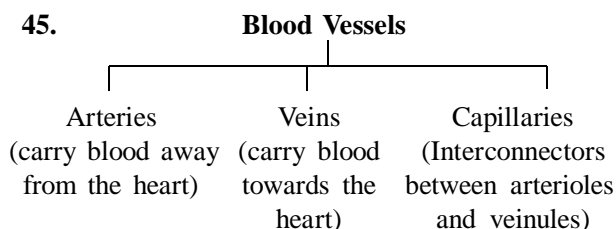


IMPORTANT NOTES

- Every living organism has a need of nutrition as it is through nutrition that one obtains energy.
- The process of intake and utilisation of nutrients (*i.e.* substances that either release energy or help in the manufacture of biomolecules) is known as nutrition.
- Green plants are autotrophs as they synthesise their own food using sunlight, chlorophyll, carbon dioxide and water.
- Photosynthetic equation**

$$6\text{CO}_2 + 12\text{H}_2\text{O} \xrightarrow[\text{chlorophyll}]{\text{sunlight}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{H}_2\text{O} + 6\text{O}_2$$
- Chlorophyll is a light receiver which can trap solar energy within its molecule.
- The site of chlorophyll activity is the special plant cell organelles called chloroplasts.
- In humans the alimentary canal is basically a long tube extending from the mouth to the anus. When we eat something we like, our mouth 'waters'. This watery fluid is called **saliva** secreted by the salivary glands.
- The gastric glands present in the stomach wall of human, release hydrochloric acid, pepsin and mucus.
- Tooth decay or dental carries causes gradual softening of enamel and dentine. Brushing the teeth after eating removes the dental plaque.
- Factors that affect photosynthesis are (i) Light, (ii) Temperature, (iii) Water, and (iv) Carbon dioxide.
- Animal nutrition shows a very wide range. Unicellular organisms like *Amoeba* obtain food by the process of phagocytosis. The human digestive system climaxes the evolutionary development of the digestive system with numerous glands, digestive juices and organs working together. The various steps of nutrition are ingestion, digestion, absorption and assimilation.
- The energy-rich molecule in which energy is first captured is adenosine triphosphate or **ATP**.
- Breathing is a physical process which involves inhalation and exhalation.
- Respiration is a biochemical process which includes breathing and oxidation of food.
- Respiration in the presence of oxygen is known as aerobic respiration.
- Respiration that occurs in absence of oxygen is known as anaerobic respiration.
- During aerobic respiration, food (glucose) is completely broken down into carbon dioxide and oxygen and energy is released in the form of ATP.
- Aerobic respiration occurs in higher organisms including human being.
- Anaerobic respiration occurs in certain bacteria, yeast and also in our muscles.
- The muscles of vertebrate animals can continue working for a minute or two without oxygen.
- Micro-organisms such as yeast and certain bacteria obtain their energy by anaerobic respiration which is termed fermentation.
- Common type of fermentation is alcoholic fermentation which is performed by yeast.
- Direct respiration is seen in unicellular organisms like *Amoeba*, *Paramecium*, bacteria and *Chlamydomonas*.
- Diffusion is defined as the movement of a substance from a region of higher concentration to a region of lower concentration.
- Rate of respiration in plants is much slower than in animals.
- In higher plants, the exchange of gases occurs through stomata and lenticels.
- Organs of respiration in animals are **skin, trachea, gills, lungs**, etc.
- Thin-walled air sacs called alveoli are present in lungs.
- The blood contains a pigment, haemoglobin, which helps in the transport of carbon dioxide and oxygen.

30. In human beings, four basic processes are involved in respiration—**breathing, gaseous transport, tissue respiration and cellular respiration.**
31. In the thoracic cavity, the lungs are bound by a convex muscular and elastic sheet called **diaphragm.**
32. Diffusion is a major method by which transportation of material occurs in single celled organisms like bacteria.
33. Diffusion is the movement of molecules from a region of higher concentration to that of lower concentration resulting in their uniform distribution.
34. The entire surface of the root is not associated with absorption of water and nutrients.
35. Only 1% to 2% of the total water absorbed by the roots, is used up in photosynthesis and metabolic activities.
36. The main process involved in the upward conduction of water and minerals is called **transpiration.**
37. Through **transpiration pull**, movement of water and minerals take place.
38. The transportation of food from the leaves to other plant parts is termed **translocation.**
39. In case of plants, xylem is made of tracheids and vessels. Both are thick walled with perforations in their cell wall.
40. Water and mineral salts are absorbed by root hair and are transported in the plant by xylem vessels which are long interconnected tubes.
41. Transpirational pull works as a suction force for the upward movement of the sap.
42. Long distance transportation of food material from the leaves to the other parts of the plant is known as 'translocation'.
43. Phloem is the living tissue that translocates prepared food in aqueous solution. Phloem is made of living cells called 'sieve tubes'.
44. In human beings the main transporter is the blood which flows in blood vessels and is pumped by the heart.



46. **Blood Vessels**
- ```

graph TD
 BV[Blood Vessels] --> P[Plasma]
 BV --> RBC[Red blood cells]
 BV --> WBC[White blood cells]
 BV --> PL[Platelets]

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47. **Lymph:** Lymph is also known as tissue fluid. It is another type of fluid involved in transportation. It is colourless and contains less protein. Some amount of plasma, proteins and blood-cells escape into intercellular spaces in the tissues in the form of lymph. It drains into lymphatic capillaries from the intercellular spaces. It drains excess fluid from the extra cellular space back into the blood. Lymph carries digested as well as absorbed fat from the intestine.
48. The pathway indicating the flow of blood within the human heart.  
The right half of the heart always has deoxygenated blood while the left half has only oxygenated blood.
49. As the blood flows, a part of it gets filtered out of the capillary walls. This forms the lymph.
- Lymph** — carries digested fats.  
— returns proteins and other fluids for circulation.  
— lymphocytes contribute towards immunity.
50. The waste products in animals include carbon dioxide, nitrogenous compounds like ammonia, urea and uric acid, bile pigments from the breakdown of haemoglobin, excess salts and vitamins.
51. The most poisonous of all waste by-products of metabolism is ammonia.
52. The kidneys extract urea from the blood and excrete it from the body as part of a liquid called urine.
53. Excretion of waste products is very simple and much less in plants as compared to animals.
54. Excretory system of human, mainly consists of a pair of kidneys, ureters, urinary bladder, urethra, etc.
55. Excretory organs in animals are lungs, skin, kidneys and liver.
56. An **artificial kidney** machine works on the principle of dialysis.
57. Dialysis is a process of separating small molecules from larger ones using a semi-permeable membrane.

58. Bowman's capsule is a cup shaped body enclosing glomerulus part of a nephron.
59. Glomerulus is a network of finely divided blood capillaries enclosed in Bowman's capsule.
60. Structural and functional unit of kidney is **nephron**.  
The parts of a nephron are (a) a tuft of capillaries called 'glomerulus', (b) Bowman's capsule, (c) extended tubular system and a collecting duct.
61. Carbon dioxide produced during respiration is carried by (i) haemoglobin in the blood and, (ii) water in which it gets dissolved.
62. The kidneys perform two major functions—(i) help to remove toxic wastes like urea from the blood and thereby clean the blood, (ii) control water balance and levels of mineral salts in the body.
63. The filtration of blood for the removal of wastes can be done by an artificial kidney, in cases of renal failure. Such a system is called 'Dialysis'.

## ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

### I. VERY SHORT ANSWER QUESTIONS

(1 Mark)

#### A. IMPORTANT QUESTIONS

- What is life process?
- What are autotrophs?
- What fulfills the carbon and energy requirements of the autotrophic organism?
- Which nutrient serves as the internal energy reserve of the plant?
- What are heterotrophic organisms?
- What are the green dots present in a leaf?
- When do desert plants take up carbon dioxide?
- What are stomata?
- When do guard cells swell?
- Name some parasitic plants and animals.
- What are the enzymes secreted by stomach?
- What are villi?
- What is respiration?
- Plant respiration is slower than animal respiration. Suggest one reason for it.
- What are the two end products of anaerobic respiration?
- Why is nasal cavity warm and coated with mucous inside?
- What is the rate of breathing in human beings under normal conditions?
- Where can you see anaerobic respiration?
- How long can the muscles of vertebrates work in absence of oxygen?
- What are the products of anaerobic fermentation?
- How does diaphragm help in inspiration?
- Why is blood called a 'liquid connective tissue'?
- Name the two major chambers of the human heart.
- What is the other term for extracellular fluid?
- Why does the face of a person become red in sunlight?
- What is the main function of lymph nodes?
- Name any two excretory organs in human.
- Where is urine carried through the ureters?

#### B. QUESTIONS FROM CBSE EXAMINATION PAPERS

- Give one reason why multicellular organisms require special organs for exchange of gases between their body and their environment?  
[2010 (T-I)]
- What is 'translocation' in plants? [2010 (T-I)]
- Where does digestion of fat take place in our body? [2009]
- Why are green plants called 'producers'? [2009]
- What is the mode of nutrition in human beings? [2009]
- A young green plant receives sunlight from one direction only. What will happen to its shoots and roots? [2009]
- What will happen to a plant if its xylem is removed? [2009]
- How do autotrophs obtain  $\text{CO}_2$  and  $\text{N}_2$  to make their food? [2008]

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
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| <p>9. Which pancreatic enzyme is effective in digesting proteins? [2008]</p> <p>10. Which enzyme present in saliva breaks down starch? [2008]</p> <p>11. Name the two ways in which glucose is oxidised to provide energy in various organisms. [2008]</p> <p>12. What process in plants is called transpiration? [2008]</p> <p>13. Name the tissue which transports soluble products of photosynthesis in a plant. [2008]</p> <p>14. Name the tissue which transports water and mineral in a plant. [2008]</p> <p>15. State the term for transport of food from leaves to other parts of the plant. [2007]</p> <p>16. What is meant by 'translocation' with respect to transport in plants? [2007]</p> <p>17. Why is nutrition necessary for an organism? [2007]</p> <p>18. Name the two stages in photosynthesis. [2007]</p> <p>19. Name the respiratory organs of: (i) Mosquito, (ii) Earthworm, (iii) Fish. [2007]</p> <p>20. Name the term for transport of food from leaves to other parts of plants. [2007]</p> | <p>21. Name the organelle in which photosynthesis occurs. [2006]</p> <p>22. What is breathing? [2006]</p> <p>23. Name the type of blood vessels which carry blood from organs to the heart. [2006]</p> <p>24. Name the mode of nutrition in <i>amoeba</i>. [2005]</p> <p>25. Write the mode of nutrition in fungi. [2005]</p> <p>26. Name the pigment present in plants which can absorb solar energy. [2005]</p> <p>27. Name the respiratory organs of animals like fish that live in water. [2005]</p> <p>28. Name two kinds of cells (elements) of xylem. [2005]</p> <p>29. Name the largest artery in the human body. [2005]</p> <p>30. What makes the red blood corpuscles (cells) red? [2005]</p> <p>31. A farmer floods his field every day thinking that watering in this manner will result a better yield of his wheat crop. What will be the result of this action of the farmer? [2004]</p> <p>32. Name the excretory unit of a kidney. [2004]</p> <p>33. Which organelle in a cell is associated with the production of energy by aerobic respiration? [2001]</p> |
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## II. SHORT ANSWER QUESTIONS-I

(2 Marks)

### A. IMPORTANT QUESTIONS

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| <p>1. What is the exact function of chlorophyll?</p> <p>2. Autotrophs synthesise food for the entire living world. Justify this statement in one sentence only inter-connecting autotrophs and heterotrophs.</p> <p>3. Write down the balanced photosynthetic equation.</p> <p>4. In case of water deficiency, why is the rate of photosynthesis lowered?</p> <p>5. Mention two functions of the large intestine.</p> <p>6. Give the role of guard cells in stomata.</p> <p>7. What are the raw materials used in photosynthesis by the plants other than CO<sub>2</sub> and sunlight.</p> <p>8. What is holozoic nutrition? Give an example.</p> <p>9. How many pairs of salivary glands are there in humans? Where do they open?</p> <p>10. Which enzyme initiates the digestion of proteins? Name the other enzyme produced by the same gland?</p> | <p>11. How is the absorptive surface of the small intestine enhanced?</p> <p>12. Nutrition is the intake of nutrients. Which two properties should a substance have in order to be called a nutrient?</p> <p>13. Are saprophytes a kind of parasites? If no, why?</p> <p>14. Name any four parasites.</p> <p>15. What is the role of (a) tongue and (b) teeth, in digestion?</p> <p>16. Name the first digestive organ that is associated with the break down of proteins in humans. What are its releases?</p> <p>17. How do roots respire?</p> <p>18. What is diffusion?</p> <p>19. Mention two characteristics that are possessed by almost all the respiratory organs.</p> <p>20. Do active tissues have rapid respiration? Explain why.</p> |
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21. Define transpiration.
22. Why is transpiration considered a necessity for better ascent of sap?
23. Name the unit of phloem. How is it different from xylem? Name a substance that is synthesised at the shoot and the root tip and therefore, needs to be translocated.
24. How is lymph formed?
25. Mention the role of the valves in maintaining blood flow in the heart.
26. What is the purpose of making urine in our body?
27. When does an artificial kidney be used?
28. Which is the major nitrogenous waste product in a human being? How is it removed from the body?
29. What is dialysis?

## B. QUESTIONS FROM CBSE EXAMINATION PAPERS

1. How do guard cells regulate opening and closing of stomatal pores? [2010 (T-I)]
2. Why and how does water enter continuously into the root xylem? [2010 (T-I)]
3. Mention the components of the transport system in highly organized plants. State the functions of these components. [2010 (T-I)]
4. What is the function of the trachea? Why do its walls not collapse even when there is less air in it? [2010 (T-I)]
5. Name any two digestive enzymes secreted in the human digestive system and write their functions. [2010 (T-I)]
6. Stomata of desert plants remain closed during day time. How do they take up carbon dioxide and perform photosynthesis? [2010 (T-I)]
7. (a) What will happen to the guard cells and stomatal pore when water flows to guard cells?  
(b) How do plants transmit informations from cell to cell? [2010 (T-I)]
8. Which is the internal energy reserve in plants? Do the animals have the same energy reserve? [2010 (T-I)]
9. Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer? Give reasons. [2010 (T-I)]
10. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason. [2010 (T-I)]
11. Explain the process of nutrition in *Amoeba*. [2010 (T-I)]
12. How are the alveoli designed to maximize the exchange of gases? [2010 (T-I)]
13. How are the fats digested in our bodies where does this process take place? [2010 (T-I)]
14. What is the role of saliva in the digestion of food. [2010 (T-I)]
15. What are the common features of the respiratory organs in aquatic and terrestrial animals? [2010 (T-I)]
16. Explain the significance of peristaltic movement that occur all along the gut during digestion. [2010 (T-I)]
17. Explain parasitic mode of nutrition with two examples. [2010 (T-I)]
18. What do the following transport:  
(i) xylem (ii) pulmonary artery  
(iii) pulmonary vein (iv) phloem [2010 (T-I)]
19. How are water and minerals absorbed by the plant? [2010 (T-I)]
20. How is the process of transpiration useful to plant? [2010 (T-I)]
21. Leaves of a healthy potted plant were coated with vaseline. Will this plant remain healthy for long? Give reasons for your answer. [2010 (T-I)]
22. Major amount of water is selectively reabsorbed by the tubular part of nephron. On what factor does the amount of water reabsorbed depend on? [2010 (T-I)]
23. Which is the largest digestive gland present in human body? What are the names and function of its secretion? [2010 (T-I)]
24. Write one function each of the following components of the transport system in a human being. [2008]  
(a) Blood vessels (b) Blood platelets  
(c) Lymph (d) Heart
25. (a) Name two different ways in which glucose oxidised to provide energy in various organisms.  
(b) Write any two differences between the two ways of oxidation of glucose in organisms. [2008]

- |                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                  |
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| <p>26. State two vital functions of the human kidney. Name the procedure used in the working of artificial kidney. [2007]</p> <p>27. Point out differences between an artery and a vein. [2007]</p> <p>28. Describe the mechanism of blood clotting. [2007]</p> | <p>29. Write any two points of differences between respiration in plants and respiration in animals. [2004]</p> <p>30. Amylase is secreted by two different glands. Name them. What is the action of amylase on food? [2002]</p> <p>31. What is the role of HCl in protein digestion? [2001]</p> |
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### III. SHORT ANSWER QUESTIONS–II

(3 Marks)

#### A. IMPORTANT QUESTIONS

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| <p>1. How do the plants obtain carbon dioxide?</p> <p>2. Briefly explain the role of water in controlling the photosynthetic rate.</p> <p>3. What is the exact role of light in photosynthesis?</p> <p>4. Where does digestion begin in humans? Which enzyme works there? What is the digestive juice? What is the end product? What is the substrate? Where is the digestive juice produced?</p> <p>5. What are the events occur during the process of photosynthesis?</p> <p>6. How do the following organisms get their food:<br/>(a) <i>Amoeba</i> (b) <i>Paramecium</i><br/>(c) Human being</p> <p>7. What are villi? Where are they present? What is their function?</p> <p>8. Explain the process by which inhalation occurs during breathing in human beings.</p> <p>9. Enumerate the three basic properties associated with a surface functioning as a respiratory surface.</p> <p>10. Write the chemical equations for aerobic respiration and anaerobic respiration.</p> <p>11. Where exactly does the oxidation of glucose take place? In which form is energy released? Name one organ in humans where anaerobic respiration takes place. Which kind of respiration is shown by red muscles?</p> | <p>12. Give three reasons to justify that energy is required during sleep.</p> <p>13. What are the internal factors of photosynthesis? How do they affect photosynthesis?</p> <p>14. What are the end products of photosynthesis? What are the uses of these end products?</p> <p>15. Describe the structure of the human heart very briefly.</p> <p>16. Write the functions of blood vessels.</p> <p>17. What is the need of special tissues or organs for transportation of substances in plants and animals?</p> <p>18. Describe transport of the following materials in plants:<br/>(i) water, (ii) minerals, (iii) food</p> <p>19. What is blood? Describe its composition.</p> <p>20. (i) Name the blood vessel that brings oxygenated blood to the human heart.<br/>(ii) Which chamber of human heart receives oxygenated blood?<br/>(iii) Explain how oxygenated blood from this chamber is sent to all parts of the body.</p> <p>21. Briefly describe the mechanism of urine formation.</p> <p>22. How does excretion take place in a plant?</p> <p>23. List various functions of food.</p> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### B. QUESTIONS FROM CBSE EXAMINATION PAPERS

- |                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. Explain the process of break down of glucose in a cell (i) in the presence of oxygen (ii) in the absence of oxygen. [2010 (T-I)]</p> <p>2. What are the final products produced after digestion of carbohydrate, protein and fats. [2010 (T-I)]</p> <p>3. State the role of the following in the human</p> | <p>respiratory system (i) Nasal cavity, (ii) Diaphragm, (iii) Alveoli [2008]</p> <p>4. How does blood circulate between lungs and heart in human beings? Give two functions of lymph. [2008]</p> <p>5. What is lymph? Write its important functions. [2008]</p> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

6. What are stomata? Draw a labelled diagram of stomata. Write two functions of stomata. [2008]
7. (a) Name the process by which autotrophs prepare their own food.  
(b) List the three events which occur during this process.  
(c) State two sources from which plants obtain nitrogen for the synthesis of proteins and other compounds. [2008]
8. (a) State two differences between autotrophic nutrition and heterotrophic nutrition.  
(b) Give one example each of these nutritions. [2008]
9. Why is blood clotting useful? In a flow chart illustrate the four major events involved in blood clotting. [2007]
10. Give reason for the following: (i) Glottis is covered by epiglottis, (ii) Lung alveoli are covered with blood capillaries, (iii) The wall of trachea is supported by cartilage rings. [2007]
11. Write the functions of the following in the digestive process:  
(i) Bile  
(ii) Bicarbonate secreted by the duodenal wall  
(iii) Pancreatic amylase. [2006]
12. Draw a diagram of human alimentary canal showing duodenum, small intestine, liver and pancreas. [2006]
13. Explain the role of the following in the process of digestion in the human body (i) Saliva (ii) Gastric Juices (iii) Trypsin [2006]
14. How do each of the following factors affect the productivity in the process of photosynthesis?  
(a) Temperature (b) Water  
(c) Carbon dioxide [2005]
15. How do plants obtain their food? What are the two phases of photosynthesis? Draw a labelled diagram of Calvin-Benson cycle. [2005]
16. What happens to glucose which enters nephron along with filtrate during excretion in human beings? State two vital functions of kidney. [2005]
17. (a) Describe the mechanism of breathing in human beings.  
(b) (i) Under normal conditions, what is the rate of breathing per minute?  
(ii) Why does the rate of breathing increase by 20-25 times during vigorous exercise? [2005]
18. What is the function of epiglottis in man? Draw a labelled diagram showing the human respiratory system? [2004]
19. Explain the process by which inhalation occurs during breathing in human beings. [2004]

#### IV. LONG ANSWER QUESTIONS

(5 Marks)

##### A. IMPORTANT QUESTIONS

1. Give a detailed summary of the types of nutrition seen in the living world, describing each type.
2. What are the two basic raw materials for photosynthesis other than light? How are they taken up by the plants?
3. Give a brief of the process of photosynthesis.
4. Enumerate all the activities related to digestion in the mouth and oesophagus in human.
5. Enumerate all the events of digestion in the human stomach and small intestine.
6. (a) Draw a diagram of a 'palisade cell'.  
(b) Label—vacuole, chloroplast, cell wall and cytoplasm on the diagram drawn.  
(c) Name the two stages of photosynthesis.
7. Complete the undermentioned table:

| S. No. | Name of the digestive organ | Enzyme present in the digestive juice | Action of the enzyme             |
|--------|-----------------------------|---------------------------------------|----------------------------------|
| 1.     | Mouth                       |                                       |                                  |
| 2.     |                             | Pepsin                                |                                  |
| 3.     |                             |                                       | Converts proteins to amino acids |
| 4.     |                             |                                       | Emulsifies fat                   |
| 5.     |                             | Trypsin                               |                                  |

8. What is the significance of photosynthesis?
9. Make a comparison between photosynthesis and respiration.
10. Explain the process of gaseous exchange in human beings.
11. Write in details about the processes involved in respiration in human being.
12. (a) Draw the respiratory system of human beings.  
(b) Label the following on the diagram drawn: Larynx, Trachea, Primary Bronchus, Lungs.
- (c) What happens to the carbon dioxide which collects in human tissues?
13. Write a note on lymphatic system in human beings stating two major functions of lymph.
14. State differences between artery, vein and capillary.
15. Give stepwise details of the working of human kidneys leading to the formation of urine.
16. How does excretion take place in a plant?
17. How does an artificial kidney or dialysis machine work?

## B. QUESTIONS FROM CBSE EXAMINATION PAPERS

1. List three events that occur during the process of photosynthesis. State in brief the role of stomata in this process.  
Describe an experiment to show that sunlight is essential for photosynthesis. **[2010 (T-I)]**
2. (a) Why is nutrition a necessity for an organism? State three reasons.  
(b) What is likely to happen if green plants disappear from earth?  
(c) "All plants give out oxygen during day and carbon dioxide during night". Justify this statement. **[2010 (T-I)]**
3. (a) Draw a neat diagram of alimentary canal and label the following parts.  
(i) the largest gland.  
(ii) the gland that secretes digestive enzymes as well as hormones.  
(iii) the part where digested food is absorbed.  
(b) What are Villi? Mention their functions. **[2010 (T-I)]**
4. (a) Draw the cross section of the leaf and label the following parts.  
(i) upper epidermis (ii) chloroplast  
(b) Define photosynthesis.  
(c) List three events which occur during this process.  
(d) Write down the chemical equation involved in photosynthesis.  
(e) How is unused energy stored in plants? **[2010 (T-I)]**
5. (a) Draw the human excretory system and label:  
(i) kidney (ii) aorta  
(iii) ureter (iv) urinary bladder  
(b) What is the purpose of sending blood to the kidneys for filtration? **[2010 (T-I)]**
6. (a) Draw a diagram of human alimentary canal and label on it:  
(i) gall bladder (ii) liver  
(iii) pancreas (iv) small intestine  
(b) What is emulsification of fats? Why is it necessary? **[2010 (T-I)]**
7. (a) Draw a sectional view of the human heart and label :  
(i) pulmonary artery (ii) aorta  
(iii) septum (iv) ventricles  
(b) Arteries have thick elastic walls while veins have valves, explain. **[2010 (T-I)]**
8. (a) Draw the human excretory system and label:  
(i) left kidney (ii) urethra  
(iii) urinary bladder (iv) vena cava  
(b) What is the main toxic waste that a kidney filters from the blood?  
(c) Name any two substances which are selectively reabsorbed from the tubules of a nephron. **[2010 (T-I)]**
9. (a) Draw a neat labelled diagram of human alimentary canal. Label the following.  
(i) Buccal cavity (ii) Liver  
(iii) Pancreas (iv) Stomach  
(v) Gall bladder (vi) Large intestine  
(b) On which type of food does salivary amylase act at buccal cavity and write the name of the initial product due to the action of amylase. **[2010 (T-I)]**
10. (a) Draw a neat labelled diagram of human respiratory system and label the following parts.  
(i) Bronchiolus (ii) Rings of cartilage  
(iii) Pharynx (iv) Trachea  
(v) Larynx (vi) Diaphragm  
(b) What are the factors needed for maintaining the direction of diffusion in plants? **[2010 (T-I)]**



11. (a) Draw the diagram of human respiratory system and label the following parts.  
 (i) Pharynx (ii) Trachea  
 (iii) Diaphragm (iv) Rings of cartilage  
 (b) How are lungs designed in human beings to maximise the area for exchange of gases? [2010 (T-I)]
12. (a) Draw the sectional view of the human heart and label the following parts :  
 (i) Left atrium (ii) Pulmonary arteries  
 (iii) Right ventricle (iv) Aorta  
 (b) Why are the valves needed in the heart?  
 (c) Leakage of blood from vessels reduces the efficiency of pumping system. How is the leakage prevented? [2010 (T-I)]
13. What is the advantage of having four chambered heart? Support your answer with a diagram of the section of a human heart. [2010 (T-I)]
14. Draw the diagram of alimentary canal of man and label the following parts : Mouth, Oesophagus, Stomach, Intestine. Where do carbohydrates, proteins and fats get digested in human beings? [2010 (T-I)]
15. Draw a neat diagram of internal structure of human heart and label the parts which do the following functions :  
 (a) chamber where oxygenated blood from lungs is collected.  
 (b) largest blood vessel in our body.  
 (c) muscular wall separating right and left chambers.  
 (d) blood vessel that carry blood from heart to the lungs. [2010 (T-I)]
16. How do the guard cells regulate opening and closing of stomatal pores? Explain with the help of diagram. Also, indicate what happens to the rate of photosynthesis if stomata get blocked due to dust. [2010 (T-I)]
17. (a) Draw a diagram showing human respiratory system and label on it the following.  
 Larynx, Trachea, Lungs, Bronchi  
 (b) Why do walls of the trachea not collapse when there is less air in it? [2010 (T-I)]
18. Describe an experiment to prove that  $\text{CO}_2$  is necessary for photosynthesis. [2010 (T-I)]
19. (a) Explain the process of nutrition in *Amoeba* with suitable diagram.  
 (b) During one cycle how many times blood goes to heart of fish and why? [2010 (T-I)]
20. (a) What are the events occurring during photosynthesis?  
 (b) Name the respiratory pigment present in our body? Where is it present?  
 (c) Why are valves present in heart and veins? [2010 (T-I)]
21. (a) What are the events occurring during photosynthesis?  
 (b) What is the term used for transport of food from leaves to other parts of plants?  
 (c) What is the main product formed during anaerobic respiration in our muscles? [2010 (T-I)]
22. (a) Explain the process of nutrition in *Amoeba* with suitable diagram.  
 (b) What are capillaries? What is their function? [2010 (T-I)]
23. (a) Draw the diagram of human heart and label the following:  
 (i) part which receives deoxygenated blood from vena cava.  
 (ii) part which send deoxygenated blood to lung through pulmonary artery.  
 (iii) part which receives oxygenated blood from lungs.  
 (iv) part which sends oxygenated blood to all parts of the body through aorta.  
 (b) What does the blood consist?  
 (c) Write two functions of blood. [2010 (T-I)]
24. (a) Draw diagram to show the nutrition in *Amoeba* and label the part used for this purpose. Mention any other purpose done by this part other than nutrition.  
 (b) Name the glands associated with digestion of starch in human digestive tract and mention their role.  
 (c) How is required pH maintained in the stomach and small intestine? [2010 (T-I)]
25. (a) Draw a neat diagram of excretory system of human beings and label the following.  
 (ii) Kidney (ii) Ureter  
 (iii) Urinary Bladder (iv) Urethra  
 (b) How is urine produced?  
 (c) Name two excretory products other than  $\text{O}_2$  and  $\text{CO}_2$  in plants. [2010 (T-I)]
26. (a) Draw diagram of human alimentary canal and label the following.

- (i) Part in which starch digestion starts.  
(ii) Part in which bile is stored.  
(iii) Part in which nutrients are absorbed.  
(iv) Part in which water is absorbed.
- (b) Mention the role of hydrochloric acid in the stomach.
- (c) What function is served by the following.  
(i) Gastric sphincter  
(ii) Anal sphincter [2010 (T-I)]
27. (a) Draw diagram of respiratory system and label the following.  
(i) Part through which air is taken in.  
(ii) Part which protects the lungs.  
(iii) Part which carry the air into the lungs.
- (b) What are alveoli? Mention their role in respiration.
- (c) Differentiate between aerobic and anaerobic respiration. [2010 (T-I)]
28. (a) Draw a schematic representation of movement of water in plants during transpiration, and explain.
- (b) Explain transport of food and other substances in plants.
- (c) Diffusion will not be sufficient to provide raw materials in leaves and energy in roots in plants. Therefore a proper system of transpiration is essential. Explain. [2010 (T-I)]
29. (a) Draw a labelled diagram of stomata. Write two functions of stomata.
- (b) What are the raw materials used during photosynthesis. Write chemical equation for photosynthesis. [2010 (T-I)]
30. Draw a labelled diagram of human heart. Draw a table to show the functions of any two chambers of human heart. [2010 (T-I)]
31. Draw neat diagram of digestive system. Label its all parts. How the main components of the food are digested in the small intestine? Explain. [2010 (T-I)]
32. Draw a neat diagram of excretory system in humans and label the following.  
(i) Kidney (ii) Left renal artery  
(iii) Left renal vein (iv) Vena cava  
(v) Urinary bladder (vi) Ureter [2010 (T-I)]
33. (a) What is meant by breathing? What happens to the rate of breathing during vigorous exercise and why?
- (b) Define translocation with respect to transport in plants. Why is it essential for plants? Where in plants are the following synthesised:  
(i) Sugar (ii) Hormone [2009]
34. (a) Draw a sectional view of the human heart and label on it aorta, pulmonary arteries, vena cava, left ventricle.
- (b) Why is double circulation of blood necessary in human beings? [2009]
35. (a) Draw a schematic representation of transport and exchange of oxygen and carbon dioxide during transportation of blood in human beings and label on it.
- (b) What is the advantage of separate channels in mammals and birds for oxygenated and deoxygenated blood? [2009]
36. (a) Draw a diagram of excretory system in human beings and label on it:  
aorta, vena cava, urinary bladder, urethra
- (b) List two vital functions of the kidney. [2009]
37. (a) Draw the structure of a nephron and label the following on it.  
Glomerulus, Bowman's capsule, Renal artery, Collecting duct.
- (b) What happens to glucose that enters the nephron along with filtrate? [2009]
38. (a) Draw a diagram depicting human alimentary canal and label on it, gall bladder, liver and pancreas.
- (b) State the roles of liver and pancreas.
- (c) Name the organ which performs the following functions in humans.  
(i) Absorption of digested food.  
(ii) Absorption of water. [2008]
39. How is 'respiration' different from 'breathing'? Explain the process of 'aerobic' respiration and 'anaerobic' respiration. [2008]
40. (a) Draw a diagram of human alimentary canal and label on it:  
oesophagus, gall bladder, liver and pancreas.
- (b) Explain the statement, 'Bile does not contain any enzyme but it is essential for digestion'. [2008]
41. (a) Draw a sectional view of the humans heart and label on it aorta, right ventricle and pulmonary veins.
- (b) State the functions of the following components of transport system.  
(i) Blood (ii) Lymph [2008]

42. (a) Draw a diagram of human alimentary canal.  
 (b) Label Oesophagus, Liver, Pancreas and Gall bladder on the diagram drawn.  
 (c) What is the function of the enzyme 'pepsin' in the digestion process? [2007]
43. (a) Draw a diagram of the human urinary system and label in it:  
 (i) kidney (ii) ureter  
 (iii) urinary bladder (iv) urethra  
 (b) Name the two major components of normal human urine. [2006]
44. Define the terms 'nutrition' and 'nutrients'. List two differences between 'Holozoic nutrition' and 'Saprophytic nutrition'. Give two examples of each of these two types of nutrition. [2005]
45. Explain the process of 'photosynthesis' in plants. List four facts which influence this process and describe how each of them affects the rate of photosynthesis process. [2005]
46. (i) Name the blood vessel that brings deoxygenated blood to the human heart.  
 (ii) Which chamber of human heart receives deoxygenated blood?  
 (iii) Describe how deoxygenated blood from this chamber is sent to lungs for oxygenation. [2004]
47. (i) State two structural differences between an artery and a vein.  
 (ii) Name a non-nucleated cell present in human blood and state one function of this cell.  
 (iii) Draw a labelled diagram of human heart. [2004]
48. (i) Why is circulation of blood in man known as double circulation?  
 (ii) Which blood cell in human blood carries haemoglobin? What is its average life span?  
 (iii) Draw a labelled diagram of human heart. [2004]
49. Name the main organs of human digestive system in the order in which they are involved in digestion of food. In what steps and how does digestion of carbohydrates and proteins take place in our body? [2003]

## ASSIGNMENTS FOR FORMATIVE ASSESSMENT

### A. Activities

#### 1. Objective :

To prepare temporary mount of leaf peel to observe stomata and to differentiate between dicot and monocot stomata.

#### Materials Required :

A fresh leaf of *Petunia* (Dicot plant) and lily or grass (Monocot plant), compound microscope, slide, cover slip, needle, brush, blotting paper, razor, etc.

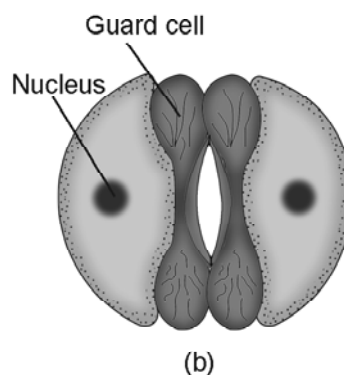
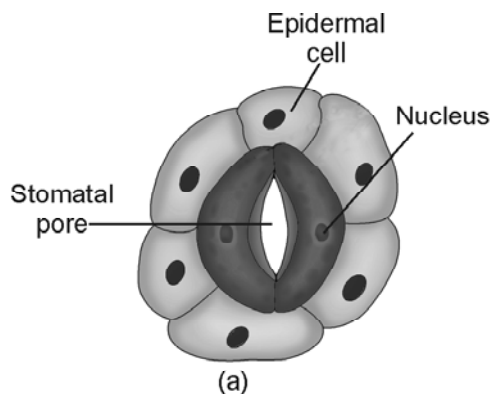
#### Procedure:

- Take a freshly plucked *Petunia* leaf. Remove a peel from the lower surface by folding and tearing the leaf.

- Mount the leaf-peel on a slide in a drop of water and cover it with a cover slip avoiding the air bubbles. Remove the excess water with the help of blotting paper.
- Observe the peel under low power of microscope. Carefully count the number of stomata and epidermal cells in the focussing area of peel.
- Observe the shape of guard cells and number of chloroplasts in each guard cell.
- Draw the diagram of a stoma and label its parts.
- Repeat this process with the leaf peel of lily or grass (monocot) and record the observations.

#### Observations:

| S.No. | Observation                                                | Dicot Leaf | Monocot |
|-------|------------------------------------------------------------|------------|---------|
| 1.    | Number of stomata in the microscopic field.                | .....      | .....   |
| 2.    | Number of epidermal cells in the microscopic field.        | .....      | .....   |
| 3.    | Shape of guard cells (bean seed shaped or dumbell shaped). | .....      | .....   |
| 4.    | Number of chloroplasts in each guard cell.                 | .....      | .....   |



**Result :** On the basis of observations draw the conclusion and compare the characteristics of dicot and monocot stomata.

## 2.Objective :

To study the action of salivary amylase on starch solution.

## Materials Required :

1% starch solution, 1% iodine solution, saliva, distilled water, three test tubes, test-tube stand, a measuring cylinder, dropper, a glazed tile, etc.

## Procedure :

- Rinse your mouth with fresh water. Collect some saliva from the mouth cavity in a test tube. Add

10 ml of distilled water to it.

- Take 2 ml of 1% starch solution in each of two test tubes. Keep them in the test-tube stand after labelling as A and B.
- Add 1 ml diluted saliva to test tube B only. Shake it thoroughly. Do not add anything to test-tube A.
- After 5 minutes, take a few drops of solution A on a glazed tile and add two drops of 1% iodine solution. Observe the colour of the mixture and record your observation.
- At the another end of glazed tile, place a few drops of solution B. Add two drops of 1% iodine solution and observe the colour of this mixture.
- Repeat the above two steps after five, ten, fifteen and twenty minutes.

## Observations:

| S.No. | Solution   | Colour after adding Iodine Solution |         |         |        |
|-------|------------|-------------------------------------|---------|---------|--------|
|       |            | 5 min.                              | 10 min. | 15 min. | 20 min |
| 1.    | Solution A | .....                               | .....   | .....   | .....  |
| 2.    | Solution B | .....                               | .....   | .....   | .....  |

**Result :** On the basis of observations conclude the result.

## Precautions :

- Rinse your mouth with water before collecting saliva.
- If saliva is containing some particles of food, filter it through moistened cotton.
- Carefully place the drops of solution A and B on glazed tile so that they do not mix with each other.

## 3. Objective:

To show that carbon dioxide is essential for photosynthesis.

## Materials Required:

A de-starched long leaved potted plant, two boiling tubes, split cork, KOH solution, alcohol, iodine solution, petroleum jelly, beakers, petridish, forceps, dropper, laboratory stand with a clamp.

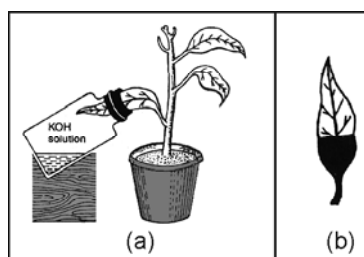
## Procedure :

- Fill one-fifth of the boiling tube with KOH solution.
- Insert one half of an intact leaf of the de-starched plant into the boiling tube with the help of split cork.
- Fix the boiling tube to the stand with clamp. Make it airtight by applying petroleum jelly.

- Keep this set-up in sunlight for 1-2 hours.
- Detach the experimental leaf and boil it in the water to kill the cells.
- Now place this leaf into another boiling tube containing alcohol. Heat it in a water-bath till the leaf become colourless.
- Wash the leaf in fresh water and keep it in a petridish.
- Add 2-3 drops of iodine solution to the leaf and observe the change of colour in leaf.

#### Observations :

After iodine test, the colour of leaf portion that was inside the boiling tube remains whitish green as it was not exposed to air and the colour of remaining leaf portion becomes blue-black.



(a) A de-starched potted plant with part of a leaf in a boiling tube with KOH solution;

(b) An experimental leaf after treatment with iodine.

**Result :** The exposed portion of experimental leaf becomes blue-black due to the presence of starch while inside boiling tube the KOH solution absorbed the  $\text{CO}_2$ . Hence photosynthesis or formation of starch was avoided.

#### 4. Objective :

To study the liberation of  $\text{CO}_2$  gas during fermentation.

#### Materials Required :

Sugar solution, yeast powder, freshly prepared lime water, petroleum jelly, test tubes, a single-bore cork, a delivery tube, beaker (250 ml) and a laboratory stand with clamp.

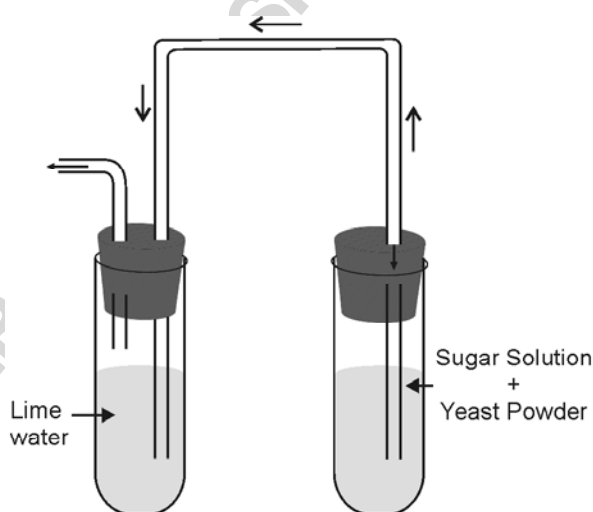
#### Procedure :

- Take a test tube, fill it with sugar solution.
- Take some yeast powder in another test tube and dissolve it by pouring water. Add 2 ml of the solution into the sugar solution.
- Fix a cork in the mouth of test tube containing sugar solution. Apply some petroleum jelly to make it airtight.

- Insert a delivery tube through the single-bore cork fitted in the test tube. Clamp the test tube to the laboratory stand.
- Dip the other end of delivery tube in the freshly prepared lime water in a beaker.
- Keep the set-up undisturbed in sunlight for one hour. Smell the sugar solution.
- Observe and record the change in lime water.

#### Observations :

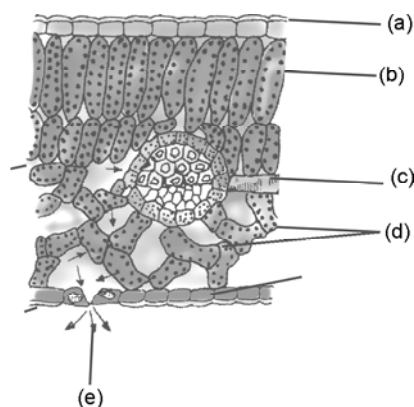
The smell of sugar solution at the beginning was ..... and at the end of experiment was ..... . The gas bubbles pass through the lime water turned it milky.



**Result :** On the basis of observations and change in the smell of sugar solution before and after the experiment conclude the result.

#### B. Quiz





1. The teacher can ask the students to name the different part of a leaf showing in the section given below.



2. Unjumble the name of five steps involved in nutrition in animals.

- (a) srpoabinot (b) geitnnos (c) seditgion (d) stnoigee (e) ssmilantiao

3. Identify the types of teeth found in human.

| Picture                                                                               | Type of teeth |
|---------------------------------------------------------------------------------------|---------------|
| (A)  | _____         |
| (B)  | _____         |
| (C)  | _____         |
| (D)  | _____         |

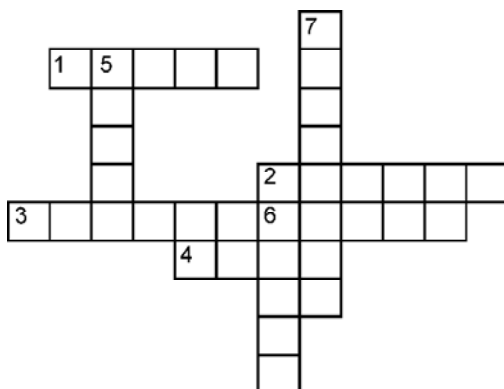
### C. Puzzles

1. Search six different parts of our respiratory system from the given chart by going upward, downward or diagonally.

|   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|
| P | T | A | X | N | P | L | S |
| O | H | R | I | B | S | U | I |
| L | J | A | A | T | H | N | I |
| R | X | Y | R | C | S | G | S |
| S | N | Z | N | Y | H | S | P |
| T | Y | O | M | J | N | E | N |
| P | R | N | K | L | Q | X | A |
| B | A | S | P | E | L | G | M |
| L | L | O | C | D | L | O | K |

- (a) .....(b) .....  
(c) .....(d) .....  
(d) .....(f) .....

2. Complete the given crossword puzzle by going across and down.



### Across

- The excretion of CO<sub>2</sub> and water vapours produced during respiration occurs through.
- A narrow tube runs from the inner side of each kidney.
- CO<sub>2</sub> produced during respiration in cells is carried by it.
- Excretion of urea, salts and excess water occurs by means of sweat glands present in it.

### Down

- It is collected and stored in the urinary bladder.
- It is the largest gland in the body and is a detoxifying gland.
- The excretory unit of kidney.

### D. Group activities

Divide the students into groups of 7-8 students and ask each group to perform the following activities.

A. To observe the internal structure of small intestine wall of human.

- Draw the structure by observing the slide (permanent) under low power of microscope.
- Observe the structure of a single villi and conclude how it serves a large surface for absorption.

B. To name the associate digestive glands and digestive juices in the following table—

| Region of alimentary canal | Digestive gland | Digestive juice produced |
|----------------------------|-----------------|--------------------------|
| (i) Mouth                  | .....           | .....                    |
| (ii) Stomach               | .....           | .....                    |
| (iii) Duodenum             | .....           | .....                    |
| (iv) Ileum                 | .....           | .....                    |

C. Collect some pond water in a beaker and prepare some temporary slides to observe the mode of nutrition in *Amoeba*.

- Observe the slides under low power of microscope and conclude how amoeba takes its food and which of the organ of amoeba helps in taking food.

### **E. Seminar**

1. **Topic** — Use of kidney machine (Hints— Include the following topics in seminar)

- The condition in which kidney machine should be used
- The method of using the machine
- How does the machine work?
- Differences between our kidney and the kidney machine

2. **Topic** — Excretion of waste products in plants

### **F. Debate**

- If autotrophs are more important than heterotrophs.

2. Respiration in plants versus animals

3. Transpiration : A necessary evil

### **G. Group Discussions**

- Conducting tubes in plants
- Role of platelets in human beings
- Blood pressure in humans
- Nutrition in *Amoeba*

### **H. Survey**

Divide the students into groups of 8-10 students. Ask them to go in green areas or forests in different localities and observe the following:

- The density or number of trees in each 100 square yard area.
- The temperature of that area. Whether it is cool or hot area in compare to outer areas.
- Whether the land around the trees is covered by grass or it is dry.
- Check the leaves of trees and observe whether these are wet on lower side.
- Which factors are responsible for the cooling or hot environment of this particular area? Conclude.

**Question 1:**

Why is diffusion insufficient to meet the oxygen requirements of multi-cellular organisms like humans?

Answer

Multicellular organisms such as humans possess complex body designs. They have specialised cells and tissues for performing various necessary functions of the body such as intake of food and oxygen. Unlike unicellular organisms, multicellular cells are not in direct contact with the outside environment. Therefore, diffusion cannot meet their oxygen requirements.

**Question 2:**

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

Answer

Any visible movement such as walking, breathing, or growing is generally used to decide whether something is alive or not. However, a living organism can also have movements, which are not visible to the naked eye. Therefore, the presence of life processes is a fundamental criterion that can be used to decide whether something is alive or not.

**Question 3:**

What are outside raw materials used for by an organism?

Answer

An organism uses outside raw materials mostly in the form of food and oxygen. The raw materials required by an organism can be quite varied depending on the complexity of the organism and its environment.

**Question 4:**

What processes would you consider essential for maintaining life?

Answer

Life processes such as nutrition, respiration, transportation, excretion, etc. are essential for maintaining life.



**Question 1:**

What are the differences between autotrophic nutrition and heterotrophic nutrition?

Answer

|       | <b>Autotrophic nutrition</b>                                                               |       | <b>Heterotrophic nutrition</b>                                                                              |
|-------|--------------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------------------------------|
| (i)   | Food is synthesised from simple inorganic raw materials such as CO <sub>2</sub> and water. | (i)   | Food is obtained directly or indirectly from autotrophs. This food is broken down with the help of enzymes. |
| (ii)  | Presence of green pigment (chlorophyll) is necessary.                                      | (ii)  | No pigment is required in this type of nutrition.                                                           |
| (iii) | Food is generally prepared during day time.                                                | (iii) | Food can be prepared at all times.                                                                          |
| (iv)  | All green plants and some bacteria have this type of nutrition.                            | (iv)  | All animals and fungi have this type of nutrition.                                                          |

**Question 2:**

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

Answer

The following raw materials are required for photosynthesis:

- The raw material CO<sub>2</sub> enters from the atmosphere through stomata.
- Water is absorbed from the soil by the plant roots.
- Sunlight, an important component to manufacture food, is absorbed by the chlorophyll and other green parts of the plants.

**Question 3:**

What is the role of the acid in our stomach?

Answer

The hydrochloric acid present in our stomach dissolves bits of food and creates an acidic medium. In this acidic medium, enzyme pepsinogen is converted to pepsin, which is a protein-digesting enzyme.

**Question 4:**

What is the function of digestive enzymes?

Answer

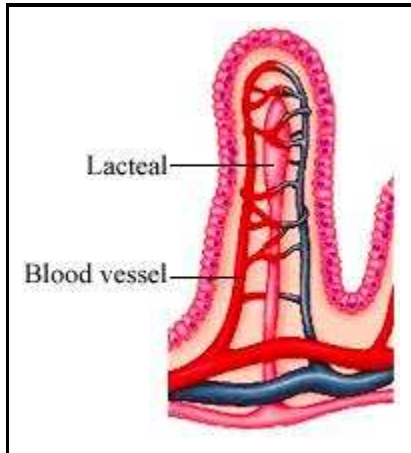
Digestive enzymes such as amylase, lipase, pepsin, trypsin, etc. help in the breaking down of complex food particles into simple ones. These simple particles can be easily absorbed by the blood and thus transported to all the cells of the body.

**Question 5:**

How is the small intestine designed to absorb digested food?

Answer

The small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for more efficient food absorption. Within these villi, many blood vessels are present that absorb the digested food and carry it to the blood stream. From the blood stream, the absorbed food is delivered to each and every cell of the body.



**Enlarged view of a villus**

**Question 1:**

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

Answer

Terrestrial organisms take up oxygen from the atmosphere whereas aquatic animals need to utilize oxygen present in the water. Air contains more  $O_2$  as compared to water. Since the content of  $O_2$  in air is high, the terrestrial animals do not have to breathe faster to get more oxygen. Therefore, unlike aquatic animals, terrestrial animals do not have to show various adaptations for better gaseous exchange.

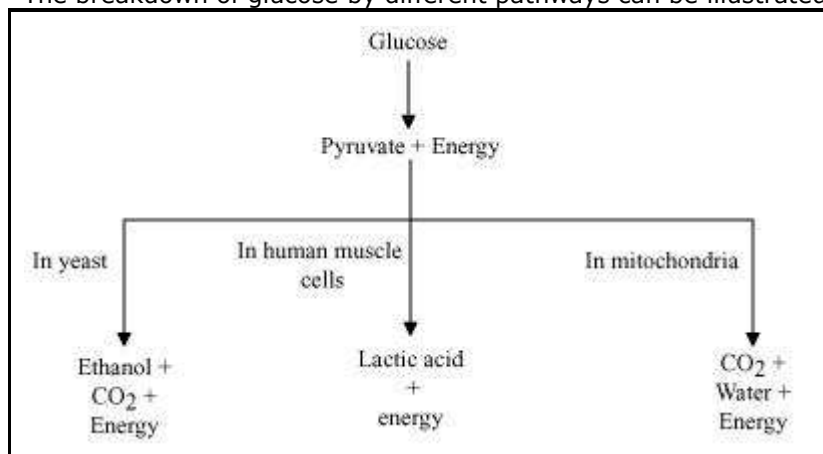
**Question 2:**

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

Answer

Glucose is first broken down in the cell cytoplasm into a three carbon molecule called pyruvate. Pyruvate is further broken down by different ways to provide energy.

The breakdown of glucose by different pathways can be illustrated as follows.



In yeast and human muscle cells, the breakdown of pyruvate occurs in the absence of oxygen whereas in mitochondria, the breakdown of pyruvate occurs in the presence of oxygen.

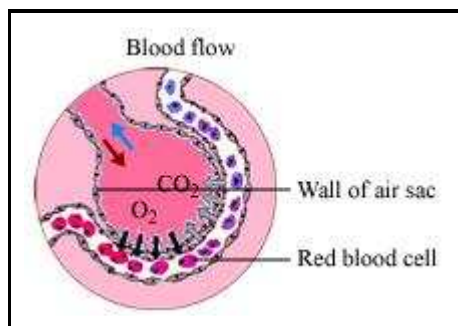
**Question 3:**

How is oxygen and carbon dioxide transported in human beings?

Answer

Haemoglobin transports oxygen molecule to all the body cells for cellular respiration. The haemoglobin pigment present in the blood gets attached to four  $O_2$  molecules that are obtained from breathing. It thus forms oxyhaemoglobin and the blood becomes oxygenated. This oxygenated blood is then distributed to all the body cells by the heart. After giving away  $O_2$  to the body cells, blood takes away  $CO_2$  which is the end product of cellular respiration. Now the blood becomes de-oxygenated.

Since haemoglobin pigment has less affinity for  $CO_2$ ,  $CO_2$  is mainly transported in the dissolved form. This de-oxygenated blood gives  $CO_2$  to lung alveoli and takes  $O_2$  in return.



### Transportation of O<sub>2</sub> and CO<sub>2</sub> in blood

#### Question 4:

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

Answer

The exchange of gases takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli. Thus, alveoli are the site for exchange of gases. The lungs get filled up with air during the process of inhalation as ribs are lifted up and diaphragm is flattened. The air that is rushed inside the lungs fills the numerous alveoli present in the lungs. Each lung contains 300-350 million alveoli. These numerous alveoli increase the surface area for gaseous exchange making the process of respiration more efficient.

#### Question 1:

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

Answer

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

- **Heart** pumps oxygenated blood throughout the body. It receives deoxygenated blood from the various body parts and sends this impure blood to the lungs for oxygenation.
- Being a fluid connective tissue, **blood** helps in the transport of oxygen, nutrients, CO<sub>2</sub>, and nitrogenous wastes.
- The **blood vessels** (arteries, veins, and capillaries) carry blood either away from the heart to various organs or from various organs back to the heart.

#### Question 2:

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

Answer

Warm-blooded animals such as birds and mammals maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies when they are in a cooler environment. Hence, these animals require more oxygen (O<sub>2</sub>) for more cellular respiration so that they can produce more energy to maintain their body temperature. Thus, it is necessary for them to separate oxygenated and de-oxygenated blood, so that their circulatory system is more efficient and can maintain their constant body temperature.

#### Question 3:

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

Answer



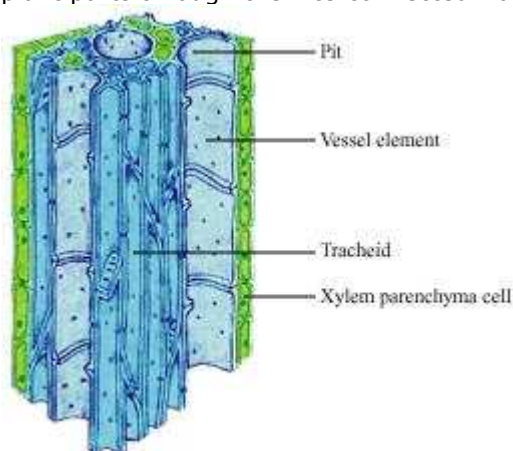
In highly organised plants, there are two different types of conducting tissues – xylem and phloem. Xylem conducts water and minerals obtained from the soil (via roots) to the rest of the plant. Phloem transports food materials from the leaves to different parts of the plant body.

**Question 4:**

How are water and minerals transported in plants?

Answer

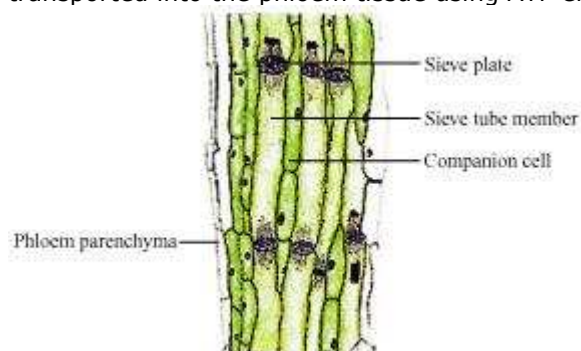
The components of xylem tissue (tracheids and vessels) of roots, stems, and leaves are interconnected to form a continuous system of water-conducting channels that reaches all parts of the plant. Transpiration creates a suction pressure, as a result of which water is forced into the xylem cells of the roots. Then there is a steady movement of water from the root xylem to all the plant parts through the interconnected water-conducting channels.

**Components of xylem tissue****Question 5:**

How is food transported in plants?

Answer

Phloem transports food materials from the leaves to different parts of the plant body. The transportation of food in phloem is achieved by utilizing energy from ATP. As a result of this, the osmotic pressure in the tissue increases causing water to move into it. This pressure moves the material in the phloem to the tissues which have less pressure. This is helpful in moving materials according to the needs of the plant. For example, the food material, such as sucrose, is transported into the phloem tissue using ATP energy.

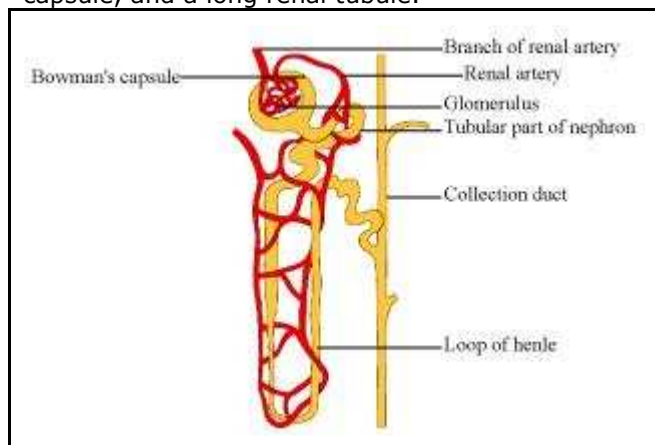
**Components of phloem tissue**

**Question 1:**

Describe the structure and functioning of nephrons.

Answer

Nephrons are the basic filtering units of kidneys. Each kidney possesses large number of nephrons, approximately 1-1.5 million. The main components of the nephron are glomerulus, Bowman's capsule, and a long renal tubule.

**Structure of a nephron****Functioning of a nephron:**

- The blood enters the kidney through the renal artery, which branches into many capillaries associated with glomerulus.
- The water and solute are transferred to the nephron at Bowman's capsule.
- In the proximal tubule, some substances such as amino acids, glucose, and salts are selectively reabsorbed and unwanted molecules are added in the urine.
- The filtrate then moves down into the loop of Henle, where more water is absorbed.
- From here, the filtrate moves upwards into the distal tubule and finally to the collecting duct. Collecting duct collects urine from many nephrons.
- The urine formed in each kidney enters a long tube called ureter. From ureter, it gets transported to the urinary bladder and then into the urethra.

**Question 2:**

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

Answer

Plants can get rid of excess of water by transpiration. Waste materials may be stored in the cell vacuoles or as gum and resin, especially in old xylem. It is also stored in the leaves that later fall off.

**Question 3:**

How is the amount of urine produced regulated?

Answer

The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as habitat of an organism and hormone such as Anti-diuretic hormone (ADH) also regulates the amount of urine produced.

**Question 1:**



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

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

Answer

- (c) In human beings, the kidneys are a part of the system for excretion.

**Question 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.

Answer

- (a) In a plant, the xylem is responsible for transport of water.

**Question 3:**

The autotrophic mode of nutrition requires

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

Answer

- (d) The autotrophic mode of nutrition requires carbon dioxide, water, chlorophyll and sunlight.

**Question 4:**

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

- (a) cytoplasm.
- (b) mitochondria.
- (c) chloroplast.
- (d) nucleus.

Answer

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

**Question 5:**

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

Answer

Fats are present in the form of large globules in the small intestine. The small intestine gets the secretions in the form of bile juice and pancreatic juice respectively from the liver and the pancreas. The bile salts (from the liver) break down the large fat globules into smaller globules so that the pancreatic enzymes can easily act on them. This is referred to as emulsification of fats. It takes place in the small intestine.

**Question 6:**

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

Answer



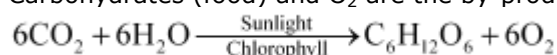
Saliva is secreted by the salivary glands, located under the tongue. It moistens the food for easy swallowing. It contains a digestive enzyme called salivary amylase, which breaks down starch into sugar.

**Question 7:**

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

Answer

Autotrophic nutrition takes place through the process of photosynthesis. Carbon dioxide, water, chlorophyll pigment, and sunlight are the necessary conditions required for autotrophic nutrition. Carbohydrates (food) and  $O_2$  are the by-products of photosynthesis.

**Question 8:**

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

Answer

|    | <b>Aerobic respiration</b>                                                          |    | <b>Anaerobic respiration</b>        |
|----|-------------------------------------------------------------------------------------|----|-------------------------------------|
| 1. | It occurs in the presence of $O_2$ .                                                | 1. | It occurs in the absence of $O_2$ . |
| 2. | It involves the exchange of gases between the organism and the outside environment. | 2. | Exchange of gases is absent.        |
| 3. | It occurs in cytoplasm and mitochondria.                                            | 3. | It occurs only in cytoplasm.        |
| 4. | It always releases $CO_2$ and $H_2O$ .                                              | 4. | End products vary.                  |
| 5. | It yields 36 ATPs.                                                                  | 5. | It yields only 2 ATPs.              |

Anaerobic respiration occurs in the roots of some waterlogged plants, some parasitic worms, animal muscles, and some micro-organisms such as yeasts.

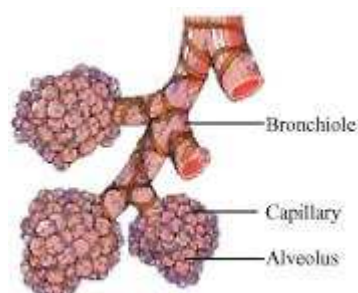
**Question 9:**

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

Answer

The alveoli are the small balloon-like structures present in the lungs. The walls of the alveoli consist of extensive network of blood vessels. Each lung contains 300–350 million alveoli, making it a total of approximately 700 million in both the lungs. The alveolar surface when spread out covers about  $80\text{ m}^2$  area. This large surface area makes the gaseous exchange more efficient.



**Alveoli and capillaries****Question 10:**

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

Answer

Haemoglobin is the respiratory pigment that transports oxygen to the body cells for cellular respiration. Therefore, deficiency of haemoglobin in blood can affect the oxygen supplying capacity of blood. This can lead to deficiency of oxygen in the body cells. It can also lead to a disease called anaemia.

**Question 11:**

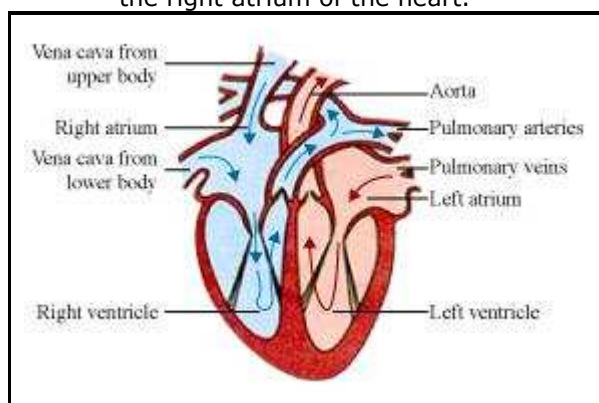
Describe double circulation in human beings. Why is it necessary?

Answer

The human heart is divided into four chambers – the right atrium, the right ventricle, the left atrium, and the left ventricle.

**Flow of blood in the heart:**

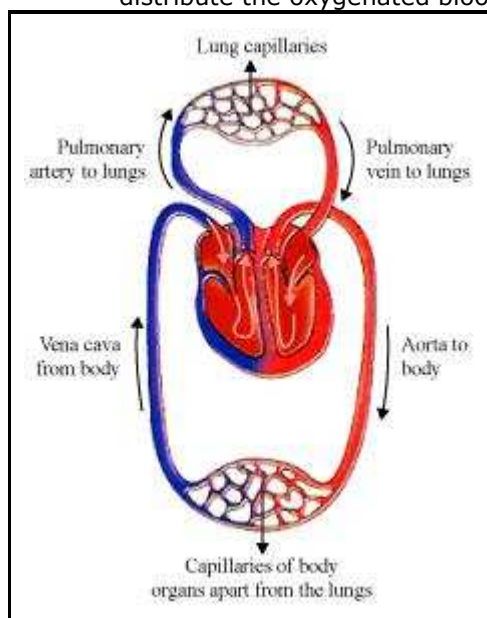
- The heart has superior and inferior vena cava, which carries de-oxygenated blood from the upper and lower regions of the body respectively and supplies this de-oxygenated blood to the right atrium of the heart.

**Flow of blood in the human heart**

- The right atrium then contracts and passes the de-oxygenated blood to the right ventricle, through an auriculo-ventricular aperture.
- Then the right ventricle contracts and passes the de-oxygenated blood into the two pulmonary arteries, which pumps it to the lungs where the blood becomes oxygenated. From the lungs, the pulmonary veins transport the oxygenated blood to the left atrium of the heart.
- Then the left atrium contracts and through the auriculo-ventricular aperture, the oxygenated blood enters the left ventricle.



- The blood passes to aorta from the left ventricle. The aorta gives rise to many arteries that distribute the oxygenated blood to all the regions of the body.

**Schematic diagram of blood circulation in humans**

Therefore, the blood goes twice through the heart. This is known as double circulation.

**Importance of double circulation:**

The separation of oxygenated and de-oxygenated blood allows a more efficient supply of oxygen to the body cells. This efficient system of oxygen supply is very useful in warm-blooded animals such as human beings.

As we know, warm-blooded animals have to maintain a constant body temperature by cooling themselves when they are in a hotter environment and by warming their bodies when they are in a cooler environment. Hence, they require more  $O_2$  for more respiration so that they can produce more energy to maintain their body temperature. Thus, the circulatory system of humans is more efficient because of the double circulatory heart.

**Question 12:**

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

Answer

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

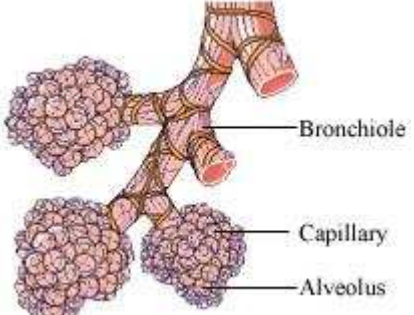
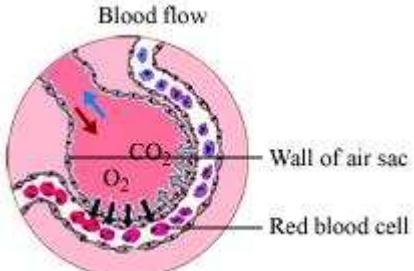
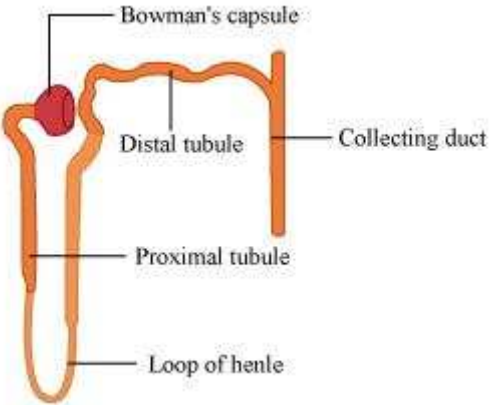


|       |                                                                                               |       |                                                                 |
|-------|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------|
| (iii) | Transport in xylem occurs with the help of simple physical forces such as transpiration pull. | (iii) | Transport of food in phloem requires energy in the form of ATP. |
|-------|-----------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------|

**Question 13:**

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

Answer

| Alveoli                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Nephron                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Structure</b></p> <p>(i) Alveoli are tiny balloon-like structures present inside the lungs.</p> <p>(ii) The walls of the alveoli are one cell thick and it contains an extensive network of blood capillaries.</p>  <p><b>Function</b></p> <p>(i) The exchange of <math>O_2</math> and <math>CO_2</math> takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli.</p>  <p>(ii) Alveoli are the site of gaseous exchange.</p> | <p><b>Structure</b></p> <p>(i) Nephrons are tubular structures present inside the kidneys.</p> <p>(ii) Nephrons are made of glomerulus, Bowman's capsule, and a long renal tube. It also contains a cluster of thin-walled capillaries.</p>  <p><b>Function</b></p> <p>(i) The blood enters the kidneys through the renal artery which branches into many capillaries in the glomerulus. The water and solute are transferred to the nephron at Bowman's capsule. Then the filtrate moves through the proximal tubule and then down into the loop of henle. From henle's loop, filtrate passes into the distal tubule and then to the collecting duct. The collecting duct collects the urine from many nephrons and passes it to the ureter. During the flow of filtrate, some substances such as glucose, amino acids, and water are selectively re-absorbed.</p> |

