NCERT CBSE Solutions for Class 10 Science Chapter 6

Life Processes

Back of chapter questions

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

(A) Nutrition

(B) Respiration

(C) Excretion

(D) Transportation

Solution: (C)

Excretion is the biological process of removal of harmful metabolic wastes from the body of an organism. Kidneys are the major excretory organs in humans. Kidneys contain nephrons which are the filtration units which remove metabolic waste products from the blood.

2. The xylem in plants are responsible for

(A) Transport of water

(B) Transport of food

(C) Transport of amino acids

(D) Transport of oxygen

Solution: (A)

In plants, water is transported through xylem tissue. The water is absorbed by the roots from the soil and is transported upwards through the xylem to other plant parts.

3. The autotrophic mode of nutrition requires

(A) Carbon dioxide and water

(B) Chlorophyll

(C) Sunlight

(D) All of the above

Solution: (D)

In autotrophic nutrition, organisms such as green plants prepare their own food by the process of photosynthesis. Photosynthesis is a process in which carbon dioxide and water, in the presence of sunlight and chlorophyll, are converted into carbohydrates. Hence, all of them are essential for autotrophic nutrition.

4. Pyruvate breakdowns to give carbon dioxide, water, and energy inside

(A) Cytoplasm

(B) Mitochondria

(C) Chloroplast

(D) Nucleus

Solution: (B)

The breakdown of pyruvate into carbon dioxide and water in aerobic organisms happens inside the mitochondria. In anaerobic organisms, pyruvate breaks down into carbon dioxide

In aerobic organisms, pyruvate is broken down into carbon dioxide and water in the mitochondria. Energy is released in the process. In anaerobic organisms, the breakdown of pyruvate occurs in the cytoplasm itself, but it produces carbon dioxide, ethanol, and energy.

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

Solution:

Fats are digested and broken down into fatty acids and glycerol in the **small intestine.** The following two secretions of digestive glands play key roles in the digestion of fats-

(a) **Bile-** It is secreted from the **liver** and stored in the **gallbladder**. Fats are present in food in the form of large globules, which makes it difficult for enzymes to act on them. Bile salts, present in the bile juice, break these large fat globules into smaller globules. This is called **emulsification** of fats. Emulsification of fats is a crucial step for the digestion of fats in the small intestine.

(b) **Lipase-** The fat digesting enzyme lipase can effectively act on smaller emulsified fat globules. They are produced by the pancreas and breakdown fats into **fatty acids and glycerol.**

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

Solution:

Saliva is secreted by the salivary glands present in the mouth. Saliva contains an enzyme called **salivary amylase**. Salivary amylase acts on **starch**, a complex carbohydrate, and converts it to simple sugars. Besides digesting starch, saliva also keeps the food **moist** which helps in swallowing it.

7. What are the necessary conditions for autotrophic nutrition and what are its by-products?

Solution:

In autotrophic nutrition, organisms such as green plants prepare their own food by the process of photosynthesis. Photosynthesis is a process in which carbon dioxide and water, in the presence of sunlight and chlorophyll, are converted into carbohydrates.

$$\text{carbon dioxide} + \text{water} \xrightarrow[\text{chlorophyll}]{\text{light energy}} \text{glucose} + \text{oxygen}$$

Thus, the following conditions are necessary for autotrophic nutrition:

(a) Availability of **carbon dioxide and water**

(b) Presence of **chlorophyll** pigments in the leaves

(c) Presence of **sunlight**

The main product of photosynthesis is carbohydrate or **glucose**. The by-product of photosynthesis or autotrophic nutrition is **oxygen**.

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

Solution:

The differences between aerobic and anaerobic respiration are summarized below:

	Aerobic Respiration		**Anaerobic respiration**
1.	Aerobic respiration is the breakdown of glucose in the **presence of oxygen.**	1.	Anaerobic respiration is the breakdown of glucose in the **absence of oxygen.**
2.	**Products** of aerobic respiration are **carbon dioxide, water**, and energy.	2.	**Products** of anaerobic respiration can be **carbon dioxide, ethanol**, and energy (example- in yeast) or **lactic acid**

			and energy (example- in muscle cells).
3.	**The energy** released in aerobic respiration is **higher**.	3.	**The energy** released in the anaerobic respiration is considerably **lower**.

The following organisms carry out anaerobic respiration

(a) **Yeast** (fermentation)

(b) Some bacteria such as ***Lactobacillus***

(c) **Muscle cells** in humans

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

Solution:

Alveoli carry out effective gaseous exchange during respiration due to their following characteristics:

(a) Alveoli, being small and sac-like structures, have an **enormous surface area** which provides more area for the exchange of gases.

(b) The alveolar **walls are extremely thin** which facilitates the diffusion of gases.

(c) The inner walls of the alveoli are lined with **numerous blood vessels** which ensures an adequate supply of oxygenated and deoxygenated blood.

10. What would be the consequences of the deficiency of hemoglobin in our bodies?

Solution:

Haemoglobin is the **respiratory pigment** in humans, present in the RBCs. It binds to oxygen during the gaseous exchange and transports it to various body tissues. Oxygen is required by all body cells to carry out **cellular respiration**. Thus, deficiency of hemoglobin results in a reduced supply of oxygen to body cells. Due to a **reduced oxygen supply**, energy released would also be reduced considerably. This can cause fatigue, dizziness, and shortness of breath.

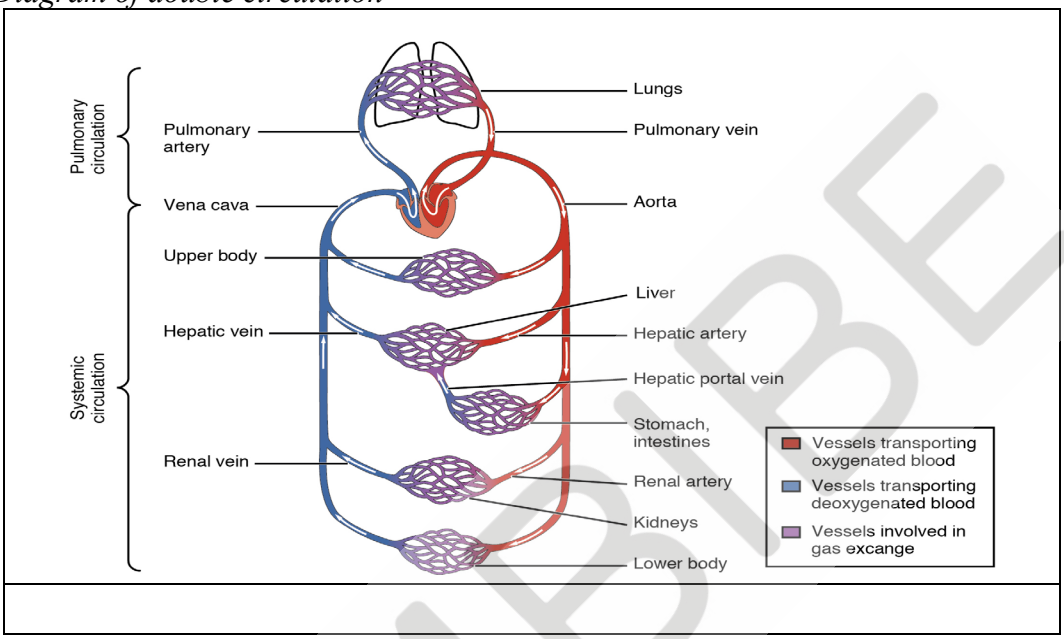
11. Describe double circulation in human beings. Why is it necessary?

Solution:

Invertebrates such as humans, in one circulation, deoxygenated blood goes through the heart twice. Firstly, the blood is sent to the lungs for oxygenation (called

pulmonary circulation). Then, the oxygenated blood is sent to the body cells for deoxygenation (called **systemic circulation**). Such circulation is called double circulation.

Diagram of double circulation



Importance of double circulation-

Due to separate pulmonary and systemic circulations, oxygenation and deoxygenation of blood occur without intermixing of oxygenated and deoxygenated blood. This, in turn, ensures a more efficient supply of oxygen to all body cells. Hence, double circulation is necessary **to ensure efficient cellular oxygen supply and energy production.**

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

Solution:

The differences between the transport of materials in xylem and phloem in plants are summarised below:

Differences between Xylem and Phloem Transport			
Xylem		**Phloem**	
1.	Xylem transports **water and minerals.**	1.	Phloem transports **food**.
2.	Xylem transport is	2.	Phloem transport is

	unidirectional- from the soil upwards.		**bidirectional**. Food can be translocated in any direction depending on the requirement and availability of food.
3.	Transport of materials in xylem occurs through two physical forces- **transpirational pull and root pressure.**	3.	Transport of materials in phloem occurs through **active transport** which requires energy.

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

Solution:

Comparison	Alveoli	Nephrons
Structural Difference	Alveoli have a sac-like structure.	Nephrons are tubular with a cup-like structure called Bowman's capsule.
Functional Difference	Alveoli are the site of gaseous exchange, that is, exchange of oxygen and carbon dioxide gases.	Nephrons remove nitrogenous wastes and reabsorb some salts and water.
Structural Similarity	Alveoli wall is single-celled and is lined with capillaries.	Wall of nephrons is also single-celled thick and rich in blood vessels.
Functional Similarity	Alveoli help in the removal of carbon dioxide which is a metabolic waste material.	Nephrons help in the removal of nitrogenous wastes which are also metabolic wastes.

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In Between chapter questions

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

Solution:

In multicellular organisms like humans, the demand for oxygen is quite high. Each cell of the body requires oxygen to perform the important functions of the body. Hence, a more sophisticated method other than simple diffusion is required to meet the oxygen demand.

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

Solution:

Important criteria to call something alive are

(a) Ability to grow

(b) Ability to move

(c) Ability to carry out life processes such as nutrition, respiration, excretion, and transportation.

(d) Metabolic activity

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

Solution:

Any living organism requires food, water, and oxygen to make energy and carry out functions inside its body.

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

Solution:

The following are the most important life processes vital for maintaining life:

(a) Nutrition
(b) Respiration
(c) Excretion
(d) Transportation
(e) Control and Coordination

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

Solution:

Autotrophic Nutrition		Heterotrophic Nutrition	
i.	Simple inorganic materials like carbon dioxide and water are used to synthesize food.	i.	Food is directly or indirectly obtained from autotrophs.
ii.	Requires chlorophyll	ii.	Requires enzymes and other digestive juices to digest food.
iii.	Happens during the day time.	iii.	Independent of time.
	Example: Green plants and some bacteria		*Example:* All animals and fungi

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

Solution:

	Raw materials required for photosynthesis	Source
i.	Carbon dioxide	Absorbed from the atmosphere through stomata
ii.	Water	Absorbed from the soil through roots
iii.	Sunlight	Absorbed by chlorophyll

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

Solution:

Hydrochloric acid secreted by stomach performs the following functions:

(i) It provides an acidic medium in our stomach thereby activating pepsin involved in protein digestion.

(ii) It kills germs present in the food.

8. What is the function of digestive enzymes?

Solution:

Digestive enzymes like amylase, lipase, pepsin, trypsin, etc. breaks down complex food particles into simple ones thereby increasing the rate of absorption of nutrients into the bloodstream.

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

Solution:

The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area to enhance the absorption of food into the blood vessels. These blood vessels carry the absorbed nutrients into other parts of the body where is it used for various life processes.

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

Solution:

Terrestrial organisms take up freely suspended oxygen from the atmosphere whereas aquatic organisms have to obtain oxygen dissolved in the surrounding water. Since the concentration of oxygen in water is fairly low, the aquatic organisms have to breathe relatively faster than other organisms.

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

Solution:

In all organisms, glucose is broken down into a three-carbon molecule called pyruvate in the cytoplasm. This pyruvate is further method broken down to provide energy based on the environment and type of organism:

(i) Yeast cells, in the absence of oxygen, convert pyruvate into ethanol and carbon dioxide. This process is called fermentation.
(ii) In the presence of oxygen, pyruvate is broken down into carbon dioxide and water inside mitochondria.
(iii) During the absence of oxygen or in cases of vigorous activity, muscles convert pyruvate into lactic acid.

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

Solution:

(i) Transport of Oxygen: Respiratory tract in human beings carry oxygen-containing air into the lungs. The respiratory pigment in blood, hemoglobin

exchanges carbon dioxide for oxygen and carries it to oxygen deficient parts of the body.
Transport of carbon dioxide: Carbon dioxide solubilizes into the plasma due to its high solubility in water. The plasma carries dissolved CO_2into lungs where it diffuses into the air in the lungs and later gets expelled out through nostrils.

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

Solution:

Lungs have well-defined structures such as bronchi, bronchioles, and alveoli to maximize the area for exchange of gases. Inside lungs, bronchi branches into smaller tubes called bronchioles which has millions of pouch-like structures at called alveoli. The alveoli provide the maximum area for exchange of gas into the blood stream. They have thin walls surrounded by an extensive network of blood vessels to facilitate the exchange of gases.

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

Solution:

Blood, blood vessels and heart are the main components of the transport system in human beings. The heart pumps blood and the blood vessels help in the circulation of blood throughout the body. Blood helps in the transport of oxygen, nutrients, carbon dioxide, and wastes throughout the body. The heart pumps oxygenated blood to various parts of the body and sends deoxygenated blood for oxygenation.

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

Solution:

Warm-blooded animals such as birds and mammals have separate channels for oxygenated and deoxygenated blood. Such an arrangement enhances the supply of oxygen in the blood thereby maintaining the optimum body temperature at all conditions surrounding the organism.

16. What are the components of the transport system in higher plants?

Solution:

Highly organizes plants have vascular tissues, xylem, and phloem as their transport system.

Xylem fiber transports water across the plant and phloem translocate food to different parts of the plant.

17. How are water and minerals transported in plants?

Solution:

Water along with dissolved minerals is absorbed by the roots from soil. This absorption through the root hair cells occurs through osmosis. However, it cannot be transported to all other plant cells only through diffusion or osmosis. The plants have developed a well-defined system of conducting tubes for such transports and this system is called the vascular system. It consists of two tissues: Xylem and Phloem. Xylem tissue is responsible to transport water and minerals from roots to all other plant cells.

18. How is the food transported in plants?

Solution:

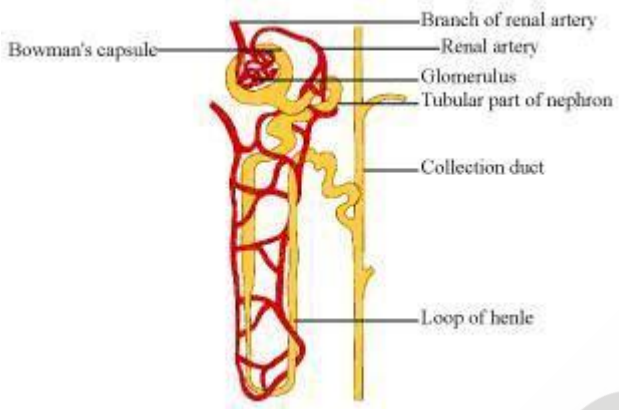
The food prepared in leaves in the form of glucose is stored as starch in the leaves. The transport of food is required for other plant cells for utilization. This is carried out by the vascular tissue 'Phloem'. This process of transport of food from leaves to all plant cells through phloem is called translocation.

19. Describe the structure and functioning of the nephron.

Solution:

Nephrons are the functional units of the kidney. They purify the blood and produce urine. Each kidney has approximately 1-1.5 million nephrons in it. The following are the main components of the nephron:

(i) Glomerulus
(ii) Bowman's capsule
(iii) Long renal tubule



The functioning of a nephron:

(i) The blood enters the kidney through the renal artery. The renal artery further branches into small capillaries surrounding the glomerulus.
(ii) Water and solutes are transferred into the nephron at the Bowman's capsule.
(iii) Substances such as amino acids, glucose, and salts are selectively retained in the proximal tubule. Other unwanted molecules are expelled into the urine.
(iv) The urine further obtains more water at the loop of Henle.
(v) Urine moves into the distal tubule and then into the collecting duct. The collecting duct collects urine from all the nephrons.

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

Solution:

Plants practice the following ways to expel its excretory products:

(i) **Leaves:** Some waste products are stored in leaves which later gets removed when the leaf withers off.
(ii) **Transpiration:** Excess water in plants is lost through transpiration.
(iii) **Bark:** Waste products like resins, tannins, and gums are stored in non-functional old xylem or bark.
(iv) **Roots:** Some waste products of plants are excreted into the soil via roots.
(v) **Vacuoles:** Plants store their waste products inside the vacuole.

21. How is the amount of urine produced regulated?

Solution:

The production of urine depends on the amount of excess water and dissolved water present in the body. It also depends on the habitat of the organism. Hormones such

as Anti-diuretic hormone (ADH) plays a vital role in regulating the amount of urine produced.

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