leaf cells.	3. In translocation, substances are conveyed into phloem tissue utilizing energy derived from ATP. This elevates the osmotic pressure, facilitating the movement of material in the phloem to tissues with lower pressure.

13.

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

Ans:

Alveoli	**Nephrons**
Structure	**Structure**
(i) Alveoli are tiny balloon-like structures present inside the lungs.	(i) Nephrons are tubular structures present inside the kidneys.
(ii) The walls of the alveoli are one cell thick, and it contains an extensive network of blood capillaries.	(ii) Nephrons are made of glomerulus, Bowman's capsule, and a long renal tube.
Function	**Function**
(i) The exchange of O_2 and CO_2 takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli.	(i) The blood enters the kidneys through the renal artery. The blood is entered here, and the nitrogenous waste in the form of urine is collected by the collecting duct.
(ii) Alveoli are the site of gaseous exchange.	(ii) Nephrons are the basic filtration unit.