Chapter 6: Life Processes

B06

1. **What are life processes?**

   The processes in which living organisms perform maintenance functions are called life processes.

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

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

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

   Any visible movement such as walking, breathing or growing is generally used to decide whether something is alive or not. 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.

4. **What are the outside raw materials used by an organism?**

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

5. **What processes would you consider essential for maintaining life?**

   Respiration, Nutrition, Transportation, reproduction and excretion.

6. **Define nutrition.**

   The process of obtaining energy through consumption of food is called nutrition.

7. **What is autotrophic nutrition?**

   The mode of nutrition in which an organism prepares its own food is called autotrophic nutrition. Green plants and blue-green algae are examples of autotrophs.

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

   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 O2 are the by-products of photosynthesis.

9. **What is meant by photosynthesis?**

   Photosynthesis is the process by which autotrophs take in carbon dioxide and water from the outside and convert them into carbohydrates in the presence of sunlight and chlorophyll.

10. Write the chemical equation of photosynthesis.

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

11. Write the steps involved in the process of photosynthesis.

a) Absorption of light energy by chlorophyll.

b) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

c) Reduction of carbon dioxide to carbohydrates.

12. Do all events during photosynthesis take place one after the other immediately? Give an example.

Not necessarily, For example desert plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day.

13. How do raw materials for photosynthesis become available to the plant?

Water comes from soil; through the xylem tissue in roots and stems. Carbon dioxide comes in the leaves through stomata.

14. Draw a labelled diagram of the cross-section of a leaf lamina to show chloroplasts.

15. Name the green dot like structures in some cells observed by a student when a leaf peel was viewed under a microscope. What is this colour due to?

The green dots like cell organelles which contain chlorophyll are called chloroplasts. The green colour is due to the presence of green pigment chlorophyll.

16. Describe an experiment to show that chlorophyll is essential for photosynthesis.

Take a potted plant with variegated leaves – for example, money plant or crotons. Keep the plant in a dark room for three days so that all the starch gets used up. Now keep the plant in sunlight for about six hours. Pluck a leaf from the plant. Mark the green areas in it and trace them on a sheet of paper. Dip the leaf in boiling water for a few minutes. After this, immerse it in a beaker containing alcohol. Carefully place the above beaker in a water-bath and heat till the alcohol begins to boil. Now dip the leaf in a dilute solution of iodine for a few minutes. Take out the leaf and rinse off the iodine solution. After iodine test, green patched areas become blue-black showing the presence of starch. The portion which does not have chlorophyll remains colourless (starch free).

17. Observe the following leaves. What can you conclude about the presence of starch in various areas of the leaf?

When the leaf is dipped in iodine solution, green patched areas become blue-black showing the presence of starch. The portion which does not have chlorophyll remains colourless (starch free).

18. In the experiment to show that chlorophyll is essential for photosynthesis, why is the plant kept in the dark room for three days?

When the plant is kept in the dark for three days all the starch gets used up.

19. What are stomata?

The Tiny pores present on the surface of the leaves are called stomata.

20. State the function of stomata.

a) Exchange of gases (O_2/CO_2).

b) Loses large amount of water (water vapour) during transpiration.

21. Draw labelled diagram to show a) open stomatal pore b) closed stomatal pore

22. What are guard cells?

The bean shaped cells on either side of stomata are called guard cells.

23. State the function of guard cells.

The function of guard cells is to regulate the opening and closing of the stomatal pore.

24. How do guard cells control the stomatal pore?

The guard cells swell when water flows into them, causing the stomatal pore to open. Similarly the pore closes if the guard cells shrink.

25. Stomata remain closed during the day in desert plants. How do they get carbon dioxide for photosynthesis?

In deserts, temperature is very high so stomata are closed to reduce the loss of water due to transpiration. Desert plants are adapted to take up carbon dioxide at night when stomata are open. The carbon dioxide taken up in the night prepares an intermediate compound which is acted upon by the energy absorbed by the chlorophyll during the day to prepare food.

26. Leaves of a healthy potted plant were covered with Vaseline to block the stomata. Will this plant remain healthy for long? Give reason.

No, this plant will not be healthy for long. The plant will begin to die because

a) Gaseous exchange will not take place.

b) No absorption of carbon dioxide, so no photosynthesis.

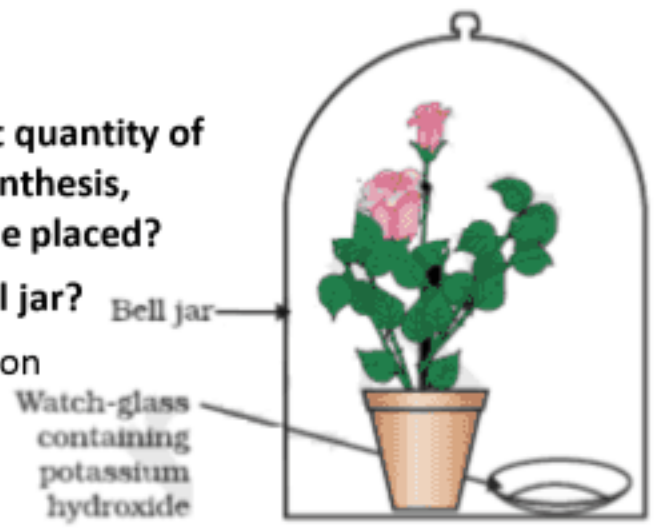
c) Transpiration will not occur, so no transport of water.

27. Describe an experiment to demonstrate that sufficient carbon dioxide is necessary to carry out photosynthesis.

Take two healthy potted plants which are nearly the same size. Keep them in a dark room for three days. Now place each plant on separate glass plates. Place a watch-glass containing potassium hydroxide by the side of one of the plants. The potassium hydroxide is used to absorb carbon dioxide. Cover both plants with separate bell-jars. Use Vaseline to seal the bottom of the jars to the glass plates so that the set-up is air-tight. Keep the plants in sunlight for about two hours. Pluck a leaf from each plant and check for the presence of starch. The leaf with KOH shows presence of no or very little amount of starch due to carbon dioxide produced in plant in respiration and utilised in photosynthesis is in very small amount. The leaf from the 2nd pot shows presence of enough starch. This shows that sufficient carbon dioxide is necessary to carry out photosynthesis.

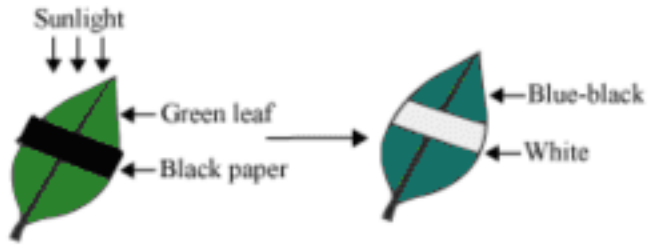
28. In the experiment to demonstrate that sufficient quantity of carbon dioxide is necessary to carry out photosynthesis,
a) Why is a watch glass with potassium hydroxide placed?
b) Why is Vaseline smeared at bottom of the bell jar?

a) Potassium hydroxide is kept to absorb the carbon dioxide in the bell jar.
b) Vaseline is applied to make the set-up air-tight.



29. Describe an experiment to show that sunlight is essential for photosynthesis.

Place a potted plant in dark for 72 hours for destarching. Attach a light proof black paper strips on both sides of the leaf with the help of paper clips as shown in the figure.



Place the plant in sunlight for 3-4 hours. Pluck the experimental leaf, remove black paper strips. Perform starch test by boiling leaf first in boiling water followed by boiling in alcohol over a water bath and then rinsing with cold water and again placing it in iodine solution. Observation: Only that portion of the leaf changes into blue-black which was not covered. The covered portion of the leaf does not give starch test.

30. In the experiment "Light is essential for photosynthesis" ,why does the uncovered part of the leaf turn blue-black after putting iodine solution?

Starch is produced in the uncovered part of the leaf which turns blue-black in the presence of iodine solution.

31. Why is nitrogen considered as an essential element? How do plants acquire nitrogen?

Nitrogen is an essential element used in the synthesis of proteins and other compounds. It is obtained from the soil in the form of inorganic nitrates or nitrites or it is taken up as organic compound which has been prepared by bacteria from atmospheric nitrogen.

32. What is heterotrophic nutrition?

The type of nutrition in which organisms are dependent on other organisms for their food requirements is called heterotrophic nutrition. Ex: Animals, fungi and bacteria

33. What are saprophytes?

Organisms that break-down the food materials outside the body and then absorb it are called saprophytes. Ex: Fungi like bread moulds, yeast and mushrooms.

34. How do organisms like bread moulds and mushrooms obtain their food?

Organisms like bread moulds and mushrooms breakdown the food material outside the body and then absorb it.

35. What is holozoic nutrition?

The type of nutrition in which organisms take in whole material and break it down inside their body is called holozoic nutrition.

36. What is parasitic nutrition?

The type of nutrition in which organisms derive nutrition from plants and animals without killing them is called parasitic nutrition. Ex: Cuscuta, orchids, ticks, lice, leeches and tape-worms.

37. Distinguish between saprophytic and holozoic nutrition.

Saprophytic nutrition	Holozoic nutrition
It is an absorptive type of nutrition	It is an ingestive type of nutrition
Food is obtained in the liquid state	Food is taken in the solid state
Digestion is external	Digestion in internal

38. Explain the process of nutrition in amoeba.

Amoeba takes in food using temporary finger like extensions called pseudopodia which fuse over the food particle forming a food vacuole. Inside the food vacuole, complex substances are broken down into simpler ones which then diffuse into the cytoplasm. The remaining undigested material is thrown out.

39. Explain how paramecium obtains its food.

In Paramoecium, which is a unicellular organism, the cell has a definite shape and food is taken in at a specific spot. Food is moved to this spot by the movement of cilia which cover the entire surface of the cell.

40. What is alimentary canal?

The long tube extending from the mouth to the anus is called alimentary canal.

41. Why should the food that we eat be wetted? How is this achieved?

The lining of the canal is soft. The food we eat must be wetted to make its passage smooth. This is achieved by mixing with food with saliva secreted by the salivary gland.

42. What are biological catalysts or enzymes?

Biological catalyst or enzymes are substance which breaks the food into smaller molecules.

43. What is the function of saliva? OR What is the role of saliva in the digestion of food?

a) Saliva moistens the food.

b) Saliva contains an enzyme called salivary amylase which breaks down the starch into sugar.

44. Describe an experiment to show that saliva acts upon starch.

Take 1 ml starch solution (1%) in two test tubes (A and B). Add 1 ml saliva to test tube A and leave both test tubes undisturbed for 20-30 minutes. Now add a few drops of dilute iodine solution to the test tubes. The solution of test tube B will turn blue-black. It indicates that test tube contains starch and test tube A does not have starch. This shows that saliva acts upon starch and converts it into sugars which do not react with iodine solution.

45. What is peristaltic movement?

Peristalsis is the contraction and relaxation of the muscles of the digestive tract to move the food through the digestive system.

46. Explain the significance of peristaltic movement that occurs all along the gut during digestion.

The lining of the digestive canal has muscles that contract rhythmically in order to push the food forward. This movement is called peristaltic movements which occur all along the gut.

47. What is the function of hydrochloric acid secreted in the stomach?

The function of hydrochloric acid is:

a) It makes the acidic medium which is necessary for the action of gastric enzymes like pepsin.

b) It kills most of the harmful bacteria.

48. How is the inner lining of stomach protected from action of acid?

The mucus protects the inner lining of the stomach from the action of acid.

49. What is meant by acidity?

Acidity is a condition when there is excess secretion of acids in the gastric glands of the stomach.

50. What will happen if mucus is not secreted by the gastric glands?

If mucus is not secreted by the gastric glands, it will lead to erosion of the inner lining of stomach causing excessive acidity, ulcers and discomfort as mucus protects the inner lining of stomach from the action of hydrochloric acid.

51. Why do herbivores need a longer small intestine?

Herbivores eating grass need a longer small intestine to allow the cellulose to be digested.

52. Give reason: Carnivores have a shorter small intestine.

Meat is easier to digest. Hence carnivores have a shorter small intestine.

53. Which is the site of complete digestion of carbohydrates, proteins and fats?

Small intestine.

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

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.

55. Write the function of small intestine.

a) Small intestine receives the secretions from liver and pancreas.

b) Small intestine is the site of complete digestion of carbohydrates, proteins and fats.

56. How is the acidic food received from the stomach made alkaline in the small intestine?

The food coming from the stomach is acidic and it is made alkaline for the pancreatic enzymes to act by the Bile juice from the liver.

57. Give reason: Food entering into the small intestine is made alkaline by bile juice from the liver.

The food coming from the stomach is acidic and it is made alkaline for the pancreatic enzymes to act.

58. What is the function of bile juice secreted by the liver?

a) Bile juice makes the food coming from the stomach alkaline.

b) It increases the efficiency of enzyme action by breaking down the fat into smaller globules.

59. How would digestion of food be affected if bile duct is completely blocked? Explain.

If the bile duct is completely blocked, bile juice will not reach the small intestine and the digestion of fats will be affected.

60. Bile juice is essential for digestion. Why?

Bile juice makes the food coming from the stomach alkaline.

61. State the function of pancreas.

a) Pancreas secretes pancreatic juice which contains the enzyme trypsin for digesting proteins.

b) It also produces the enzyme lipase for breaking down emulsified fat.

62. Differentiate between the functions of enzyme pepsin and trypsin.

Pepsin	Trypsin
Pepsin acts in stomach	Trypsin acts in small intestine
It acts in acidic medium	It acts in alkaline medium

63. How would digestion of food be affected if pancreatic duct is completely blocked? Explain.

If the pancreatic duct is completely blocked, pancreatic juice will not reach the small intestine and the digestion of carbohydrates and proteins will be affected.

64. State the function of intestinal juice.

a) The enzyme in intestinal juice converts proteins to amino acids

b) It also converts complex carbohydrates into glucose.

c) It converts fats into fatty acids and glycerol.

65. What are villi?

The inner lining of the small intestine has numerous finger-like projections called villi.

66. How doe s villi help in absorption of food?

The inner lining of the small intestine has numerous finger-like projections called villi which increase the surface area for absorption. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

67. How does small intestine help in the digestion of starch, proteins and fats?

Small intestine is the site of complete digestion of fats, proteins and starch.

Bile juice from the liver helps to change the acidic food into alkaline which is essential for the action of pancreatic enzymes.

Bile salts break-down the fats into smaller globules increasing the efficiency of enzyme action. Trypsin helps in digestion of proteins.

Pancreatic lipase helps in break-down of fats and converts them into fatty acids and glycerol. Pancreatic amylase catalyses the breakdown of starch.

68. What are the final products after digestion of carbohydrates and proteins?

The final product produced after digestion of carbohydrates is glucose and proteins are amino acids.

69. Why does absorption of digested food occur mainly in the small intestine?

a) Digestion of food is completed in the small intestine.

b) Inner lining of small intestine have a number of finger-like projections called villi, which increase the surface area for absorption.

c) Walls of intestine have blood vessels for carrying the absorbed food to different parts of the body.

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

Autotrophic nutrition	Heterotrophic nutrition
1. Food is synthesized from simple inorganic raw materials such as $CO_2$and water.	1. Food is obtained directly or indirectly from autotrophs. This food is broken down with the help of enzymes.
2. Presence of green pigment (chlorophyll) is necessary.	2. No pigment is required in this type of nutrition.
3. Food is generally prepared during day time.	3. Food can be prepared at all times.
4. All green plants and some bacteria have this type of nutrition.	4. All animals and fungi have this type of nutrition.

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

The following raw materials are required for photosynthesis:

a) The raw material CO_2 enters from the atmosphere through stomata.

b) Water is absorbed from the soil by the plant roots.

c) Sunlight, an important component to manufacture food, is absorbed by the chlorophyll and other green parts of the plants.

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

Following are the roles of acid in our stomach:

a) 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.

b) The hydrochloric acid kills the harmful microbes that enter with food and thus prevents infection of digestive tract.

73. What is the function of digestive enzymes?

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.

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

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.

75. Draw a labelled diagram of the human alimentary canal.

76. What is dental caries? How is it produced? What precautions can prevent it? What can it cause if untreated?

Dental caries is the tooth decay that causes gradual softening of enamel and dentine.

It is caused when bacteria acts on sugars and produce acid that softens or demineralizes the enamel. It happens when masses of bacterial cell together with food particles stick to the teeth to from dental plaque. As plaque covers the teeth, saliva cannot reach the teeth surface to neutralize the acid. Brushing the teeth after eating removes the plaque before the bacteria produces acids. Microorganisms may invade the tooth pulp, causing inflammation and infection.

77. Define respiration.

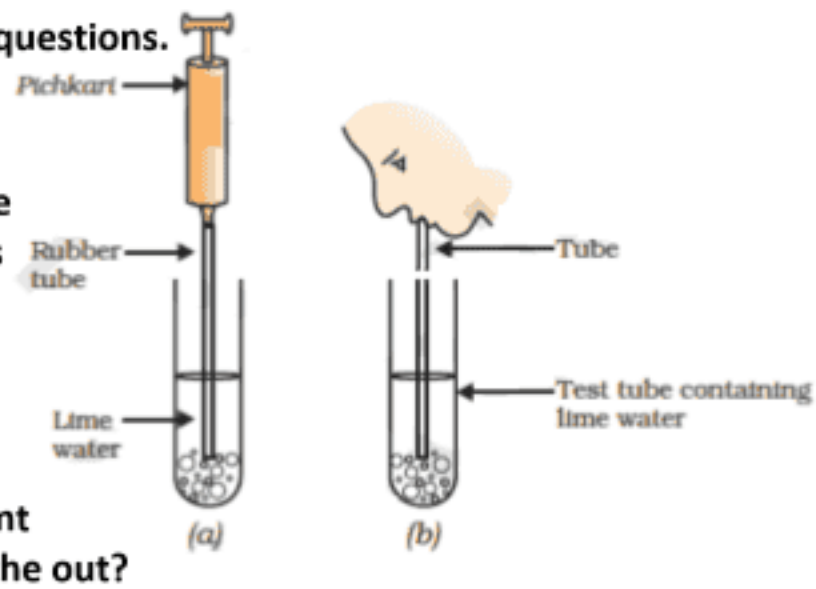
The process by which a living being utilizes the food to get energy is called respiration. Respiration is an oxidation reaction in which carbohydrate is oxidized to produce energy.

78. In the experiment, answer the following questions.

Take some freshly prepared lime water in a test tube. Blow air through this lime water. Note how long it takes for the lime water to turn milky. Use a syringe to pass air through some fresh lime water taken in another test tube.

a) How long it takes for this lime water to turn milky?

b) What does this tell us about the amount of carbon dioxide in the air that we breathe out?



a) Lime water in test tube (b) turns milky much earlier than lime water in test tube (a).

b) This experiment shows that the air we breathe out has much more carbon dioxide than the air.

79. Take some fruit juice or sugar solution and add some yeast to this. Take this mixture in a test tube fitted with a one-holed cork. Fit the cork with a bent glass tube. Dip the free end of the glass tube into a test tube containing freshly prepared lime water.

a) What change is observed in the lime water and how long does it take for this change to occur? b) What does this tell us about the products of fermentation?

a) Lime water turns milky. This change occurs when yeast cells start fermentation, the evolved carbon dioxide gas starts bubbling in the freshly prepared lime water.

b) This tells us that one of the products of fermentation is carbon dioxide.

80. Write the steps involved in respiration.

a) Breaking down glucose into pyruvate: This step happens in the cytoplasm. Glucose molecule is broken down into pyruvic acid. Glucose molecule is composed of 6 carbon atoms, while pyruvic acid is composed of 3 carbon atoms.

b) Fate of Pyruvic Acid: Further breaking down of pyruvic acid takes place in mitochondria and the molecules formed depend on the type of respiration in a particular organism.

81. What is pyruvate?

The three carbon molecule formed by the breakdown of glucose is called pyruvate.

82. What is anaerobic respiration?

The process of breakdown of glucose in absence of oxygen is called anaerobic respiration. In this process small amount of energy is released.

83. Explain anaerobic respiration.

Glucose (6-carbon molecules) is broken down into a three carbon molecule called pyruvate. The pyruvate is converted into ethanol and carbon dioxide.

84. What is aerobic respiration?

Aerobic respiration is the process in which glucose is completely broken down into carbon dioxide and water in presence of oxygen.

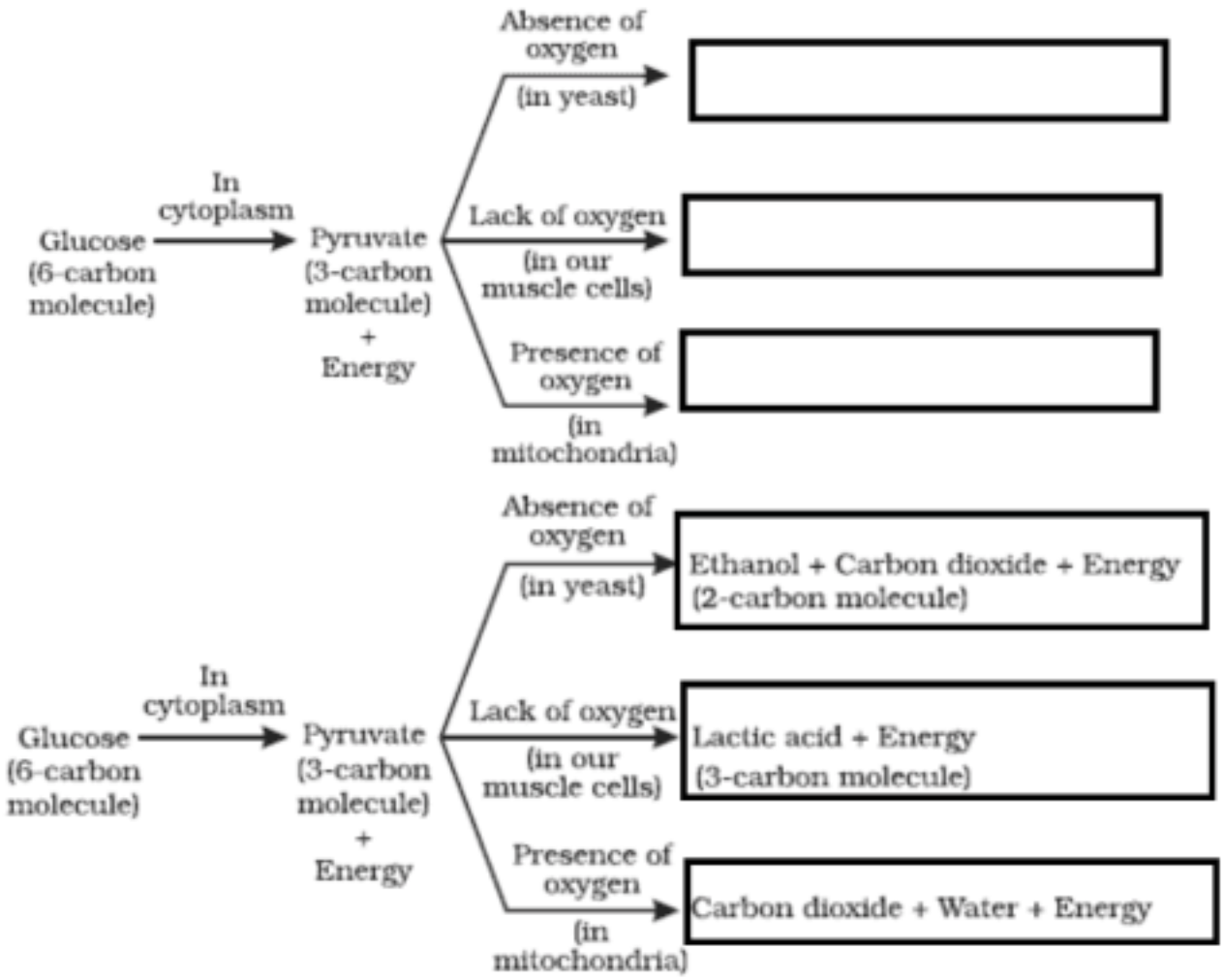
85. Explain aerobic respiration.

Glucose (6-carbon molecules) is broken down into three carbon molecule called pyruvate using oxygen. Pyruvate breaks up to give three molecules of carbon dioxide and water.

86. Write differences between aerobic and anaerobic respiration.

Aerobic respiration	Anaerobic respiration
Aerobic respiration takes place in the presence of oxygen.	Anaerobic respiration takes place in absence of oxygen.
End products are carbon dioxide and water.	End products are ethyl alcohol and carbon dioxide.
It yields more energy (36 ATP) compared to anaerobic respiration.	It yields less energy (2 ATP) compared to aerobic respiration.
The process takes place in cytoplasm and mitochondria.	The process takes place only in cytoplasm

87. In the following schematic diagram of breakdown of glucose, complete the pathway.



88. What causes muscle cramps?

When there is lack of oxygen in the muscle cells, pyruvate is converted into lactic acid which is also a three-carbon molecule. This build-up of lactic acid in the muscles during sudden activity causes muscle cramps.

89. Write one point which is common for both aerobic and anaerobic respiration.

In both aerobic and anaerobic respiration, the substance used is glucose.

90. Why is anaerobic respiration less efficient?

Anaerobic respiration is incomplete breakdown of glucose and produces less energy, so it is less efficient.

91. Name the energy currency in living organisms.

Adenosine triphosphate (ATP)

92. Write the full form of ATP. How is it formed? How much energy it releases when broken down? What are its uses?

ATP stands for Adenosine Triphosphate

The energy released during respiration process is used to make an ATP molecule from ADP (adenosine diphosphate) and inorganic phosphate (P).

$$ADP + P \xrightarrow[\text{from respiration}]{\text{Energy}} ATP$$

When the terminal phosphate linkage in ATP is broken using water, the energy equivalent to 30.5kJ/mol is released.

ATP is the energy currency for most cellular processes. ATP is used to supply energy in the cells for contraction of muscles, protein synthesis, conduction of nerve impulse etc.

93. When does exchange of gases take place in plants?

At night, when there is no photosynthesis occurring, carbon dioxide elimination is the major exchange activity going on.

During the day, carbon dioxide generated during respiration is used up for photosynthesis; hence there is no carbon dioxide release. Oxygen release is the major event at day time.

94. Give reason: In plants, carbon dioxide elimination is a major exchange at night.

At night, there is no photosynthesis occurring. Hence carbon dioxide is the major exchange taking place.

95. Give reason: In plants, oxygen release is a major exchange during day time.

During the day, carbon dioxide generated during respiration is used up for photosynthesis; hence there is no release of carbon dioxide.

96. Give reason: The rate of breathing in aquatic organisms is much faster than that of terrestrial organisms.

Since the amount of dissolved oxygen is low compared to the amount of oxygen in the air, the rate of breathing in aquatic organisms is much faster than that that of terrestrial organisms.

97. Observe fish in an aquarium. They open and close their mouths and the gill-slits (or the operculum which covers the gill-slits) behind their eyes also open and close.

a) Are the timings of the opening and closing of the mouth and gill-slits coordinated in some manner?

b) Count the number of times the fish opens and closes its mouth in a minute.

c) Compare this to the number of times you breathe in and out in a minute.

a) The opening and closing of the mouth and gill-slits are well coordinated. When the mouth opens to engulf water, the gill-slits remain closed. When the mouth of the fish closes, release of water through the gill-slits takes place. This is to provide sufficient time for exchange of gases over the gills.

b) Opening and closing of mouth of fish varies according to the size, type etc.

c) The rate of breathing of fish in a minute is much faster than that of humans because oxygen dissolved in water is very less than the air.

98. Why are the organs which absorb oxygen placed inside the body in terrestrial organisms?

The organs which absorb oxygen have structures that increase the surface area which is in contact with oxygen-rich atmosphere. These structures are very fine and delicate. To protect these organs, they are usually placed within the body.

99. How does the nasal cavity help in respiration?

Nasal cavity has external nostrils through which air is drawn into nasal cavity. Nasal cavity has fine hairs which filter the dust particles for the air passing through it. The passage is also lined with mucus which moistens to avoid friction and trap dust particles.

100. Why do the walls of trachea not collapse when there is less air in it?

Trachea is supported by C-shaped rings of cartilage. So the walls of trachea do not collapse.

101. What are alveoli?

Within the lungs, the passage divides into smaller and smaller tubes which terminate in balloon-like structures which are called alveoli.

102. State the function of alveoli.

The alveoli provide a surface where the exchange of gases can take place.

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

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 $80m^2$ area. This large surface area makes the gaseous exchange more efficient.

104. Explain the mechanism of breathing in human beings.

When we breathe in, the ribs raise upward and outward. The diaphragm flattens. The chest cavity becomes larger. Air is sucked into the lungs and fills the expanded alveoli.

105. How is oxygen delivered from lungs to tissues?

Blood brings carbon dioxide from the rest of the body for release into the alveoli. The oxygen in the alveolar air is taken up by blood in the alveolar blood vessels to be transported to all the cells in the body.

106. Why do lungs always have residual volume of air?

The lungs always contain a residual volume of air so that there is sufficient time for oxygen to be absorbed and for the carbon dioxide to be released.

107. Give reason: Diffusion is not sufficient to meet the oxygen requirement of all the cells in multicellular organisms.

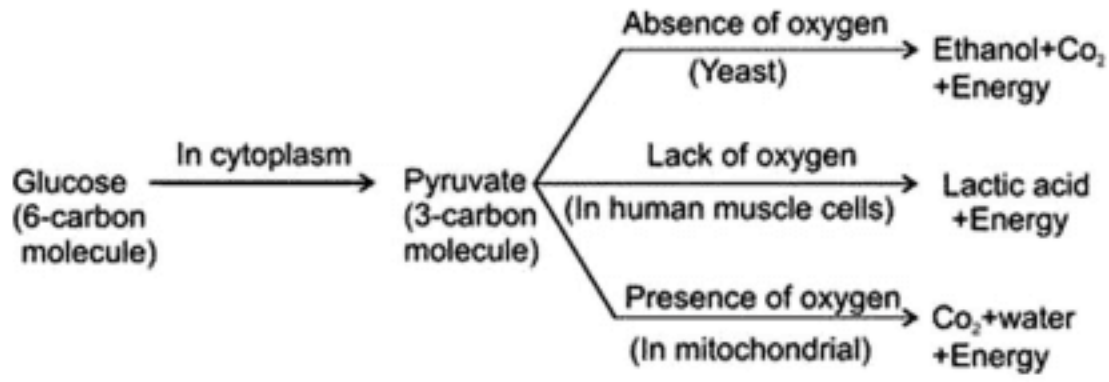
Multicellular organisms have large body size. Diffusion pressure alone cannot take care of oxygen delivery to all parts of the body efficiently and timely. Therefore there is a need of blood circulatory system.

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

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.

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

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.



(Break down of glucose by various pathways)

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.

110. How is oxygen and carbon dioxide transported in human beings?

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.

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

Haemoglobin is the respiratory pigment that transports oxygen to the body cells for cellular respiration. 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.

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

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.

113. Define transportation.

Transportation is the process by which the food and oxygen is carried from one organ to the other organs in the body.

114. Why is there a need for transport system in multi-cellular organisms?

Intake of food and oxygen are now taken up at one place in the body of the organisms, while all parts of the body need them. So there is a need for a transportation system for carrying food and oxygen from one place to another in the body.

115. What is blood plasma?

Blood consists of fluid medium called plasma

116. Write the function of plasma.

Plasma transports food, carbon dioxide and nitrogenous wastes in dissolved form.

117. Why heart has different chambers?

Oxygen and carbon dioxide have to be transported by the blood. To prevent the oxygen-rich blood from mixing with the blood containing carbon dioxide.

118. Why there is no mixing of deoxygenated and oxygenated blood in human heart?

There is no mixing of deoxygenated and oxygenated bloods in human heart due to the presence of inter-ventricular septum. This divided the ventricle into right and left to avoid mixing of blood.

119. Why ventricles have thicker muscular walls?

The ventricles have to pump blood into various organs, so they have thicker muscular walls than atria.

120. What is the advantage of separate channels in mammals and birds for oxygenated and deoxygenated blood?

OR

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

The separation of oxygenated and deoxygenated blood provides high oxygen supply to the organs. This is useful in animals that have high energy needs such as birds and mammals which constantly us energy to maintain their body temperature.

121. How is the transport system in amphibians and reptiles?

In amphibians and reptiles, the body temperature depends on the temperature in the environment. They have three-chambered hearts, and tolerate some mixing of the oxygenated and de-oxygenated blood streams.

122. How is the transport system in fishes?

Fishes have only two chambers to their hearts. The blood is pumped to the gills for getting oxygenated. Then it passes directly to the rest of the body. Blood goes only once through the heart in the fish during one cycle of passage through the body.

123. What is meant by single circulation?

The type of circulation in which blood flows through the heart only once is called single circulation.

124. What is meant by double circulation?

The type of circulation in which blood flows through the heart twice during each cycle is called double circulation.

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

Double circulation of blood is useful to keep oxygenated and deoxygenated blood from mixing. Separation allows a high efficient supply of oxygen to the body. This helps human beings to use energy to maintain constant body temperature.

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

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

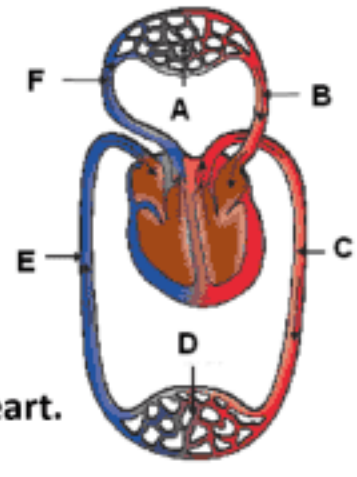
deoxygenated blood from the various body parts and sends this impure blood to the lungs for oxygenation. Being a fluid connective tissue, blood helps in the transport of oxygen, nutrients, CO_2, and nitrogenous wastes. The blood vessels (arteries, veins, and capillaries) carry blood either away from the heart to various organs or from various organs back to the heart.

127. Write the function of left auricle and left ventricle.

Left auricle is thin walled upper chamber. When the left auricle relaxes it collects oxygen rich blood from the lungs. When the left auricle contracts, it sends the oxygenated blood to the left ventricle.

Left ventricle relaxes when the left auricle contracts to receive oxygenated blood from the left auricle. When the left ventricle contracts blood is pumped out to the body.

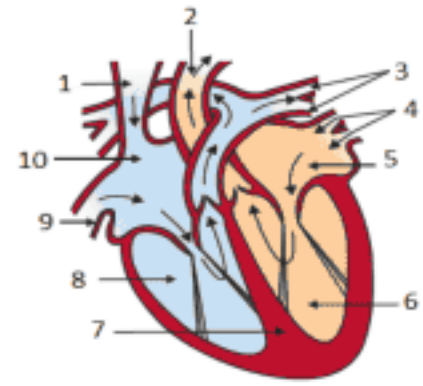
128. In the schematic representation of transport and exchange of oxygen and carbon dioxide. Identify the letters A through F



A – Lung capillaries B- Pulmonary vein from lungs
C –Aorta to body D – Capillaries in body organs
E – Vena cava from body
F – Pulmonary artery to lungs.

129. Draw a neat labelled diagram of the sectional view of human heart.

130. The diagram given below represents the human heart. Study the diagram and answer the questions that follow:



a) Label the parts 1 – 10

1 – Vena Cava; 2 – Aorta;

3 – Pulmonary arteries; 4 – Pulmonary veins;

5 – Left atrium; 6 – Left ventricle
7 – Septum; 8 – Right ventricle; 9 – Vena Cava,
10 – Right atrium

b) What type of blood flows through '2'?

Oxygenated

131. Give reason: Valves are present between the left atrium and left ventricle as well as right atrium and right ventricle.

Valves present between left atrium & left ventricle and right atrium & right ventricle allow the flow of blood only in one direction (atrium to ventricle) and prevent the back flow of blood from ventricle to atrium at the time of ventricular contraction.

132. What is blood pressure?

The force that blood exerts against the wall of a vessel is called blood pressure.

133. What is systole and diastole?

The contraction of heart is called systole. The relaxation of heart is called diastole.

134. What is systolic pressure?

The pressure of blood inside the artery during ventricular systole (contraction) is called systolic pressure.

135. What is diastolic pressure?

The pressure of blood inside the artery during ventricular diastole is called diastolic pressure.

136. State the normal human systolic and diastolic pressure.

The normal human systolic pressure is about 120mm of Hg and diastolic pressure is 80mm of Hg.

137. Name the instrument used to measure blood pressure.

Sphygmomanometer.

138. What is hypertension? What are its effects?

If the blood pressure is higher than the normal blood pressure it is referred to as hypertension. It can lead to the rupture of an artery and internal bleeding.

139. What is the cause of hypertension?

Hypertension is caused by the constriction of arterioles which results in increased resistance to blood flow.

140. List the three kinds of blood vessels of human circulatory system and write their function.

The three types of blood vessels are arteries, veins and capillaries.

Arteries	Veins	Capillaries
Arteries carry oxygenated blood from heart to various organs of the body.	Veins carry deoxygenated blood from various organs to heart.	Exchange of materials between blood and surrounding cells take place in the capillaries.
They have thick and elastic walls.	They are thin walled.	They are thin walled and extremely narrow tubes or blood vessels which connect arteries to veins.
They do not have valves.	They have valves to ensure that the blood flows only in one direction.	They do not have valves.

141. Why veins are not thick walled?

Veins need not be thick walled because the blood is no longer under pressure.

142. Why veins have valves?

Veins have valves to ensure that the blood flows only in one direction.

143. What are capillaries?

The smallest vessels have walls which are on-cell thick called capillaries.

144. Describe the mechanism of blood clotting.

Blood clotting is the mechanism that prevents the loss of blood at the site of an injury or wound by forming a blood clot. The blood has platelet cells which circulate around the body and plug these leaks by helping to clot the blood at these points of injury to prevent it from excessive bleeding.

145. What is lymph? How is it formed?

Lymph is a type of fluid that is colourless and involved in transportation. Lymph is formed when some amount of plasma, proteins and blood cells escape through the pores present in the walls of capillaries into intercellular spaces in the tissues.

146. Write the function of lymph.

Lymph carries digested and absorbed fat from intestine and drains excess fluid from extra cellular space back into the blood.

147. Distinguish between blood and lymph.

Blood	Lymph
Red in colour due to the presence of haemoglobin	Colourless due to the lack of haemoglobin.
Contains plasma, RBC, WBC and platelets.	Contains plasma and WBC only.
Transports materials from one organ to another in body.	Transports materials from tissue cells into the blood
The path of circulation of blood in heart is Arteries →capillaries →veins→heart	The path of circulation of lymph is tissue spaces →lymphatic capillaries →lymph vessels → veins.

148. How are water and minerals transported in plants?

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.

149. How is food transported in plants?

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.

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

Transport of materials in xylem	Transport of materials in phloem
1. Xylem tissue helps in the transport of water and minerals.	1. Phloem tissue helps in the transport of food.
2. Water is transported upwards from roots to all other plant parts.	2. Food is transported in both upward and downward directions.
3. Transport in xylem occurs with the help of simple physical forces such as transpiration pull.	3. Transport of food in phloem requires energy in the form of ATP.

151. Give reason: Plants have low energy needs.

Plants do not move and plant bodies have large proportion of dead cells in many tissues. So plants have low energy needs.

152. Give reason: Plants have relatively slow transport systems.

Plants have low energy needs so they can use relatively slow transport systems. The distances over which transport systems have to operate can be very large in plants such as very tall trees.

153. Diffusion will not be sufficient to provide raw materials in leaves and energy in roots in plants. Proper system of transport is essential. Explain.

Diffusion is a slow process compared to the need of leaves, roots and other parts. If the distance between leaves containing chlorophyll and roots in contact with soil is small, energy and raw materials can easily diffuse to all parts of plant body. In shrubs and trees, the distance becomes large. So diffusion process is not sufficient to provide raw materials in leaves and energy in roots. So a proper system of transport is essential.

154. Mention the two main components of the transport system in plants. State one function of these components.

Components of the transport system are xylem and phloem.

Xylem transports water and dissolved mineral to leaves and other parts of plant.

Phloem transports food and other products of photosynthesis from leaves to other parts of plant.

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

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.

156. Name the two kinds of cells of xylem.

The two types of cells of xylem are trachieds and vessels.

157. How does water move in plants?

At the roots, cells in contact with the soil actively take up ions. This creates a difference in the concentration of these ions between the root and the soil. Water moves into the root from the soil to eliminate this difference. There is steady movement of water into root xylem, creating a column of water that is steadily pushed upwards.

158. What is transpiration?

The loss of water in the form of vapour from the aerial parts of the plant is known as transpiration.

159. How does water move up in the tall tree?

If the plant has an adequate supply of water, the water which is lost through the stomata is replaced by water from the xylem vessels in the leaf. Evaporation of water molecules from the cells of a leaf creates a suction which pulls water from the xylem cells of roots. Transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves.

160. What is the function of transpiration?

a) Transpiration helps in the absorption and upward movement of water and minerals dissolved in it from roots to the leaves.

b) It helps in temperature regulation.

161. Give reason: Transpiration is a necessary evil.

Transpiration is the process by which land plants lose water. Plants absorb large amount of water and lose most of the water by transpiration. Transpiration helps the absorption and upward movement of water and dissolved mineral salts to the leaves.

162. What is the importance of root pressure for plants?

The effect of root pressure in transport of water is more important at night. During the day when the stomata are open, the transpiration pull becomes the major driving force in the movement of water in the xylem.

163. What is translocation?

The transport of soluble products of photosynthesis is called translocation. It occurs through phloem.

164. What is the function of phloem?

Phloem transports amino acids and other substances to storage organs of roots, fruits and seeds and to growing organs.

165. How does translocation take place?

Translocation of food and other substances takes place in the sieve tubes with the help of adjacent companion cells both in upward and downward directions. Translocation in

phloem is achieved by utilizing energy. Material like sucrose is transferred into phloem tissue using energy from ATP. This increases the osmatic pressure of the tissue causing water to move into it. This pressure moves the material in the phloem to tissues which have less pressure. This allows the phloem to move material according to the plant's needs.

166. Give an example to show how translocation supplies food to places where it is needed.

In the spring season, sugar stored in root or stem tissue would be transported to the buds which need energy to grow.

167. Define excretion.

The biological process involved in the removal of these harmful metabolic wastes from the body is called excretion.

168. How do unicellular organisms excrete waste?

Unicellular organisms remove wastes by simple diffusion from the body surface into the surrounding water.

169. Why is there a need for excretory system in multi-cellular organisms?

When chemical reactions use the carbon source and the oxygen for energy generation, they create by-products that are not only useless for the cells of the body, but also be harmful. These waste by-products are therefore needed to be removed from the body and discarded outside. Hence there is a need for excretory system.

170. What does the excretory system of human beings consist of?

The excretory system of human beings includes a pair of kidneys, a pair of ureters, a urinary bladder and a urethra.

171. Name the waste secreted by the kidneys.

Nitrogenous wastes such as urea or uric acid are removed from the blood in the kidneys.

172. What is nephron?

The large number of filtration units packed close together is called nephron.

173. Describe the structure of nephron.

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

174. Mention the stages in formation of urine.

Urine is formed in three stages:
a) Glomerular filtration b) Tubular reabsorption c) Tubular secretion.

175. What is the purpose of formation of urine?

The purpose of making urine is to filter out waste products from the blood.

176. What is glomerulus?

A branch of artery enters the Bowman's capsule breaks to form a network of capillaries called glomerulus.

177. How is urine produced in kidneys?

1. Nephrons are made up of a cluster of thin walled capillaries called glomerulus which is associated with a cup like structure called as Bowman's capsule and the long tube which terminates through this capsule.
2. The renal artery brings oxygenated blood to the kidneys along with the nitrogenous wastes like urea and uric acid and many other substances.
3. The blood gets filtered through the glomerulus and this filtrate enters the tubular part of nephron.
4. As this filtrate moves down the tubular part, glucose, amino acids, salts and excess of water gets selectively reabsorbed by the blood vessels surrounding these tubules.
5. The fluid now flowing in the tubular part is urine which gets collected in collecting ducts of nephrons.

178. Draw a neat diagram of a nephron and label

179. The given diagram represents a nephron. Label the parts 1 to 4.

1 – Collecting duct; 2 – Renal artery

3 – Bowman's Capsule; 4 – Glomerulus

180. What is Bowman's capsule?

Bowman's capsule is a cup-like sack at the beginning of the tubular component of a nephron in the human kidney.

181. What is Glomerular filtration?

The process in which filtration of substances like glucose, amino acids, salts and water from blood takes place when blood flows at high pressure into Bowman's capsule is called Glomerular filtration.

182. Write the substances that are selectively reabsorbed from the urine.

Glucose, amino acids, salts and water

183. On what factors does the amount of water re-absorbed depend?

The amount of water reabsorbed depends upon:

a) Amount of excess of water in the body.
b) Amount of dissolved wastes need to be excreted out.

184. What is meant by selective reabsorption?

The process in which useful and essential constituents like water, glucose, amino acids and salts from the Glomerular filtrate are reabsorbed back into blood is called selective reabsorption.

185. What will happen if there is not tubular reabsorption in the nephrons of kidney?

Tubular reabsorption helps in absorbing most of the nutrients. It helps in absorption of water, salts, glucose etc. If this does not occur, all the essential nutrients will be passed away with urine. The body will get dehydrated. Glucose will not be absorbed, so person feels weak.

186. Why is urine stored in the urinary bladder?

Urine is stored in the urinary bladder until the pressure of the expanded bladder leads to the urge to pass it out through the urethra.

187. Give reason: Urinary bladder is muscular.

The bladder is muscular and under nervous control so we can usually control the urge to urinate.

188. What are the causes for the reduction of activity of kidneys?

Infections, injury or restricted blood flow to kidneys reduce the activity of kidneys.

189. What are artificial kidneys? How do they work?

An artificial kidney is a device to remove nitrogenous waste products from the blood through dialysis.

Artificial kidneys contain a number of tubes with a semi-permeable lining, suspended in a tank filled with dialysing fluid. This fluid has the same osmotic pressure as blood, except that it does not have nitrogenous wastes. The patient's blood is passed through these tubes. During this passage, the waste products from the blood pass into dialysing fluid by diffusion. The purified blood is pumped back into the patient.

190. What is dialysis?

Dialysis is the process used in artificial kidney to remove nitrogenous wastes from the body.

191. What is the average output of urine in normal man?

The volume actually excreted is only a litre or two a day.

192. How is the amount of urine produced regulated?

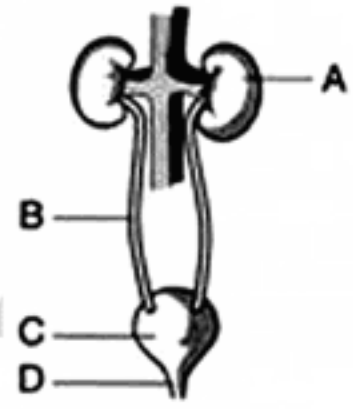
The amount of urine produced depends on the amount of excess water and dissolved wastes present in the body. Some other factors such as habitat of an organism and hormone such as Anti-diuretic hormone (ADH) also regulates the amount of urine produced.

193. Draw a neat diagram of the human excretory system and label the following parts:
a) part in which urine is produced. **b) Part which stores the urine.**
c) Part which connects a) and b) **d) part from which urine is passed out.**

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

ALVEOLI	NEPHRON
Structure	
(i) Alveoli are tiny balloon-like structures present inside the lungs. (ii) The walls of the alveoli are one cell thick and it contains an extensive network of blood capillaries.	(i) Nephrons are tubular structures present inside the kidneys. (ii) Nephrons are made of glomerulus, bowman's capsule, and a long renal tube. It also contains a cluster of thin-walled capillaries.
Function	
(i) The exchange of O_2 and CO_2 takes place between the blood of the capillaries that surround the alveoli and the gases present in the alveoli. (ii) Alveoli are the site of gaseous exchange.	i) Remove nitrogenous wastes. ii) Selectively reabsorb glucose, amino acids and water.

195. The diagram below represents urinary system in the human body. Identify the structure through which urine leaves the urinary bladder.



Urine leaves the urinary bladder through urethra which is labelled as D

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

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. Plants also excrete some waste substances into the soil around them.

Fill in the blanks:

1) The maintenance job of living organisms is called life processes.
2) Most of the food sources are carbon-based.
3) The energy for maintenance processes comes from nutrition.
4) The source of energy and materials is the food we eat.
5) The bio-catalysts used by organisms to achieve breaking down of complex substances are enzymes.
6) Carbon and energy requirements of the autotrophic organism are fulfilled by photosynthesis.
7) The form in which carbohydrates are stored in plants is starch.
8) The organisms which use carbon dioxide and water for making food is autotrophs.
9) The solution used to test the presence of starch is iodine.
10) The site of photosynthesis is chloroplasts.
11) The raw material that is made available to plants for photosynthesis when stomata are open is carbon dioxide.
12) The group of plants in which stomata remain closed during the day is desert plants.
13) Plants obtain carbon dioxide through stomata.
14) The tiny pores present on the leaves are called stomatal pore.
15) The opening and closing of the pore is controlled by guard cells.
16) The bean shaped cells present on either side of stomatal pores is guard cells.
17) The chemical used to absorb carbon dioxide in the experiment to show carbon dioxide is necessary for photosynthesis is potassium hydroxide.
18) The element essential in plants to synthesize proteins and other compounds is nitrogen.
19) The type of nutrition in which organisms are dependent on other organisms for their food requirements is called heterotrophic nutrition.
20) Organisms that break-down the food materials outside the body and then absorb it are called saprophytes.
21) An example of saprophyte is bread moulds/yeast/mushroom.
22) The type of nutrition in which organisms take in whole material and break it down inside their body is called holozoic nutrition.

23) An example of organism with holozoic nutrition is rabbit/lion/man.
24) The type of nutrition in which organisms derive nutrition from plants and animals without killing them is called parasitic nutrition.
25) An example of a parasite is tapeworm/Cuscuta.
26) The enzyme present in saliva is salivary amylase.
27) Salivary amylase breaks down starch into sugar.
28) The biocatalysts which break food into smaller molecules are enzymes.
29) The food is taken to the stomach through the oesophagus.
30) The exit of food from the stomach is regulated by sphincter muscle.
31) The site of complete digestion of carbohydrates, proteins and fats is small intestine.
32) The acidic food received from the stomach made alkaline in the small intestine by bile juice.
33) The enzyme which acts on the fats in the small intestine is bile juice.
34) The enzyme present in pancreatic juice is trypsin and lipase.
35) The enzyme which helps in digesting of proteins is trypsin.
36) The enzyme which helps in breaking down emulsified fats is lipase.
37) The inner lining of the small intestine has numerous finger like projections called villi.
38) Digestion of fat takes place in small intestine.
39) The final product after digestion of carbohydrates is glucose.
40) The final product after digestion of proteins is amino acids.
41) The breakdown of glucose to pyruvate takes place in cytoplasm.
42) Aerobic respiration pathway depends on oxygen.
43) The major exchange activity of plants during night time is carbon dioxide elimination.
44) The major exchange activity of plants during day time is oxygen release.
45) The blood vessel that brings oxygenated blood to the human heart is pulmonary vein.
46) The chamber of human heart that receives oxygenated blood is Left auricle.
47) The normal human blood pressure is 120/80 mm of Hg.
48) The instrument used to measure the human blood pressure is Sphygmomanometer.
49) The force exerted against the walls of a blood vessel is called blood pressure.
50) Blood pressure is greater in arteries than in veins.
51) The pressure of blood inside the artery during ventricular contraction is called systolic pressure.
52) The pressure of blood inside the artery during ventricular relaxation is called diastolic pressure.
53) The vessels which carry blood away from the heart to various organs is arteries.
54) Arteries have thick elastic walls.
55) The vessel which collects blood from different organs and brings it back to heart is veins.
56) The smallest vessels that have walls which are one-cell thick are called capillaries.
57) The cells that help in clotting of blood are platelets.

58) For plants, the nearest and richest source of raw materials is soil.

Multiple choice Questions:

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

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

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.

3. The autotrophic mode of nutrition requires:

(a) carbon dioxide and water. (b) chlorophyll.

(c) sunlight. **(d) all of the above.**

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

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

5. Which of the following statements about the autotrophs is incorrect?

(a) They synthesise carbohydrates from carbon dioxide and water in the presence of sunlight and chlorophyll

(b) They store carbohydrates in the form of starch

(c) They convert carbon dioxide and water into carbohydrates in the absence of sunlight

(d) They constitute the first trophic level in food chains

6. In which of the following groups of organisms, food material is broken down outside the body and absorbed?

(a) Mushroom, green plants, Amoeba **(b) Yeast, mushroom, bread mould**

(c) Paramecium, Amoeba, Cuscuta (d) Cuscuta, lice, tapeworm

7. Select the correct statement

(a) Heterotrophs do not synthesise their own food

(b) Heterotrophs utilise solar energy for photosynthesis

(c) Heterotrophs synthesise their own food

(d) Heterotrophs are capable of converting carbon dioxide and water into carbohydrates

8. Which is the correct sequence of parts in human alimentary canal?

(a) Mouth → stomach → small intestine → oesophagus → large intestine

(b) Mouth →oesophagus → stomach → large intestine → small intestine

(c) Mouth → stomach → oesophagus → small intestine → large intestine

(d) Mouth → oesophagus → stomach → small intestine → large intestine

9. If salivary amylase is lacking in the saliva, which of the following events in the mouth cavity will be affected?

(a) Proteins breaking down into amino acids **(b) Starch breaking down into sugars**

(c) Fats breaking down into fatty acids and glycerol (d) Absorption of vitamins

10. The inner lining of stomach is protected by one of the following from hydrochloric acid. Choose the correct one

(a) Pepsin **(b) Mucus** (c) Salivary amylase (d) Bile

11. Which part of alimentary canal receives bile from the liver?

(a) Stomach **(b) Small intestine** (c) Large intestine (d) Oesophagus

12. A few drops of iodine solution were added to rice water. The solution turned blue-black in colour. This indicates that rice water contains

(a) complex proteins (b) simple proteins (c) fats **(d) starch**

13. In which part of the alimentary canal food is finally digested?

(a) Stomach (b) Mouth cavity (c) Large intestine **(d) Small intestine**

14. Choose the function of the pancreatic juice from the following

(a) trypsin digests proteins and lipase carbohydrates

(b) trypsin digests emulsified fats and lipase proteins

(c) trypsin and lipase digest fats

(d) trypsin digests proteins and lipase emulsified fats

15. When air is blown from mouth into a test-tube containing lime water, the lime water turned milky due to the presence of

(a) oxygen **(b) carbon dioxide** (c) nitrogen (d) water vapour

16. The correct sequence of anaerobic reactions in yeast is:

(a) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Ethanol + Carbondioxide

(b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Lactic acid

(c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ Lactic acid

(d) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{cytoplasm}}$ Ethanol + Carbondioxide

17. Which of the following is most appropriate for aerobic respiration?

(a) Glucose $\xrightarrow{\text{mitochondria}}$ Pyruvate CO_2+H_2O+ Energy

(b) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate $\xrightarrow{\text{mitochondria}}$ CO_2+H_2O+ Energy

(c) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ CO_2+H_2O

(d) Glucose $\xrightarrow{\text{cytoplasm}}$ Pyruvate + Energy $\xrightarrow{\text{mitochondria}}$ CO_2+H_2O+ Energy

18. Which of the following statement(s) is (are) true about respiration?

(i) During inhalation, ribs move inward and diaphragm is raised

(ii) In the alveoli, exchange of gases takes place i.e., oxygen from alveolar air diffuses into blood and carbon dioxide from blood

into alveolar air

(iii) Haemoglobin has greater affinity for carbon dioxide than oxygen

(iv) Alveoli increase surface area for exchange of gases

(a) (i) and (iv) (b) (ii) and (iii) (c) (i) and (iii) **(d) (ii) and (iv)**

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

(a) Nostrils → larynx → pharynx → trachea → lungs

(b) Nasal passage → trachea → pharynx → larynx → alveoli

(c) larynx → nostrils → pharynx → lungs

(d) Nostrils → pharynx → larynx → trachea → alveoli

20. During respiration exchange of gases take place in

(a) trachea and larynx **(b) alveoli of lungs**

(c) alveoli and throat (d) throat and larynx

21. Which of the following statement (s) is (are) true about heart?

(i) Left atrium receives oxygenated blood from different parts of body while right atrium receives deoxygenated blood from lungs

(ii) Left ventricle pumps oxygenated blood to different body parts while right ventricle pumps deoxygenated blood to lungs

(iii) Left atrium transfers oxygenated blood to right ventricle which sends it to different body parts

(iv) Right atrium receives deoxygenated blood from different parts of the body while left ventricle pumps oxygenated blood to different parts of the body

(a) (i) (b) (ii) **(c) (ii) and (iv)** (d) (i) and (iii)

22. What prevents backflow of blood inside the heart during contraction?

(a) Valves in heart (b) Thick muscular walls of ventricles

(c) Thin walls of atria (d) All of the above

23. Single circulation i.e., blood flows through the heart only once during one cycle of passage through the body, is exhibited by

(a) Labeo, Chameleon, Salamander **(b) Hippocampus, Exocoetus, Anabas**

(c) Hyla, Rana, Draco (d) Whale, Dolphin, Turtle

24. In which of the following vertebrate group/groups, heart does not pump oxygenated blood to different parts of the body?

(a) Pisces and amphibians (b) Amphibians and reptiles

(c) Amphibians only **(d) Pisces only**

25. Choose the correct statement that describes arteries.

(a) They have thick elastic walls, blood flows under high pressure; collect blood from different organs and bring it back to the heart

(b) They have thin walls with valves inside, blood flows under low pressure and carry blood away from the heart to various organs of the body

(c) They have thick elastic walls, blood flows under low pressure; carry blood from the heart to various organs of the body

(d) They have thick elastic walls without valves inside, blood flows under high pressure and carry blood away from the heart to different parts of the body.

26. The filtration units of kidneys are called:

(a) ureter (b) urethra (c) neurons **(d) nephrons**

27. Oxygen liberated during photosynthesis comes from

(a) water (b) chlorophyll (c) carbon dioxide (d) glucose

28. The blood leaving the tissues becomes richer in

(a) carbon dioxide (b) water (c) haemoglobin (d) oxygen

29. Which of the following is an incorrect statement?

(a) Organisms grow with time

(b) Organisms must repair and maintain their structure

(c) Movement of molecules does not take place among cells

(d) Energy is essential for life processes

30. The internal (cellular) energy reserve in autotrophs is

(a) glycogen (b) protein **(c) starch** (d) fatty acid

31. Which of the following equations is the summary of photosynthesis?

(a) $6CO_2 + 12H_2O \rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$

(b) $6CO_2 + H_2O$ + Sunlight$\rightarrow C_6H_{12}O_6 + O2 + 6H_2O$

(c) $6CO_2 + 12H_2O$ + Chlorophyll + Sunlight$\rightarrow C_6H_{12}O_6 + 6O_2 + 6H_2O$

(d) $6CO_2 + 12H_2O$ + Chlorophyll + Sunlight$\rightarrow C_6H_{12}O_6 + 6CO_2 + 6H_2O$

32. Choose the event that does not occur in photosynthesis

(a) Absorption of light energy by chlorophyll

(b) Reduction of carbon dioxide to carbohydrates

(c) Oxidation of carbon to carbon dioxide

(d) Conversion of light energy to chemical energy

33. The opening and closing of the stomatal pore depends upon

(a) oxygen (b) temperature

(c) water in guard cells (d) concentration of CO2 in stomata

34. Choose the forms in which most plants absorb nitrogen

(i) Proteins (ii) Nitrates and Nitrites

(iii) Urea (iv) Atmospheric nitrogen

(a) (i) and (ii) **(b) (ii) and (iii)** (c) (iii) and (iv) (d) (i) and (iv)

35. Which is the first enzyme to mix with food in the digestive tract?

(a) Pepsin (b) Cellulose **(c) Amylase** (d) Trypsin

36. Which of the following statement(s) is (are) correct?

(i) Pyruvate can be converted into ethanol and carbon dioxide by yeast

(ii) Fermentation takes place in aerobic bacteria

(iii) Fermentation takes place in mitochondria

(iv) Fermentation is a form of anaerobic respiration

(a) (i) and (iii) (b) (ii) and (iv) **(c) (i) and (iv)** (d) (ii) and (iii)

37. Lack of oxygen in muscles often leads to cramps among cricketers. This results due to

(a) conversion of pyruvate to ethanol

(b) conversion of pyruvate to glucose

(c) non conversion of glucose to pyruvate

(d) conversion of pyruvate to lactic acid

38. Choose the correct path of urine in our body

(a) kidney → ureter → urethra → urinary bladder

(b) kidney → urinary bladder → urethra → ureter

(c) kidney → ureters → urinary bladder → urethra

(d) urinary bladder → kidney → ureter → urethra

39. During deficiency of oxygen in tissues of human beings, pyruvic acid is converted into lactic acid in the

(a) cytoplasm (b) chloroplast (c) mitochondria (d) golgi body

Match the following:

Column I	Column II
1. Anaerobic respiration	a. Auricles
2. Holozoic nutrition	b. Bacteria
3. Bicuspid valve	c. Paramoecium
4. Semi-lunar valves	d. Left auricle and right ventricle
5. Thin walled	e. Veins

Column I	Column II
1. The red colour of human blood	a. Chlorophyll
2. The pigment which absorbs solar energy	b. Heart
3. Carrier of oxygen	c. Hemoglobin
4. Pumping organ of the body	d. RBC

Column I	Column II
1. The tissues transporting water is plants	a. Chloroplast
2. Translocation of food	b. Phloem
3. Glomerulus	c. Xylem
4. Main site of photosynthesis	d. A part of nephron

Column I	Column II
1. Pulmonary artery	a. oxygenated blood
2. Pulmonary vein	b. Exchange of substances
3. Aorta	c. Supplies blood to body tissues/parts
4. Capillary	d. deoxygenated blood

Column I	Column II
1. Insects	a. Gills
2. Earthworm	b. Trachea
3. Fishes	c. Lungs
4. Mammals	d. Skin

Column I	Column II
1. Anaerobic oxidation of glucose	a. 2 ATP
2. Aerobic oxidation of glucose	b. Ethyl alcohol
3. End product of fermentation	c. 38 ATP
4. Anaerobic muscular respiration	d. Lactic acid

Column I	Column II
1. Epiglottis	a. Blood coagulation
2. Platelets	b. Sphygmomanometer
3. Instrument used to check normal activities of heart	c. Electro cardiograph
4. Instrument used to measure blood pressure of human heart	d. Covers wind pipe while swallowing food