Life Processes

Previous Years' CBSE Board Questions

1. In a nerve cell, the site where the electrical impulse is converted into a chemical signal is known as: (2024)
(a) Axon
(b) Dendrites
(c) Neuromuscular junction
(d) Cell body

Answer. (c) /Neuromuscular junction

2. The length of small intestine in a deer is more as compared to the length of small intestine of a tiger. The reason for this is (2024)
(a) mode of intake of food
(b) type of food consumed
(c) presence or absence of villi in intestines
(d) presence or absence of digestive enzymes.

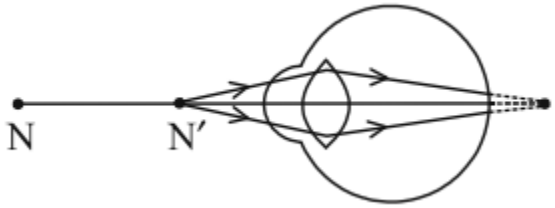
3. Assertion (A): The rate of breathing in aquatic organisms is much faster than in terrestrial organisms. (2024)
Reason (R): The amount of oxygen dissolved in water is very high as compared to the amount of oxygen in air.

Answer. (c) /Assertion (A) is true, but Reason (R) is false.

4. State one role of each of the following in human digestive system: (2024)
(i) Hydrochloric acid
(ii) Villi
(iii) Anal Sphincter
(iv) Lipase

Answer. Role of: (i) Hydrochloric acid: Creates an acidic medium for facilitating the action of enzyme / kills microorganisms.
(ii) Villi: Increases the surface area for absorption of digested food.
(iii) Anal Sphincter: Exit of waste material from anus is regulated.
(iv) Lipase: Breakdown / digestion of emulsified fats or lipids

5. Study the diagram given below and answer the questions that follow: (2024)

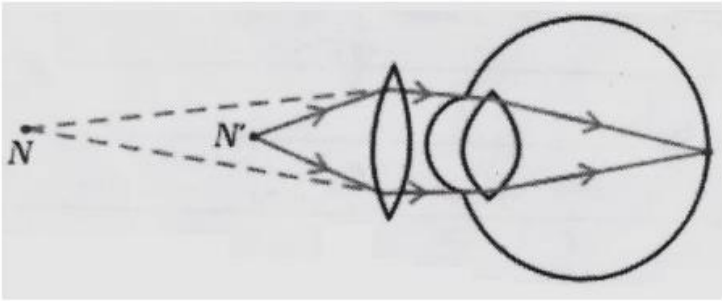


(i) Name the defect of vision represented in the diagram. Give reason for your answer.
(ii) List two causes of this defect.
(iii) With the help of a diagram show how this defect of vision is corrected.

Answer. (i) Hypermetropia or Far-sightedness.
Reason – Image is formed behind the retina. / Near point for the person is farther away from the normal near point (25 cm)

(ii) • Focal length of the eye lens is too long.
• The eyeball has become too small.

(iii)



N = Near point of a hypermetropic eye
N'= Near point of a normal eye

5.2 Nutrition

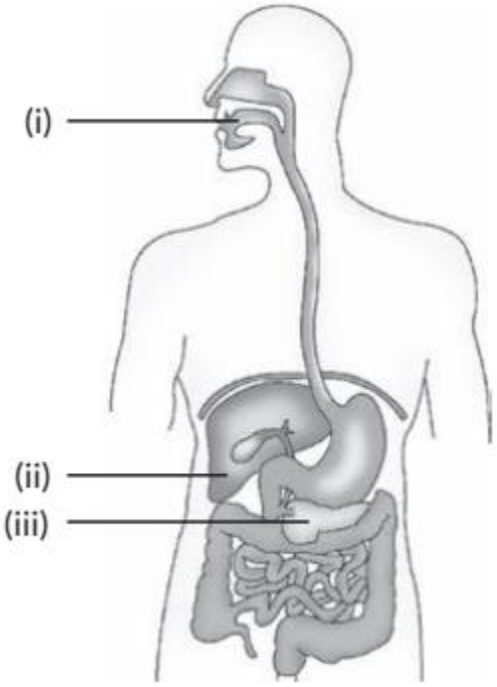
MCQ

1. Opening and closing of stomata is due to
(a) high pressure of gases inside the cells
(b) movement of water in and out of the guard cells
(c) stimulus of light in the guard cells
(d) diffusion of CO2 in and out of the guard cells. (2023)

2. Assertion (A): The inner walls of the small intestine have finger like projections called villi which are rich in blood.
Reason (R): These villi have a large surface area to help the small intestine in completing the digestion of food.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true and (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true. (2023)

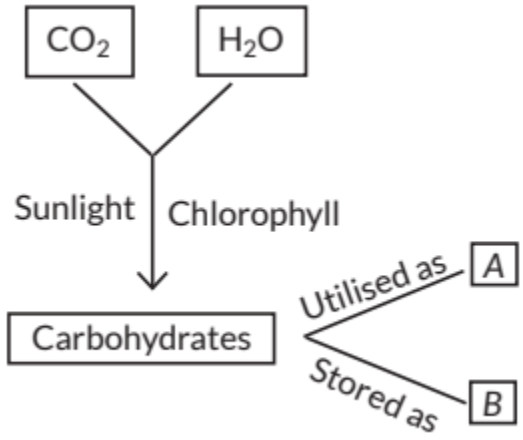
3. Water in the root enters due to
(a) the function of the root to absorb water
(b) difference in the concentration of ions between the root and the soil
(c) excess water present in the soil
(d) diffusion of water in the roots. (2023)

4. In human alimentary canal, the specific enzyme/ juice secreted in locations (i), (ii) and (iii) are



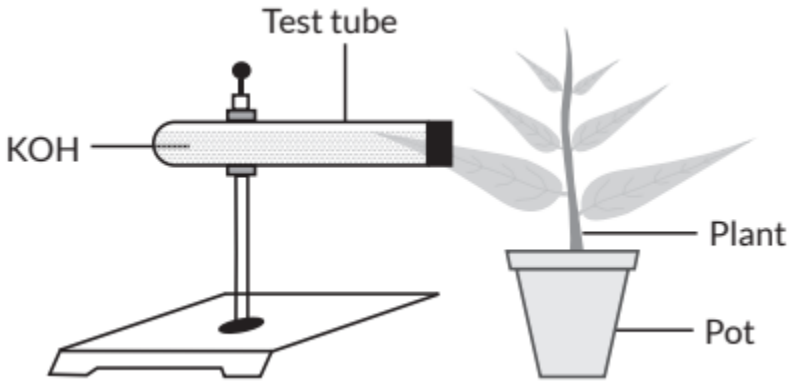
(a) (i) Amylase (ii) Pepsin (iii) Bile
(b) (i) Amylase (ii) Bile (iii) Trypsin
(c) (i) Lipase (ii) Bile (iii) Pepsin
(d) (i) Trypsin (ii) Amylas (iii) Amylase. (Term I, 2021-22) R

5. In the following flow chart showing autotrophic nutrition in green plants, A and B respectively are



(a) oxygen and energy
(c) energy and starch
(b) starch and oxygen
(d) oxygen and water. (Term I, 2021-22)

6. Read the following and answer the questions from 6(i) to 6(iv).
Take a healthy potted plant with elongated leaves. Select a leaf and insert about one half of this leaf in a test tube containing KOH and make it air tight. Place the set-up in sun for two hours. Take out the leaf from the test tube and dip it in boiling water for a few minutes. Put this leaf in a beaker with alcohol and boil it in a water bath. Wash the leaf with water and then dip the leaf in iodine solution for a few minutes. The portion of the leaf dipped in KOH solution will not show any change when dipped in iodine solution.



(i) The function of KOH taken in the test tube is to absorb
(a) released water vapours

(b) released CO_2
(c) released O_2
(d) chlorophyll.

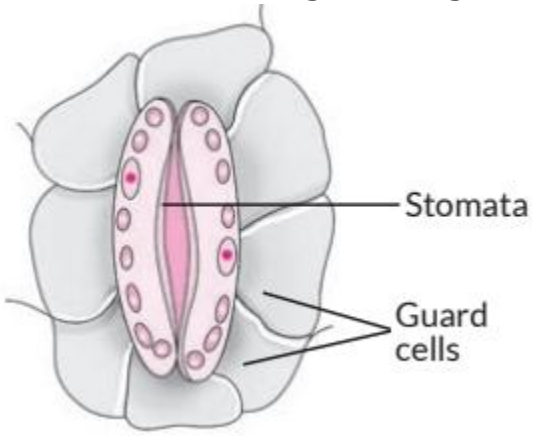
(ii) On the basis of this activity, we may conclude that the factor for photosynthesis is
(a) carbon dioxide
(c) chlorophyll
(b) oxygen
(d) water vapour.

(iii) The event that does not occur in photosynthesis is
(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.

(iv) Iodine solution gives blue-black colour with
(a) starch
(b) proteins
(c) glucose
(d) fats. (Term I, 2021-22)

7. The correct statements with reference to single celled organisms are
(i) complex substances are not broken down into simpler substances
(ii) simple diffusion is sufficient to meet the requirement of exchange of gases
(iii) specialised tissues perform different functions in the organism
(iv) entire surface of the organism is in contact with the environment for taking in food.
(a) (i) and (iii)
(c) (ii) and (iv)
(b) (ii) and (iii)
(d) (i) and (iv). (Term I, 2021-22)

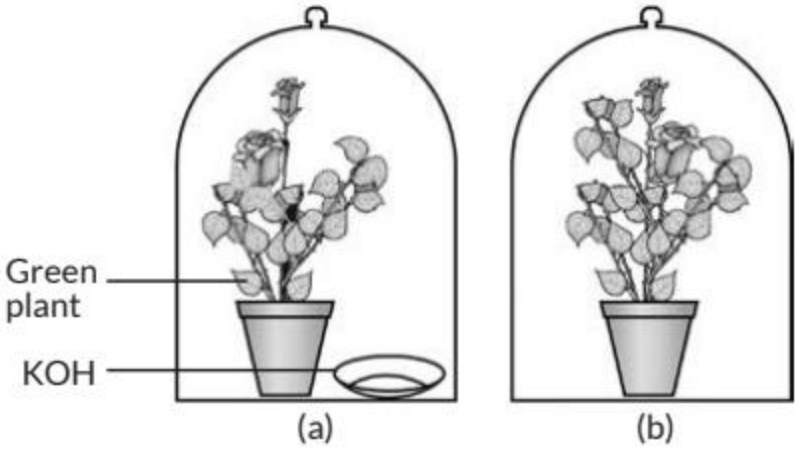
8. Which one of the following conditions is true for the state of stomata of a green leaf shown in the given diagram?



(a) Large amount of water flows into the guard cells.
(b) Gaseous exchange is occurring in large amount.
(c) Large amount of water flows out from the guard cells.
(d) Large amount of sugar collects in the guard cells. (Term I, 2021-22)

9. Assertion (A): Nitrogen is an essential element for plant growth and is taken up by plants in the form of inorganic nitrates or nitrites.
Reason (R): The soil is the nearest and richest source of raw materials like nitrogen, phosphorus and other minerals for the plants.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true. (Term I, 2021-22)

10. A student was asked to write a stepwise procedure to demonstrate that carbon dioxide is necessary for photosynthesis. He wrote the following steps. The wrongly worded step is



(a) both potted plants are kept in dark room for at least three days
(b) bottom of the bell jars is sealed to make them air tight
(c) both potted plants are kept in sunlight after the starch test
(d) a leaf from both the plants is taken to test the presence of starch. (Term I, 2021-22)

11. The length of small intestine in a deer is more as compared to the length of small intestine of a tiger. The reason for this is
(a) mode of intake of food
(b) type of food consumed
(c) presence or absence of villi in intestines
(d) presence or absence of digestive enzymes. (Term I, 2021-22)

12. Most of the digestion and absorption of the food takes place in the
(a) small intestine
(b) liver
(c) stomach
(d) large intestine. (2020)

VSA (1 mark)

13. Name an enzyme present in pancreatic juice. (2019 C)

14. What causes movement of food inside the alimentary canal in human beings? (2019 C)

15. Mention the raw materials required for photosynthesis. (NCERT, Board Term 1, 2016)

16. State the location and function of gastric glands. (Board Term 1, 2014)

SAI (2 marks)

17. Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that plant kept in dark could not survive longer. Give reason for this observation. (2023) (U

18. List the events in proper sequence that takes place during the process of photosynthesis. (2023) R

19. Name the glands present in the wall of the stomach that release secretions for digestion of food. Write the three components of secretion that are released by these glands. (Board Term 1, 2014)

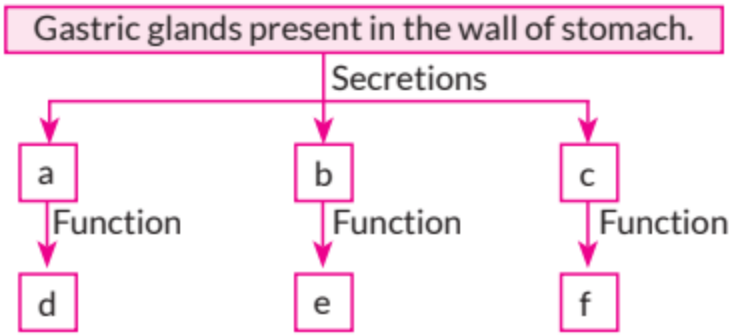
SA II (3 marks)

20. (i) How does Paramecium obtain its food?
(ii) List the role of each of the following in our digestive system:
(a) Hydrochloric acid
(b) Trypsin
(c) Muscular walls of stomach
(d) Salivary amylase (2023)

21. (a) With the help of an activity, explain the action of saliva on the food we eat.
(b) Why is bile juice important in the process of digestion? (2023)

22. In the human body the site of absorption of digested food is the small intestine. How is the process of absorption carried out and why is absorption of digested food necessary? (2020 C)

23. Complete the following flow chart as per the given instructions.



(2020) Ap

24. (a) State the role played by the following in the process of digestion:
(i) Enzyme trypsin
(ii) Enzyme lipase
(b) List two functions of finger-like projections present in the small intestine. (2020)

25. (a) Write the function of the following in the human alimentary canal:
(i) Saliva
(ii) HCl in stomach
(iii) Bile juice
(iv) Villi
(b) Write one function each of the following enzymes :
(i) Pepsin
(ii) Lipase (2019)

26. Explain the significance of photosynthesis. Write the balanced chemical equation involved in the process. (Board Term 1, 2017)

27. Differentiate between autotrophs and hetero- trophs and give one example of each. (NCERT Exemplar, Board Term 1, 2017)

28. Explain with the help of neat and well labelled diagrams the different steps involved in nutrition in Amoeba. (Board Term 1, 2015)

LA (5 marks)

29. (a) Why is nutrition necessary for the human body?
(b) What causes movement of food inside the alimentary canal?
(c) Why is small intestine in herbivores longer than in carnivores?

(d) What will happen if mucus is not secreted by the gastric glands? (NCERT Exemplar, 2020)

30. (a) State the form in which the following are stored:
(i) Unused carbohydrates in plants.
(ii) The energy derived from food in humans.
(b) Describe the process of nutrition in Amoeba with the help of diagram. (NCERT Exemplar, Board Term 1, 2016)

5.3 Respiration

MCQ

31. As compared to terrestrial organisms, the rate of breathing in aquatic organism is
(a) faster because they need more oxygen for their survival
(b) faster because the amount of dissolved oxygen in water is fairly low
(c) slower because the amount of dissolved oxygen in water is fairly low
(d) slower because the capacity of water of dissolving atmospheric air is limited (2023)

32. The sequence of anaerobic respiration in our muscle cells during heavy exercise is

(a) $\text{Glucose} \xrightarrow{\text{Cytoplasm}} \text{Pyruvate} \xrightarrow{\text{Muscle cells}} \text{Lactic acid} + \text{Energy}$

(b) $\text{Glucose} \xrightarrow{\text{Mitochondria}} \text{Pyruvate} \xrightarrow{\text{Muscle cells}} \text{Carbon dioxide} + \text{Water}$

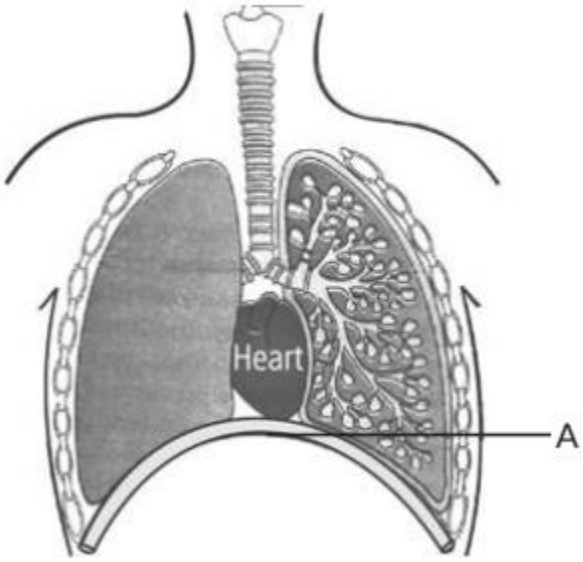
(c) $\text{Glucose} \xrightarrow{\text{Cytoplasm}} \text{Pyruvate} \xrightarrow{\text{Muscle cells}} \text{Ethanol} + \text{Carbon dioxide}$

(d) $\text{Glucose} \xrightarrow{\text{Mitochondria}} \text{Pyruvate} \xrightarrow{\text{Muscle cells}} \text{Ethanol} + \text{Lactic acid}$. *(Term I, 2021-22)* R

33. The energy released during cellular respiration is used to synthesise
(a) ribosomes
(b) RBC

(c) ATP
(d) mitochondria. (Term I, 2021-22)

34. Which of the following statements are correct in reference to the role of A (shown in the given diagram) during a breathing cycle in human beings?



(i) It helps to decrease the residual volume of air in lungs.
(ii) If flattens as we inhale.
(iii) It gets raised as we inhale.
(iv) It helps the chest cavity to become larger.
(a) (ii) and (iv)
(c) (i) and (ii)
(b) (iii) and (iv)
(d) (i), (ii) and (iv) (Term I, 2021-22)

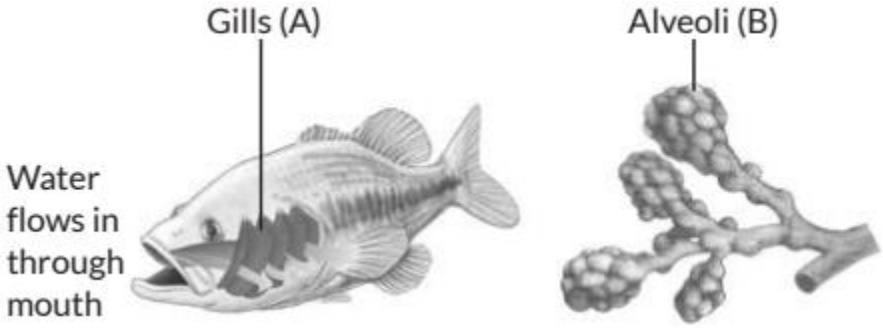
35. Assertion (A): The rate of breathing in aquatic organisms is much slower than that seen in terrestrial organisms.
Reason (R): The amount of oxygen dissolved in water is very low as compared to the amount of oxygen in air.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true. (Term I, 2021-22)

36. Assertion (A): In human beings, when air is taken into the body through the nostrils and passed through the throat, the air passage does not collapse.
Reason (R): Rings of cartilage present in the throat ensure that the air passage does not collapse.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true, but (R) is false.
(d) (A) is false, but (R) is true. (2021C)

37. The function of the lining of mucus in the nasal passage of human beings is to
(a) increase the temperature of inhaled air
(b) move the air in and out
(c) filter the air that we breathe in
(d) absorb oxygen from the air. (Term I, 2021-22)

38. In living organisms during respiration which of the following products are not formed if oxygen is not available?
(a) Carbon dioxide + Water
(b) Carbon dioxide + Alcohol
(c) Lactic acid + Alcohol
(d) Carbon dioxide + Lactic Acid (Term 1, 2021-22)

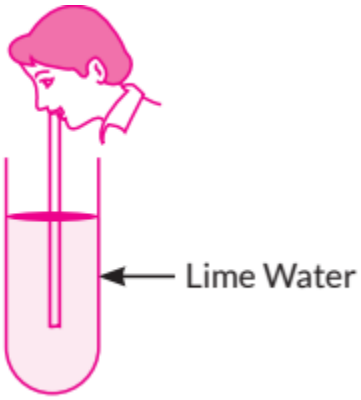
39. Respiratory structures of two different animals-a fish and a human being are shown. Observe (A) and (B) and select one characteristic that holds true for both of them.



(a) Both are placed internally in the body of animal.
(b) Both have thin and moist surface for gaseous exchange.
(c) Both are poorly supplied with blood vessels to conserve energy.
(d) In both the blood returns to the heart after being oxygenated.

(Term I, 2021-22)

40. Observe the diagram of an activity given below. What does it help to conclude, when the person exhales into the test-tube?



(a) Percentage of carbon dioxide is more in inhaled air.
(b) Fermentation occurs in the presence of oxygen.
(c) Percentage of carbon dioxide is more in the exhaled air.
(d) Fermentation occurs in the presence of carbon dioxide. (Term I, 2021-22)

41. Anaerobic process
(a) takes place in yeast during fermentation
(b) takes place in the presence of oxygen
(c) produces only energy in the muscles of human beings
(d) produces ethanol, oxygen and energy. (2020)

VSA (1 mark)

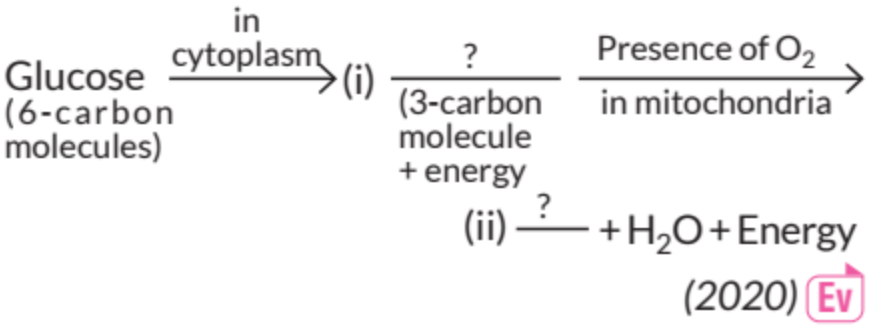
42. Diffusion is insufficient to meet the oxygen requirement of multicellular organisms like human. State reason. (NCERT, Board Term I, 2017)

SAI (2 marks)

43. Write two different ways in which glucose is oxidised to provide energy in human body. Write the products formed in each case. (Delhi 2019)

SA II (3 marks)

44. (a) In the process of respiration, state the function of alveoli.
(b) Rate of breathing in aquatic organisms is much faster than that in terrestrial organisms. Give reasons.
(c) Complete the following pathway showing the breakdown of glucose.



(2020) Ev

45. Explain the ways in which glucose is broken down in absence or shortage of oxygen. (2019)

46. Write three points of difference between breathing and respiration. (Board Term 1, 2016)

47. Draw a flow chart to show the breakdown of glucose by various pathways. (NCERT Exemplar, Board Term 1, 2016)

48. Write three respiration in plants and respiration in animals. points of difference between (Board Term I, 2014)

LA (5 marks)

49. (a) Why is there a difference in the rate of breathing between aquatic organisms and terrestrial organisms? Explain.
(b) Draw a diagram of human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it. (2020)

50. In the experimental set up to show that "CO2 is given out during respiration", name the substance taken in the small test tube kept in the conical flask. State its function and the consequence of its use. (2019)

51. (a) State reasons for the following:
(i) Herbivores need a longer small intestine while carnivores have shorter small intestine.
(ii) The lungs are designed in human beings to maximise the area for exchange of gases.
(b) The rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms. (NCERT Exemplar, Board Term I, 2016)

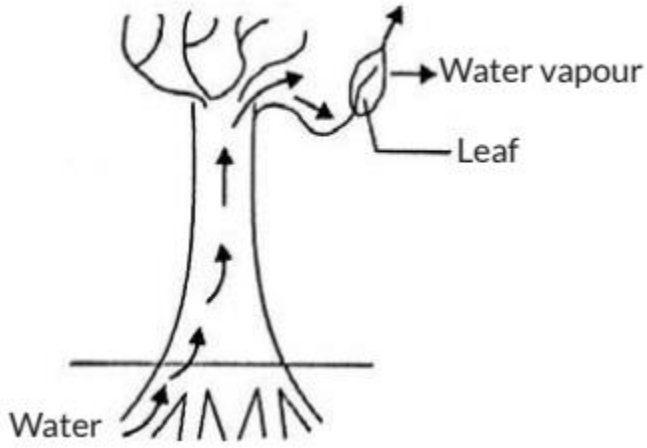
52. Draw a flow chart showing the three different pathways involved in the breakdown of glucose in different organisms. Name the respiratory pigment

present in human beings. State the function of rings of cartilage present in our throat. (NCERT Exemplar, Board Term 1, 2015)

5.4 Transportation

MCQ

53. Observe the following diagram and identify the process and its significance from the following options:



(a) Evaporation : maintains water contents in leaf cells.
(b) Transpiration creates a suction force which pulls water inside the plant.
(c) Excretion: helps in excreting out waste water from the plant.
(d) Translocation: helps in transporting materials from one cell to another.
(2023)

54. The process in which loss of water in the form of vapours from the aerial parts of plants takes place is X, which helps in Y. Here, X and Y respectively are
(a) transpiration and photosynthesis
(b) transpiration and temperature regulation
(c) translocation and movement of soluble products of photosynthesis in phloem
(d) translocation and absorption of water and minerals from soil by roots.
(2023)

55. Assertion (A) : The walls of atria are thicker than those of the ventricles.
Reason (R) Ventricles have to pump blood into various organs at high pressure.
(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct

explanation of the Assertion (A)
(b) Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A)
(c) Assertion (A) is true, but Reason (R) is false.
(d) Assertion (A) is false, but Reason (R) is true.
(2023)

56. Study the following and answer any four questions from 56(i) to 56(v):
Visible movements only cannot be the defining characteristic of life. Molecular movements which are invisible to the naked eye are necessary for life. Viruses are said to be living as they also show molecular movements but only when they are inside a living cell. Living organisms are organised structures. They must keep repairing and maintaining their structures. Maintenance of an organism is the collection of processes like nutrition, respiration, etc. In absence of any one of these, life would be difficult. To remain alive, chemical energy is needed by the living organism to perform vital process. It provides energy to (a) maintain life processes, (b) produce molecules for repair of worn out cells, and (c) for the growth of the body.
(i) Viruses show molecular movements when they are
(a) in crystalline form
(b) inside a dead material
(c) in air
(d) in the body of a living organism.
(ii) The process which involves intake of O2 from outside and breaking down of nutrient molecules to produce energy is called
(a) excretion
(b) nutrition
(c) respiration
(d) reproduction.
(iii) Which one of the following statements is incorrect? Energy is needed by a living organism to
(a) maintain life processes
(b) grow
(c) repair worn out tissues of the body
(d) synthesise waste materials.
(iv) The type of nutrition found in green plants is
(a) autotrophic

(b) heterotrophic
(c) parasitic
(d) holozoic.
(v) The function of the circulatory system of human beings is to transport
(a) food
(b) oxygen
(c) waste material
(d) all of the above. (2021 C)

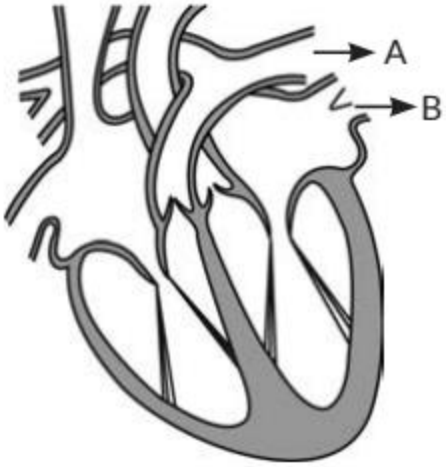
57. The separation of the right side and the left side of heart is useful to
(a) keep oxygenated blood from mixing with deoxygenated blood
(b) allow a slow supply of oxygen in the body
(c) supply energy to animals with low energy needs
(d) often change their body temperature. (Term I, 2021-22)

58. In spring, sugar stored in root or stem tissue of plants is transported to the buds for
(a) the energy needs of the buds to grow
(b) temperature regulation
(c) balancing the storage in different organs
(d) diffusion process. (Term I, 2021-22)

59. Upward movement of water in tall trees is due to
(a) translocation
(b) capillaries
(c) photosynthesis
(d) transpiration. (Term I, 2021-22)

60. Thin walled blood vessels are called
(a) aorta
(b) capillaries
(c) arteries
(d) vena cava. (Term I, 2021-22)

61. Consider the following statements in connection with the functions of the blood vessels marked A and B in the diagram of a human heart as shown.



(i) Blood vessel A - It carries carbon dioxide rich blood to the lungs.
(ii) Blood vessel B - It carries oxygen rich blood from the lungs.
(iii) Blood vessel B - Left atrium relaxes as it receives blood from this blood vessel.
(iv) Blood vessel A - Right atrium has thick muscular wall as it has to pump blood to this blood vessel.
The correct statements are
(a) (i) and (ii) only
(b) (ii) and (iii) only
(c) (ii), (iii) and (iv)
(d) (i), (ii) and (iii). (Term I, 2021-22)

62. Identify the two components of phloem tissue that help in transportation of food in plants.
(a) Phloem parenchyma and sieve tubes
(b) Sieve tubes and companion cells
(c) Phloem parenchyma and companion cells
(d) Phloem fibres and sieve tubes (Term I, 2021-22)

63. Which one of the following statements is correct about the human circulatory system?
(a) Blood transports only oxygen and not carbon dioxide.
(b) Human heart has five chambers.
(c) Valves ensure that the blood does not flow backwards.
(d) Both oxygen-rich and oxygen-deficient blood gets mixed in the heart. (2020)

VSA (1 mark)

64. Name the vein which brings blood to left atrium from the lungs. (Board Term 1, 2017)

65. Define translocation in reference to plants. (Board Term 1, 2016)

SAI (2 marks)

66. What is the other name of 'tissue fluid'? Write its two functions. (2023)

67. What will happen if:
(a) Xylem tissue in a plant is removed?
(b) We are injured and start bleeding? (2023) An

SA II (3 marks)

68. (i) What is double circulation?
(ii) Why is the separation of the right side and the left side of the heart useful? How does it help birds and mammals? (2023)

69. (a) List in tabular form two differentiating features between xylem and phloem.
(b) Write two advantages of transpiration in plants. (2019 C)

70. Write three types of blood vessels. Give one important feature of each. (Delhi 2019)

71. (a) Write two water conducting tissues present in plants. How does water enter continuously into the root xylem?
(b) Explain why plants have low energy needs as compared to animals. (AI 2019)

72. List four functions of the human heart. Why is double circulation necessary in the human body? (2019)

73. Explain how the translocation of materials in phloem tissue in plants is achieved by utilising energy. (NCERT, Board Term I, 2017)

74. What do the following transport?
(i) Xylem
(ii) Phloem
(iii) Pulmonary vein

(iv) Vena cava
(v) Pulmonary artery
(vi) Aorta (Board Term 1, 2014)

75. Explain giving any three reasons the significance of transpiration in plants. (NCERT Exemplar, Board Term I, 2014)

LA (5 marks)

76. (i) Plants absorb water from the soil. Explain how it is taken up and transported from the soil.
(ii) "When we are injured and start bleeding, it requires the loss of blood from the system to be minimised." What will happen if the blood loss is not stopped? Is there anything the system would do on its own to prevent the loss? (2021 C)

77. Give reasons:
(a) Ventricles have thicker muscular walls than atria.
(b) Transport system in plants is slow.
(c) Circulation of blood in aquatic vertebrates differs from that in terrestrial vertebrates.
(d) During the daytime, water and minerals travel faster through xylem as compared to the night.
(e) Veins have valves whereas arteries do not. (2020)

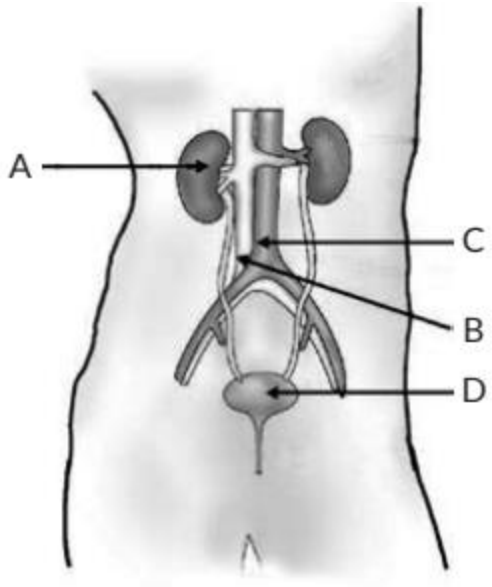
78. (a) "Blood circulation in fishes is different from the blood circulation in human beings". Justify the statement.
(b) Describe "blood circulation" in human beings. (NCERT, 2020)

79. (a) Mention any two components of blood.
(b) Trace the movement of oxygenated blood in the body.
(c) Write the function of valves present in between atria and ventricles.
(d) Write one structural difference between the composition of artery and veins. (2018)

5.5 Excretion

MCQ

80. In the given diagram, A, B, C and D respectively are

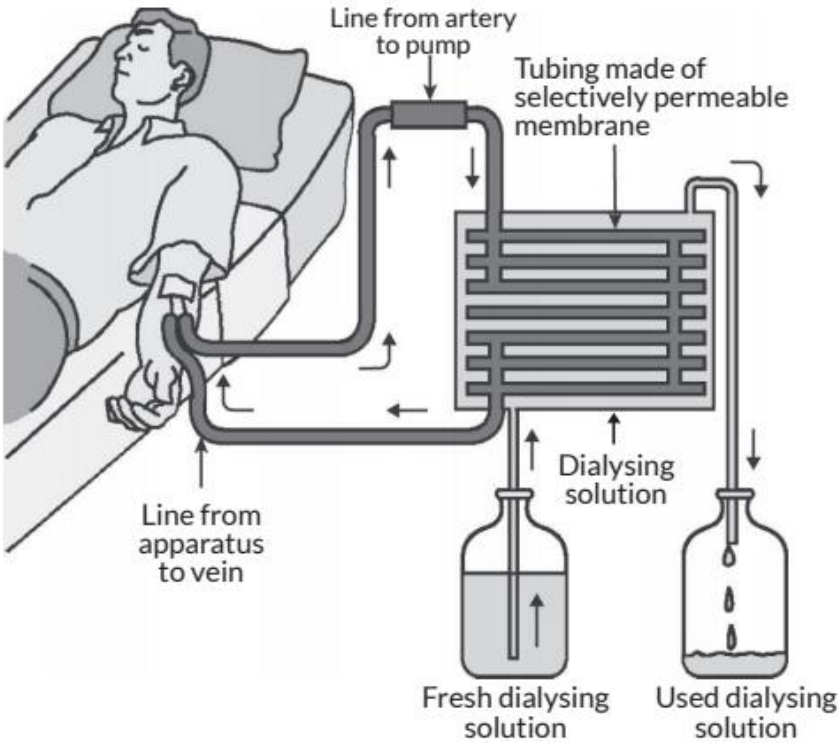


(a) A - Left kidney; B - Aorta; C - Vena cava; D - Urethra
(b) A - Left kidney; B - Vena cava; C - Aorta; D- Urinary bladder
(c) A- Right kidney; B - Aorta; C - Ureter; D - Urethra
(d) A- Right kidney; B - Vena cava; C - Aorta; D- Urinary bladder (Term I, 2021-22)

81. Which one among the following is not removed as a waste product from the body of a plant?
(a) Resins and gums
(b) Urea
(c) Dry leaves
(d) Excess water (Term I, 2021-22)

82. Read the following and answer the questions from

82(i) to 82(iv).
The figure shown below represents a common type of dialysis called as haemodialysis. It removes waste products from the blood, such as excess salts, and urea which are insufficiently removed by the kidney in patients with kidney failure. During the procedure, the patient's blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient. On the basis of this answer the following questions.



(i) The haemodialyser has semi-permeable lining of tubes which help
(a) to maintain osmotic pressure of blood
(b) to filter nitrogenous wastes from the dialysing solution
(c) in passing the waste products in the dialysing solution
(d) to pump purified blood back into the body of the patient.
(ii) Which one of the following is not a function of artificial kidney?
(a) To remove nitrogenous wastes from the blood.
(b) To remove excess fluids from the blood.
(c) To reabsorb essential nutrients from the blood.
(d) To filter and purify the blood.
(iii) The 'used dialysing' solution is rich in
(a) urea and excess salts
(b) blood cells
(c) lymph
(d) proteins.
(iv) Which part of the nephron in human kidney, serves the function of reabsorption of certain substances?
(a) Glomerulus
(b) Bowman's Capsule

(c) Tubules
(d) Collecting duct (Term I, 2021-22)

SAI (2 marks)

83. Write one specific function of each of the following organs in relation with excretion in human beings:
(i) Renal Artery
(ii) Urethra
(iii) Glomerulus
(iv) Tubular part of nephron (2023)

84. Explain in brief two ways by which leaves of a plant help in excretion. (2023)

SA II (3 marks)

85. (a) Define the term excretion. Why should animals excrete waste matter?
(b) Name the main excretory organ of human beings and state the form in which the excretory matter is thrown out of the body? (2019 C)

86. Draw a diagram of human excretory system and label kidneys, ureters on it. (Board Term 1, 2017)

OR

Draw a neat diagram of excretory system of human beings and label on it:
(i) Left kidney
(ii) Urinary bladder. (Board Term 1, 2016)

87. Describe the structure and function of nephron with the help of diagram. (NCERT Intext, Board Term I, 2014)

LA (5 marks)

88. (a) Describe the structure and function of the basic filtering unit of kidney.
(b) List two factors on which reabsorption of water from urine depends. (2020)

89. (a) Name the organs that form the excretory system in human beings.
(b) Describe in brief how urine is produced in human body. (NCERT Exemplar, 2020)

90. (a) Define excretion.
(b) Name the basic filtration unit present in the kidney.
(c) Draw excretory system in human beings and label the following organs of excretory system which perform following functions:
(i) form urine
(ii) is a long tube which collects urine from kidney
(iii) store urine until it is passed out. (2018)

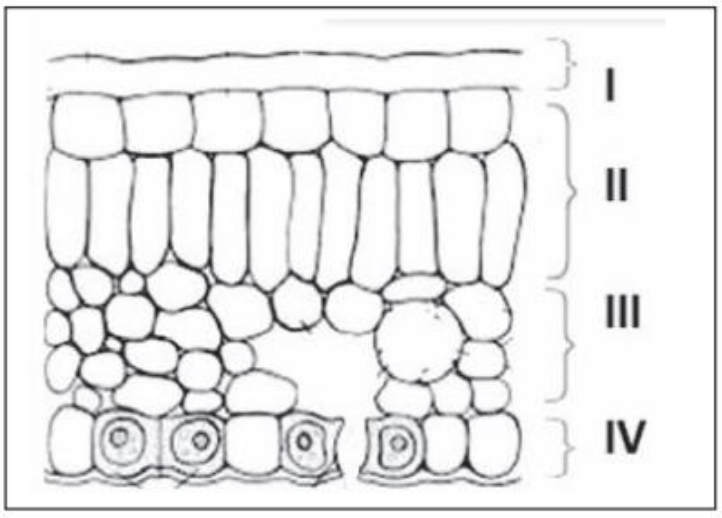
91. (a) Draw a neat diagram of the human excretory system and label following parts:
(i) Urethra
(ii) Kidney
(iii) Ureter
(iv) Urinary bladder
(b) What are nephrons? How is a nephron involved in the filtration of blood and formation of urine? (Board Term 1, 2015)

CBSE Sample Questions

5.2 Nutrition

MCQ

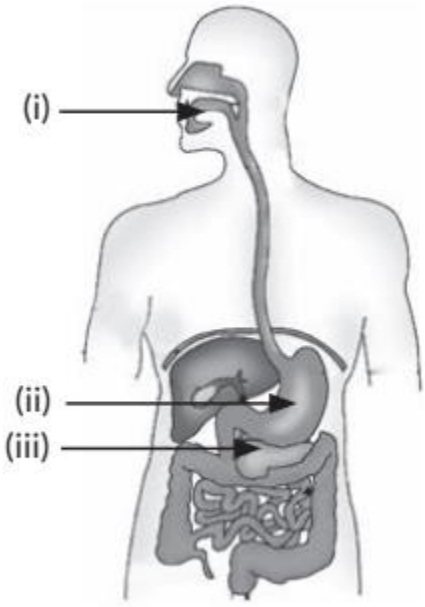
1. In the given transverse section of the leaf identify the layer of cells where maximum photosynthesis occurs.



(a) I, II
(b) II, III

(c) III, IV
(d) I, IV (2022-23)

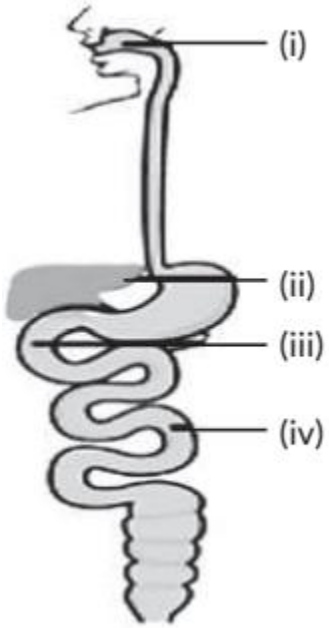
2. Identify the option that indicates the correct enzyme that is secreted in location (i), (ii) and (iii).



(a) (i)-lipase, (ii)-trypsin, (iii)-pepsin
(b) (i)-amylase, (ii)-pepsin, (iii)-trypsin
(c) (i)-trypsin, (ii)-amylase, (iii)-carboxylase
(d) (i)-permease, (ii)-carboxylase, (iii)-oxidase (Term I, 2021-22)

3. Opening and closing of stomatal pore depends on
(a) atmospheric temperature
(b) oxygen concentration around stomata
(c) carbon dioxide concentration around stomata
(d) water content in the guard cells. (Term I, 2021-22)

4. Observe the diagram of human digestive system.



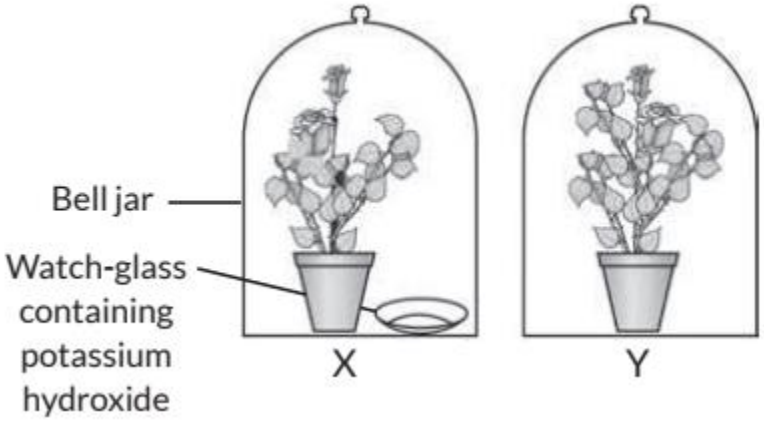
Match the labelling referred in column I and correlate with the function in column II.

Column I	Column II
(i)	A. The length of this depends on food the organism eats.
(ii)	B. Initial phase of starch digestion
(iii)	C. Increases the efficiency of lipase enzyme action
(iv)	D. This is the site of the complete digestion of carbohydrates, proteins and fats.

(a) (i)-(A); (ii) - (B); (iii) - (C); (iv)-(D)
(b) (i)-(B); (ii) - (C); (iii) - (D); (iv)-(A)
(c) (i)-(B); (ii) - (D); (iii) - (C); (iv)-(A)
(d) (i)-(D); (ii) – (A); (iii) – (B); (iv)-(C) (Term I, 2021-22)

5. In which of the following groups of organisms, food material is broken down outside the body and then absorbed in?
(a) Mushroom, green plants, Amoeba
(b) Yeast, mushroom, bread mould
(c) Paramecium, Amoeba, Cuscuta
(d) Cuscuta, lice, tapeworm (Term I, 2021-22)

6. Read the following and answer the questions from 6(i) to 6(iv).
The figure shown below represents an activity to prove the requirements for photosynthesis. During this activity, two healthy potted plants were kept in the dark for 72 hours. After 72 hours, KOH is kept in the watch glass in setup X and not in setup Y. Both these setups are air tight and have been kept in light for 6 hours. Then, iodine test is performed with one leaf from each of the two plants X and Y.



(i) This experimental set up is used to prove essentiality of which of the following requirements of photosynthesis?
(a) Chlorophyll
(b) Oxygen
(c) Carbon dioxide
(d) Sunlight
(ii) The function of KOH is to absorb
(a) oxygen
(b) carbon dioxide
(c) moisture
(d) sunlight.
(iii) Which of the following statements shows the correct results of lodine Test

performed on the leaf from plant X and Y respectively?
(a) Blue black colour would be obtained on the leaf of plant X and no change in colour on leaf of plant Y.
(b) Blue - black colour would be obtained on the leaf of plant Y and no change in colour on leaf of plant X.
(c) Red colour would be obtained on the leaf of plant X and brown colour on the leaf of plant Y.
(d) Red colour would be obtained on the leaf of plant Y and brown colour on the leaf of plant X.
(iv) Which of the following steps can be followed for making the apparatus air tight?
(i) Placing the plants on glass plate
(ii) Using a suction pump
(iii) Applying vaseline to seal the bottom of jar
(iv) Creating vacuum
(a) (i) and (ii)
(b) (ii) and (iii)
(c) (i) and (iii)
(d) (ii) and (iv) (Term I, 2021-22)

VSA (1 mark)

7. State the role of pancreas in digestion of food. (2020-21)

8. How is the wall of small intestine adapted for performing the function of absorption of food? (2020-21)

9. Out of a goat and a tiger, which one will have a longer small intestine? Justify your answer. (2020-21)

SAI (2 marks)

10. Patients whose gall bladder are removed are recommended to eat less oily food. Why? (2022-23)

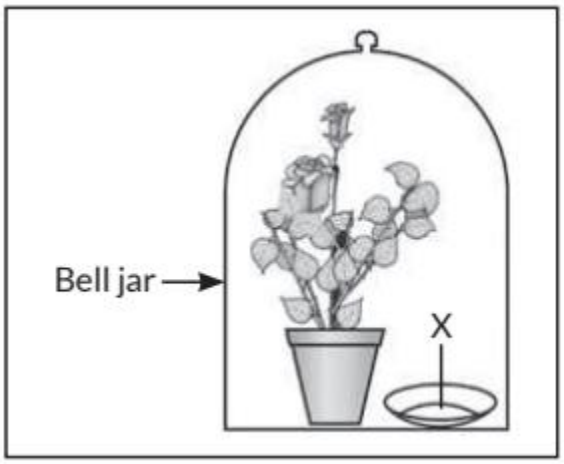
11. Bile juice does not have any digestive enzyme but still plays a significant role in the process of digestion. Justify the statement. (2020-21)

12. State the events occurring during the process of photosynthesis. Is it essential that these steps take place one after the other immediately? (2020-21)

5.3 Respiration

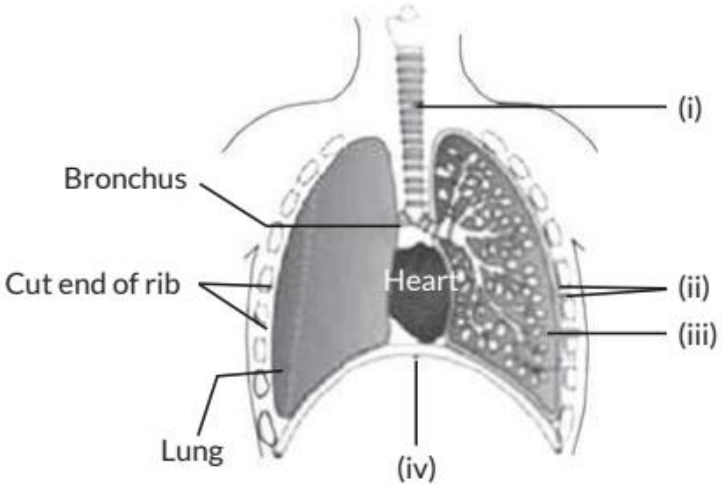
MCQ

13. Observe the experimental setup shown below. Name the chemical indicated as 'X' that can absorb the gas which is evolved as a byproduct of respiration.



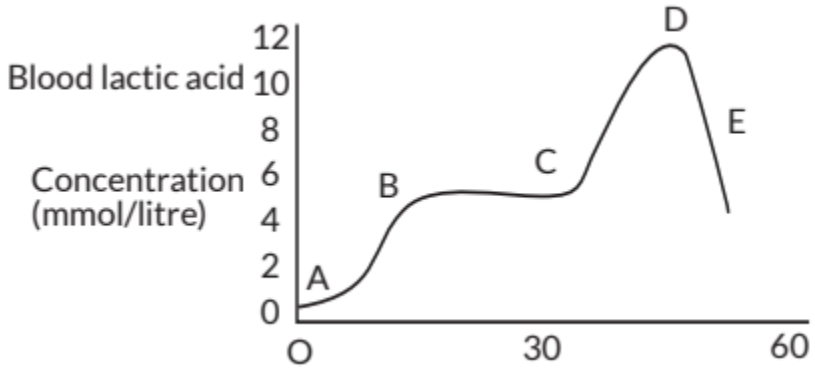
(a) NaOH
(b) KOH
(c) Ca(OH)2
(d) K_2CO3 (2022-23)

14. Carefully study the diagram of the human respiratory system with labels (i), (ii), (iii) and (iv). Select the option which gives correct identification and main function and /or characteristic.

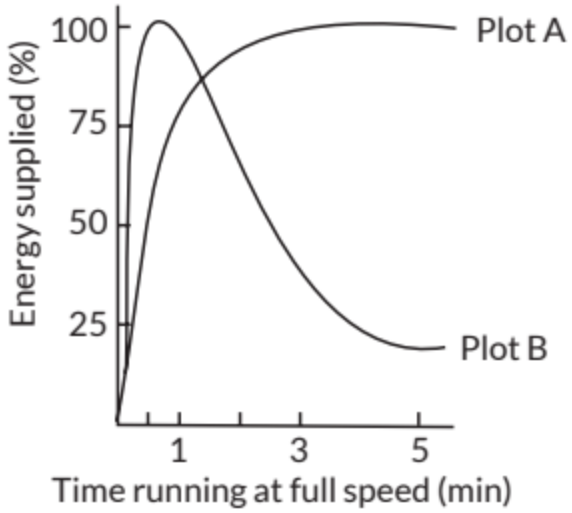


(a) (i) Trachea: It is supported by bony rings for conducting inspired air.
(b) (ii) Ribs: When we breathe out, ribs are lifted
(c) (iii) Alveoli: Thin-walled sac like structures for exchange of gases.
(d) (iv) Diaphragm: It is pulled up when we breathe in. (Term I, 2021-22)

15. Read the following and answer any four questions from 15(i) to 15(v).
All living cells require energy for various activities. This energy is available by the breakdown of simple carbohydrates either using oxygen or without using oxygen.
(i) Energy in the case of higher plants and animals is obtained by
(a) breathing
(b) tissue respiration
(c) organ respiration
(d) digestion of food.
(ii) The graph below represents the blood lactic acid concentration of an athlete during a race of 400 m and shows a peak at point D. Respiration in athletics The blood of an athlete was tested before, during and after a 400 m race. Lactic acid production has occurred in the athlete while running in the 400 m race. Which of the following processes explains this event?



(a) Aerobic respiration
(b) Anaerobic respiration
(c) Fermentation
(d) Breathing
(iii) Study the graph below that represents the amount of energy supplied with respect to the time while an athlete is running at full speed.



Choose the correct combination of plots and justification provided in the following table.

	Plot A	Plot B	Justification
(a)	Aerobic	Anaerobic	Amount of energy is low and inconsistent in aerobic and high in anaerobic
(b)	Aerobic	Anaerobic	Amount of energy is high and consistent in aerobic and low in anaerobic
(c)	Anaerobic	Aerobic	Amount of energy is high and consistent in aerobic and low in anaerobic.
(d)	Anaerobic	Aerobic	Amount of energy is high and inconsistent in anaerobic and low in aerobic.

(iv) The characteristic processes observed in anaerobic respiration are
(i) presence of oxygen

(ii) release of carbon dioxide
(iii) release of energy
(iv) release of lactic acid.
(a) (i) and (ii) only
(b) (i), (ii) and (iii) only
(c) (ii), (iii) and (iv) only
(d) (iv) only
(v) Study the table below and select the row that has the incorrect information.

		Aerobic	Anaerobic
(a)	Location	Cytoplasm	Mitochondria
(b)	End Product	CO_2 and H_2O	Ethanol and CO_2
(c)	Amount of ATP	High	Low
(d)	Oxygen	Needed	Not needed

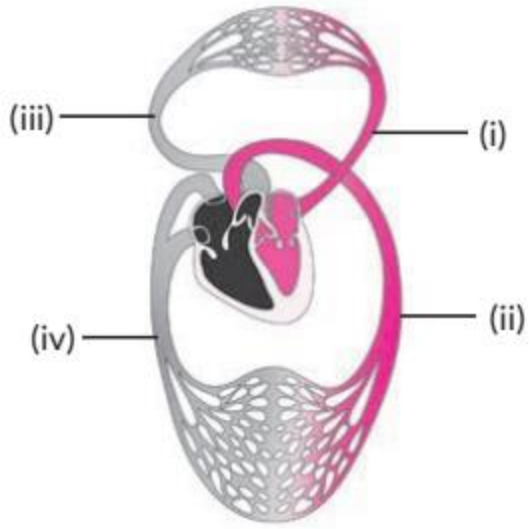
(2020-21)

5.4 Transportation

MCQ

16. Assertion (A): Amphibians can tolerate mixing of oxygenated and deoxygenated blood.
Reason (R): Amphibians are animals with two chambered heart.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true. (2022-23)

17. The figure given below shows a schematic plan of blood circulation in humans with labels (i) to (iv). Identify the correct label with its functions.



(a) (i) Pulmonary vein - takes impure blood from body part.
(b) (ii) Pulmonary artery - takes blood from lung to heart.
(c) (iii) Aorta - takes blood from heart to body parts.
(d) (iv) Vena cava - takes blood from body parts to right auricle. (Term I, 2021-22)

18. Identify the phase of circulation which is represented in the diagram of heart given below. Arrows indicate contraction of the chambers shown.
(a) Blood transferred to the right ventricle and left ventricle simultaneously.
(b) Blood is transferred to lungs for oxygenation and is pumped into various organs simultaneously.
(c) Blood transferred to the right auricle and left auricle simultaneously.
(d) Blood is received from lungs after oxygenation and is received from various organs of the body. (Term I, 2021-22)

19. Assertion (A): Resins and gums are stored in old xylem tissue in plants.
Reason (R): Resins and gums facilitate transport of water molecules.
(a) Both (A) and (R) are true and (R) is the correct explanation of (A).
(b) Both (A) and (R) are true but (R) is not the correct explanation of (A).
(c) (A) is true but (R) is false.
(d) (A) is false but (R) is true. (Term I, 2021-22)

20. In which of the following groups of organisms, blood flows through the heart only once during one cycle of passage through the body?
(a) Rabbit, parrot, turtle

(b) Frog, crocodile, pigeon
(c) Whale, Labeo, penguin
(d) Shark, dog fish, sting ray (Term I, 2021-22)

VSA (1 mark)

21. Veins are thin walled and have valves. Justify. (2020-21)

SAI (2 marks)

22. The leaves of a plant were covered with aluminium foil, how would it affect the physiology of the plant? (2022-23)

23. How is lymph an important fluid involved in transportation? If lymphatic vessels get blocked, how would it affect the human body? Elaborate. (2022-23)

24. In birds and mammals, the left and right side of the heart are separated. Give reasons. (2020-21)

5.5 Excretion

MCQ

25. What is common between extensive network of blood vessels around walls of alveoli and in glomerulus of nephron?
(a) Thick walled arteries richly supplied with blood.
(b) Thin walled veins poorly supplied with blood.
(c) Thick walled capillaries poorly supplied with blood.
(d) Thin walled capillaries richly supplied with blood. (Term I, 2021-22)

26. Plants use completely different process for excretion as compared to animals. Which one of the following processes is not followed by plants for excretion?
(a) They can get rid of excess water by transpiration.
(b) They selectively filter toxic substances through their leaves.
(c) Waste products are stored as resins and gums in old xylem.
(d) They excrete waste substances into the soil around them. (Term I, 2021-22)

27. In a person the tubule part of the nephron is not functioning at all. What will its effect be on urine formation?

(a) The urine will not be formed.
(b) Quality and quantity of urine is unaffected.
(c) Urine is more concentrated.
(d) Urine is more diluted. (Term I, 2021-22)

SAI (2 marks)

28. Name the substances other than water, that are reabsorbed during urine formation. What are the two parameters that decide the amount of water that is reabsorbed in the kidney? (2022-23)

SA II (3 marks)

29. Explain where and how urine is produced? (2020-21)

SOLUTIONS

Previous Years' CBSE Board Questions

1. (b)

2. (c): Presence of villi in small intestine increases the capacity of absorption by wall of intestine.

3. (b) Water needed by plants is absorbed by roots. The root hair absorb water from soil by osmosis. Difference in concentration of ions is created between roots and soil which enables water to enter into roots to compensate difference in concentration.

4. (b) Saliva (i) is secreted in the mouth. Saliva contains an enzyme called salivary amylase for digestion of carbohydrates. Liver (ii) secretes bile to emulsify fat. The pancreas (iii) secretes pancreatic juice which contains enzyme trypsin for digestion of proteins.

5. (c) Carbohydrates produced by photosynthesis are utilised as energy (A) (glucose) and stored as starch (B).

6. (i) (b): In the given experiment, KOH (Potassium hydroxide) in the test tube absorbs carbon dioxide; thus, due to the absence of CO_2, the leaf fails to produce starch which proves that carbon dioxide is necessary for photosynthesis.

(ii) (a) The given experiment demonstrates the requirement of carbon dioxide for photosynthesis. When KOH absorbs the available CO_2 from the portion of leaf dipped in it, formation of sugar and starch is inhibited and the portion of leaf dipped in KOH did not show any change when dipped in iodine solution. Thus, it is proved that CO_2 is necessary for photosynthesis.
(iii) (c): Following are the three events that occur during the process of photosynthesis:
(i) Absorption of light energy by chlorophyll.
(ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.
(iii) Reduction of carbon dioxide to carbohydrates.
(iv) (a) The brown coloured iodine will turn blue-black when it reacts with starch.

7. (c) Unicellular organisms are one-celled and perform all the life processes that are essential for maintaining the life of cell or organisms like nutrition, respiration, reproduction, excretion, etc. In single-celled organisms such as Amoeba, complex substances are broken into simpler substances.

8. (c): The opening and closing of the stomatal pore depends on turgidity of the guard cells. The given figure shows closed stomatal pore which occurs when guard cells looses water and become flaccid.

9. (b)

10. (c) Both potted plants should be kept in sunlight for about two hours before the starch test.

11. (b) Herbivores such as deer eating grass need a longer small intestine to allow the cellulose to be digested. Meat is easier to digest, hence carnivores like tigers have a shorter small intestine.

12. (a)

13. Pancreatic juice contains digestive enzyme trypsin.

14. The movement of food within the alimentary canal is mostly caused by peristalsis. Peristalsis is the rhythmic contraction and relaxation of muscles of alimentary canal to push the food downward.

15. Raw materials required for photosynthesis are carbon dioxide (CO_2), water, light and chloroplast.

16. Gastric glands are present in the wall of the stomach. They secrete gastric juices containing mucus, protein digesting enzymes pepsin, rennin and hydrochloric acid (HCI).

17. The plant kept in dark could not survive longer because it will not be able to produce oxygen required for its respiration by the process of photosynthesis. Oxygen is evolved as the byproduct of photosynthesis during photolysis of water and helps plant to survive longer that is kept in sunlight.

18. The three events that occur during the process of photosynthesis are:
(i) Absorption of light energy by chlorophyll.
(ii) Conversion of light energy to chemical energy (in the form of ATP and NADPH) and splitting of water molecules into hydrogen and oxygen.
(iii) Reduction of carbon dioxide to carbohydrates (carbon assimilation).

19. Gastric glands are present in the wall of stomach that release secretions for digestion of food. The secretion of these glands is called gastric juices which contain dilute hydrochloric acid, mucus and two protein digesting enzymes rennin and pepsin.

20. (i) In Paramecium, a unicellular protozoan, the hair like outgrowth cilia are present on the entire surface and help in collecting the food. They sweep the food inside body through the oral groove.
(ii) (a) Role of hydrochloric acid: It helps to maintain the acidic pH in stomach required for activation of enzyme pepsin that digests proteins in the stomach.
(b) Role of trypsin in our digestion system: Trypsin breaks down protein into smaller peptides in the duodenum of the small intestine. It helps in digesting dietary protein by breaking the chain of amino acids. It also activates some proenzymes present in pancreatic juice.
(c) Role of muscular walls in of stomach in our digestive system:
The muscular wall in stomach contract periodically and thereby help in the churning and mixing the food with the digestive enzymes and HCI. It helps in chemical digestion.
(d) Role of salivary amylase in our digestive system:
Salivary amylase found in saliva breaks down the starch and convert it into simplest sugar.

21. (a) The action of saliva on the food we eat is explained with the help of an activity as follows:
Take two test tubes A and B. In test tube A, put one teaspoon full of boiled rice and in test tube B, keep one teaspoon full of boiled rice after chewing it for 3 to 5 minutes. Add 3.4 mL of water in both test tubes and add few drops of iodine solution in each test tube. In test tube A, colour of rice changes because of absence of any enzyme while in test tube B, no colour change is observed because when rice is chewed, amylase enzyme present in saliva breaks down the starch of rice to simple sugars.
(b) Bile juice break down fats into fatty acids that can be taken into the body by the digestive tract. In addition, it provides alkaline fluid in intestine to neutralise the acidic pH of food that comes from stomach.

22. Small intestine is the main region for the absorption of digested food. It consists of the following parts: The inner surface of small intestine has millions of tiny finger-like projections called villi. These villi increase the surface area for efficient food absorption. Within these villi, many blood vessels are present that absorb the digested food and carry it to the bloodstream. The small intestine in human beings is the site of complete digestion of food like carbohydrates, proteins and fats. The absorption of digested food is necessary because an organism takes the complex organic materials by the process of absorption, then utilise absorbed nutrients for various metabolic processes with the help of these metabolic processes, body uses these food nutrients for energy, growth and cell repair.

23. a Hydrochloric acid (HCI)
b- Pepsin
c - Mucus
d - HCI makes medium acidic for the activation of an enzyme pepsin.
e - Pepsin acts in acidic medium which breaks down proteins into peptones.
f - Mucus protects the inner lining of stomach from corroding action of HCI.

24. (a) (i) Enzyme trypsin : This enzyme is produced by the pancreas in an inactive form called trypsinogen. Trypsin converts remaining proteins into peptones and the peptones into peptides and amino acids.
(ii) Enzyme lipase: It is secreted by pancreas and small intestine. Lipase converts fats into fatty acids and glycerol.
(b) Internally, the wall of the small intestine is provided with long finger-like

projections called villi. Two functions of villi are:
(i) The villi greatly increase the absorptive surface area of the inner lining of small intestine.
(ii) Villi are richly supplied with blood vessels which carry absorbed food to all cells of body, where it is utilised for obtaining energy.

25. (a) (i) Saliva contains salivary amylase and is released in our mouth. It breaks down starch into sugar (complex carbohydrates into simpler ones).
(ii) Acid (HCI) plays an important role in the process of digestion. These are:
- HCI or hydrochloric acid creates an acidic medium inside stomach which is essential for the activation and action of the gastric enzyme pepsin.
- HCI kills the harmful bacteria present in the food.
- Bile brings about the emulsification of fat (i.e. breaks fat molecules into small globules).
- Internally, the wall of the small intestine is provided with long finger-like projections called villi. Two functions of villi are:
- The villi greatly increase the absorptive surface area of the inner lining of small intestine.
- Villi are richly supplied with blood vessels which carry absorbed food to all cells of body, where it is utilised for obtaining energy.

(b) (i) Pepsin is a protein digesting enzyme present in gastric juice. Pepsin gets activated in acidic medium and splits proteins into peptones and peptides.
(ii) Lipase is secreted by pancreas and small intestine. Lipase converts fats into fatty acids and glycerol.

26. Photosynthesis is important for a number of reasons:
(i) Food: By photosynthesis, green plants synthesise food from simple raw materials like CO2 and H_2O. Thus, it sustains life on earth.
(ii) Oxygen Oxygen released during the process of photosynthesis is needed by animals and humans for respiration. Oxygen also supports combustion of fuels. Balanced chemical equation involved in the process of photosynthesis is given as :

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

Carbon dioxide Water Glucose

27. Differences between autotrophs and heterotrophs are as follows:

S.No.	Autotrophs	Heterotrophs
(i)	These organisms are able to form organic substances from simple inorganic substances such as CO_2 and water.	They cannot produce organic compounds from inorganic sources and therefore completely rely on consuming other organisms for their food requirement.
(ii)	They have chlorophyll to trap solar energy.	Chlorophyll is absent, so they cannot trap solar energy.
(iii)	They can be chemoautotroph and photoautotroph.	They can be saprophytic, parasitic and holozoic in mode of nutrition.
(iv)	Autotrophs are placed at the bottom of the food chain as producers.	Heterotrophs are placed above autotrophs in the food chain as consumers.
(v)	Green plants, some bacteria and some protists like *Euglena* are examples of autotrophs.	Mushrooms, *Euglena*, cow, goat, etc., are examples of heterotrophs.

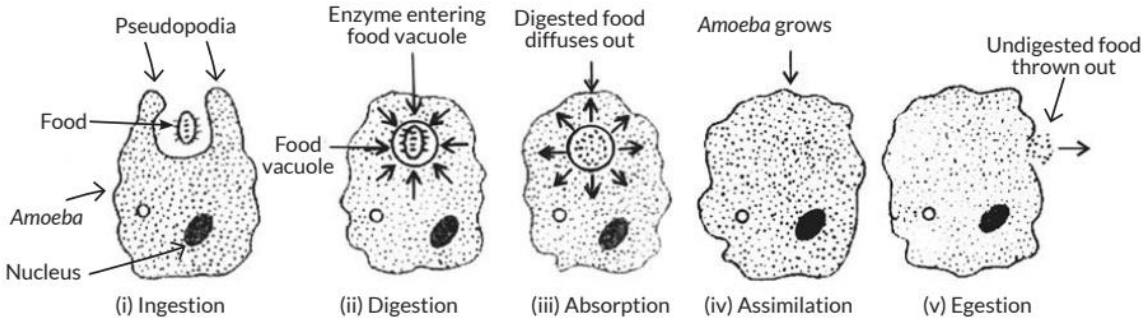
28. The mode of nutrition in Amoeba is holozoic. The process of obtaining food by Amoeba is called phagocytosis.

(i) Amoeba ingests food by using its finger-like projections called pseudopodia.

(ii) The food is engulfed with a little surrounding water to form a food vacuole inside the Amoeba. The food is digested inside food vacuole by digestive enzymes.

(iii) Food is absorbed directly into the cytoplasm of Amoeba by diffusion.

(iv) Food is used to obtain energy and growth of Amoeba.
(v) When considerable amount of undigested food collects inside Amoeba, then its cell membrane ruptures at any place to throw out this undigested food. Diagrammatic representation of different stages in the holozoic nutrition (feeding) of Amoeba is as follows:



29. (a) Nutrition is necessary for the human body because human body continuously require energy for their life activities like respiration, circulation, excretion, etc. Energy is required even when we are sleeping because a number of biological processes keep on occurring. All these processes require energy and this energy is obtained from nutrition. It is also needed for growth and repair of human body.
(b) The wall of alimentary tract contains muscles which can contract and expand alternately. The contraction and expansion movement of the wall of food pipe is called peristaltic movement. The peristaltic movement moves the partially digested food in all the digestive organs throughout the alimentary canal.
(c) Small intestine in herbivores is longer than in carnivores because herbivores eat plants, rich in cellulose which takes longer time for complete digestion by the enzymes present in symbiotic bacteria. Therefore, they have longer small intestine. Carnivores, feed on flesh which is easier to digest and do not contain cellulose. Therefore, they have shorter intestine for digestion of food eaten by them.

(d) Gastric glands secrete HCI, mucus, rennin and pepsin enzymes. Mucus protects the inner lining of stomach from the action of acidic HCI and enzymes. In the absence of mucus, there would be erosion of inner lining of stomach leading to acidity and ulcers.
30. (a) (i) Unused carbohydrates in plants are stored in the form of complex

sugar known as starch. They are later broken down into simple sugars (glucose) when energy is needed.
(ii) The assimilated food molecules hold energy in their chemical bonds. Their bond energy is released by oxidation in the cell. This energy is trapped by forming bonds between ADP (adenosine diphosphate) and inorganic phosphate (Pi) to synthesise ATP (Adenosine triphosphate) molecules. These bonds are later broken by enzymatic hydrolysis and the energy released is utilised for cellular processes.
(b) Amoeba is a unicellular animal and the mode of nutrition is holozoic. Amoeba eats tiny (microscopic) plants and animals which float in water. The process of obtaining food by Amoeba is called phagocytosis. When a food particle comes close to Amoeba, it ingests the food particle by forming temporary finger-like projections called pseudopodia around it. The food is engulfed with a little surrounding water to form a food vacuole inside the Amoeba. The food is digested inside food vacuole by digestive enzymes and absorbed directly into the cytoplasm of Amoeba cell by diffusion. A part of absorbed food is used to obtain energy and the remaining part is utilised for growth of Amoeba. When considerable amount of undigested food collects inside Amoeba then its cell membrane ruptures at any place to throw out this undigested food. This process is called egestion. For diagram, refer to answer 28.

31. (b) In aquatic organisms, rate of breathing is higher as these organisms utilise oxygen dissolved in water which is present in lesser amount compared to others.

32. (a) When there is lack of oxygen in our muscle cells, pyruvate is converted into lactic acid and energy. Therefore, the correct pathway of glucose metabolism in our muscle cells during heavy exercise is :

$$\text{Glucose} \xrightarrow{\text{Cytoplasm}} \text{Pyruvate} \xrightarrow[\text{Absence of } O_2]{\text{Muscle cells}} \text{Lactic acid} + \text{Energy}$$

33. (c) The energy released during cellular respiration is immediately used to synthesise a molecule called ATP which is energy currency of the cell and is used as fuel for cellular activities.
34. (a) During inhalation, we lift our ribs and flatten our diaphragm (A), and

the chest cavity becomes larger as a result. Because of this, air is sucked into the lungs and fills the expanded alveoli. When our ribs and diaphragm return to their normal position and the chest cavity becomes smaller, exhalation occurs. During breathing, 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. The residual volume remains unchanged in normal conditions.

35. (d): The amount of dissolved oxygen in water is fairly low as compared to the amount of oxygen in the air but the rate of breathing in aquatic organisms is much faster than that seen in terrestrial organisms because the aquatic animals have to breath rapidly to take in sufficient oxygen.

36. (a) Trachea is a air passage which is provided with C-shaped cartilaginous rings. These rings prevent the air passage from collapsing even if there is not much air.

37. (c) The mucus lining in the nasal passage helps to moisten and warm the inhaled air and also trap dust particles (i.e., helps in filtering the inhaled air).

38. (a) In aerobic respiration, glucose is completely broken down to CO_2 and H_2O with the production of a large amount of energy (ATP).

$$\text{Glucose} \xrightarrow{\text{In cytoplasm}} \text{Pyruvate} + \text{Energy}$$

$$\xrightarrow[\text{(In mitochondria)}]{\text{Presence of } O_2} \text{Carbon dioxide} + \text{Water} + \text{Energy}$$

Thus, CO2 and water are formed as a result of aerobic respiration and will not formed in the absence of oxygen (anaerobic respiration).

39. (b)

40. (c) When a person blows air from mouth into the test tube containing lime water, the lime water turn into a white precipitate which appears milky. This occurs because the air we exhale has more carbon dioxide.

41. (a)

42. Due to higher metabolic rate and the large volume of body, oxygen cannot diffuse into all cells of the human body quickly as oxygen will have to travel

large distances to reach each and every cell. So, diffusion is insufficient to meet the oxygen demand of multicellular organisms.

43. The two different ways by which glucose is oxidised to provide energy in human body are:
(i) Aerobic respiration (In the presence of oxygen): The end products in aerobic respiration are carbon dioxide, water and energy.

$$\underset{(1\ \text{molecule})}{\text{Glucose}} \xrightarrow[(\text{in cytoplasm})]{\text{Glycolysis}} \underset{(2\ \text{molecules})}{\text{Pyruvate}} \xrightarrow[(\text{in mitochondria})]{\text{Oxygen}} 6CO_2 + 6H_2O + \underset{(38\ \text{ATP})}{\text{Energy}}$$

(ii) Anaerobic respiration (In the lack of oxygen): The end products are lactic acid and energy.

$$\underset{(1\ \text{molecule})}{\text{Glucose}} \xrightarrow[(\text{in cytoplasm})]{\text{Glycolysis}} \underset{(2\ \text{molecules})}{\text{Pyruvate}} \xrightarrow[(\text{in cytoplasm})]{\text{No } O_2 \text{ required}} \text{Lactic acid} + \text{Energy}$$

44. (a) Functions of alveoli are:
(i) They increase the surface area for exchange of gases.
(ii) The thin walls of alveoli facilitate rapid exchange of oxygen and carbon dioxide between alveolar air and blood.
(b) Aquatic animals like fishes obtain dissolved oxygen from water present through their gills. The amount of dissolved oxygen is quite small as compared to the amount of oxygen in the air. Therefore, to obtain required amount of oxygen from water, aquatic animals have to breathe much faster than the terrestrial organisms.

(c)

$$\underset{\substack{(6\text{-carbon}\\ \text{molecules})}}{\text{Glucose}} \xrightarrow{\text{in cytoplasm}} \text{(i) } \underset{\substack{(3\text{-carbon}\\ \text{molecule})\\ + \text{Energy}}}{\text{Pyruvate}} \xrightarrow[\text{in mitochondria}]{\text{Presence of } O_2}$$

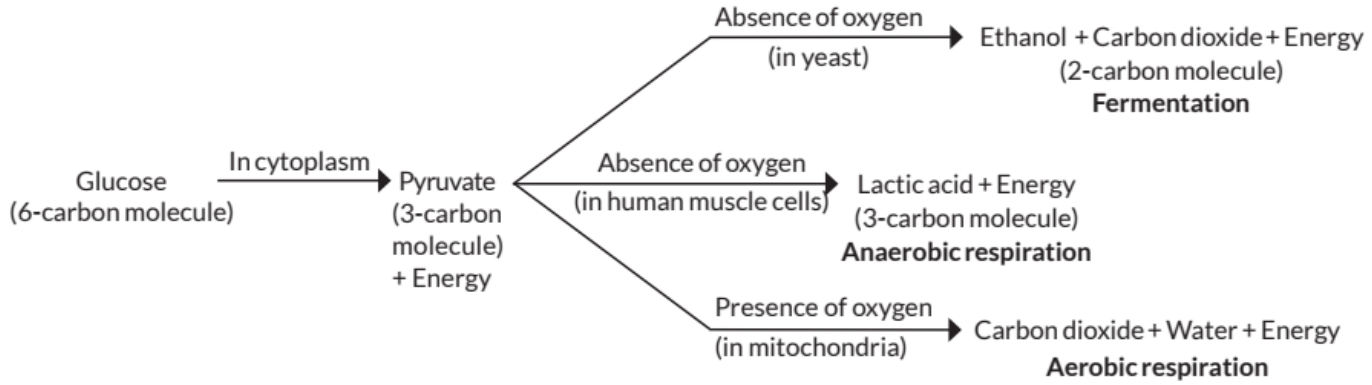
(ii) $Co_2 + H_2O + \text{Energy}$

45. In absence or shortage of oxygen, glucose is oxidised in the following ways:
(i) In cytoplasm, glucose is oxidised to pyruvate and release energy.
(ii) In muscles of humans, i.e., under anaerobic conditions pyruvate breaks down to lactic acid and release energy.
(iii) In yeast, i.e., during fermentation process pyruvate converts to ethanol while carbon dioxide along with it releases a certain amount of energy.

46. Differences between breathing and respiration are as follows:

S. No.	Breathing	Respiration
(i)	It is a physical process. It involves inhalation of fresh oxygen rich air and exhalation of carbon dioxide rich air.	It is a biochemical process. It involves exchange of respiratory gases and also oxidation of food.
(ii)	It is an extracellular process.	It is both an extracellular as well as intracellular process.
(iii)	It does not release energy, infact it consumes energy.	It releases energy.

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

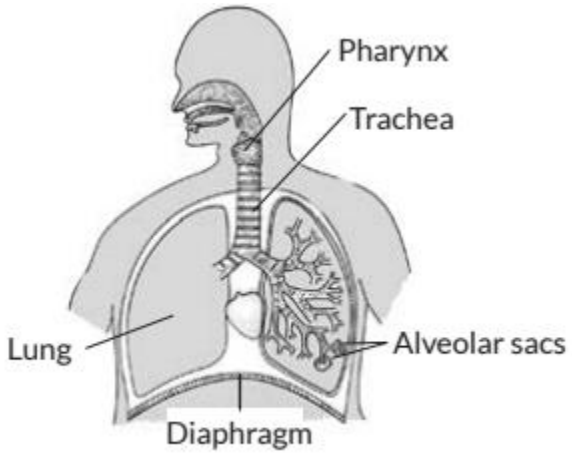


48. Differences between respiration in plants and animals are as follows:

S. No.	Plant respiration	Animal respiration
(i)	All parts of plants, like roots, stem and leaves, perform respiration individually.	Animal performs respiration as a single unit.
(ii)	There is little transport of respiratory gases from one part to the other during respiration.	Respiratory gases are usually transported over long distance inside an animal during respiration.
(iii)	Respiration occurs at a very slow rate.	It is a fast process in animals.

49. (a) Terrestrial organisms inspire atmospheric oxygen, while aquatic organisms thrive on the dissolved oxygen present in water. Air contains about 21% of oxygen while water has less than 1% oxygen in dissolved state. Oxygen diffuses through water at a much slower rate as compared to air. A terrestrial organism has the advantage of utilising greater amount of oxygen at a faster rate with lesser effort whereas, aquatic organisms have to put more effort to obtain the same amount of oxygen, therefore breathing in aquatic organisms is much faster than the terrestrial organisms.

(b) The labelled diagram of human respiratory system is as follows:



50. In the experiment in which carbon dioxide is given out during respiration, KOH (potassium hydroxide) solution or pellets are taken in a tube and placed within the conical flask, KOH absorbs the carbon dioxide and it prevents the carbon dioxide from being utilised by the plant for the process of photosynthesis. Function of KOH KOH KOH solution kept in the flask absorbs carbon dioxide and created partial vacuum in the flask. The air present in bent tube moves into conical flask and this pulls the water level up in the tube.
Consequences:
(i) The whole amount of CO_2 liberated gets absorbed by KOH to prevent it from being utilized by the plant for the process of photosynthesis.
(ii) This CO_2 absorption leads to creating a vacuum in a flask that causes an observable rise in the water level of the connected U tube.
(iii) Any gas produced can neither escape nor can get outside air in.
(iv) Germinating seed produces CO_2 via the following
reactions:
Aerobic respiration:
$C_6H_{12}O_6+60_26CO_2 + 6H_2O+ 38ATP$

51. (a) (i) Herbivores need a longer small intestine than that of carnivores because their diet is mostly grass and plants, that contains more fibres and cellulose which are hard to digest. Longer small intestine also hosts many small bacteria that process and break down cellulose into glucose which is a source of energy. Carnivores diet is not rich in cellulose so, they do not need to harbour bacteria for cellulose digestion.
(ii) Human lungs have a highly branched network of respiratory tubes. A primary bronchus divides into secondary bronchi, which in turn forms tertiary bronchi. Tertiary bronchi divide repeatedly into bronchioles which finally terminate into alveoli. Alveoli are small, rounded polyhedral pouches which are extremely thin- walled and possess a network of capillaries, for the exchange of gases. Due to vast surface area of alveoli, exchange of gases becomes a fast and effective process. Oxygen diffuses from alveoli into pulmonary blood capillaries and CO_2 diffuses out from capillaries into alveoli.
(b) Refer answer 49 (a).

52. For flow chart refer to answer 47. Respiratory pigment present in human beings is haemoglobin. Rings of cartilage are C-shaped, stacked one on top of

the other. These cartilaginous rings prevent the trachea from collapsing and blocking the airway.

53. (b) Transpiration pull help in the upward movement of water from roots to leaves. A lot of water evaporates through stomata present on the surface of leaf.

54. (b)

55. (d) The walls of ventricles are thicker than walls of atria.

56. (i) (d): Viruses show molecular movements when they are inside a living cell. Molecular movements are movements that are produced by a living cell for its day to day metabolic activities.
(ii) (c) Respiration is an oxidative process in which food substances such as carbohydrates, proteins and fats are burnt within tissues to form carbon dioxide, water and consequent release of energy. The released energy temporarily remains stored as ATP.
(iii) (d)
(iv) (a) In autotrophic nutrition, green plants take in substances such as CO_2 and H2O from outside and convert them into stored energy (carbohydrates) in the presence of sunlight and chlorophyll.
(v) (d): The circulatory system transport materials like food, O_2 or waste material throughout the body.

57. (a) The right and left sides of the heart are separated by a muscular wall that prevents mixing of oxygenated with deoxygenated blood. Such separation allows a highly efficient supply of oxygen to the body.

58. (a) In spring, new buds are formed. These buds need more energy to grow than other parts of the plant. This energy comes from the sugar stored in root or stem tissue and is transported to the buds by phloem.

59. (d) In tall trees, the driving force to move water upward is transpiration. During transpiration, as the water evaporates through the stomata in the leaves, it creates a negative pressure in the leaves and xylem tissues.

60. (b) Capillaries are tiny blood vessels which have thin walls and are one-cell thick. Exchange of materials between blood and surrounding cells takes place across these thin walled, capillaries. These also take waste products away from tissues.

61. (d) Blood vessel A represents pulmonary artery and blood vessel B represents pulmonary vein. Oxygen-rich blood from the lungs comes to the left atrium via pulmonary vein. The left atrium relaxes when it receives blood.

62. (b) The two components of phloem tissue that helps in transportation of food in plants are sieve tubes and companion cells.

63. (c)

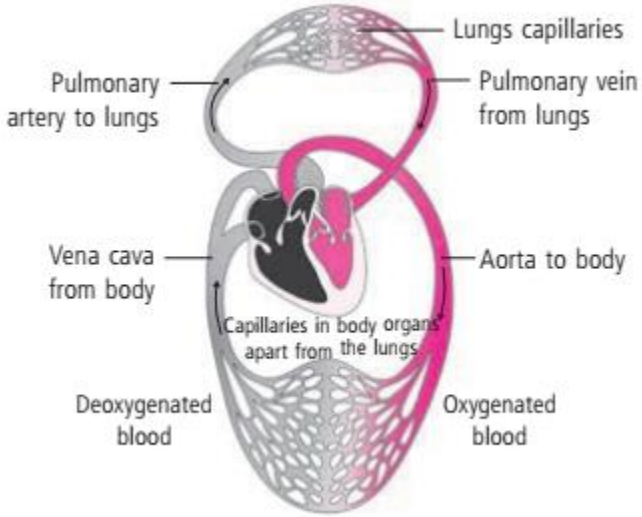
64. Pulmonary vein carries oxygenated blood from lungs to left atrium of heart.

65. The transport of food prepared in the leaves, by the process of photosynthesis, to various parts (roots, stem, branches, etc.) of the plant is called translocation.

66. Tissue fluid is also called lymph. The functions of tissue fluid are:
(i) It carries digested and absorbed fat from intestine.
(ii) It drains excess fluid from extracellular space back into blood.

67. (a) If xylem is removed, transport of water and minerals from soil would not occur, which lead to wilting of leaves and ultimately death of plant.
(b) In case of any injury when bleeding occurs, platelets circulate around body and form mesh-like network or clot at site of injury.

68. (i) Double circulation is a mechanism in which blood circulates twice through the heart in one complete cycle. Systemic circulation and pulmonary circulation are two pathways through which blood flows in double circulation.



(ii) The separation of right and left side of heart helps in separation of oxygenated and deoxygenated blood and allows highly efficient supply of oxygen to the body. Birds and mammals are warm blooded animals and their metabolism is quite complex. They require a constant supply of oxygen without proper separation, oxygenated blood can mix with deoxygenated blood which can cause problems in bird and mammals. Separation of the right side and left side of the heart ensures circulation of oxygenated blood to different body parts.

69. (a) Differences between transport in xylem and transport in phloem are as follows:

S. No.	Transport in xylem	Transport in phloem
(i)	Water and mineral salts are transported.	Food in aqueous form is translocated.
(ii)	The transport is unidirectional, *i.e.*, from roots to tip.	The transport is bidirectional, *i.e.*, from source to sink.

(b) Significance of transpiration in plants:
(i) The absorbed water is transported from roots to leaves through xylem vessels which is greatly influenced by transpiration pull.
(ii) The water stream moving upwards carries dissolved minerals with it. Transpiration also helps in distributing these minerals throughout the plant.
(iii) The evaporation of water during transpiration provide cooling effect to the leaves. (Any two)

70. The three types of blood vessels in human body are:
(i) arteries, (ii) veins and (iii) capillaries.
(i) Arteries are the blood vessels which carry blood from heart to various parts of the body. They are thick walled, elastic and muscular that enables them to dilate but do not rupture when the heart contracts and forces blood into them.
(ii) Veins are thin walled blood vessels which bring blood from the body back to the heart. They are larger and hold more blood than the arteries. The lumen of veins have valves which prevent the backflow of blood.
(iii) Capillaries are thin walled and extremely narrow blood vessels which

occur at the terminals of artery and vein. The wall of capillaries are permeable to water and dissolved substances, so that the exchange of materials between the blood and body cells can take place.

71. (a) Xylem tracheids and vessels are two water conducting tissues present in plants that help in rapid movement of water. In xylem tissue, vessels and tracheids of the roots, stems and leaves are interconnected to form a continuous system of water conducting channels reaching all parts of the plant. Minerals and water needed by the plants are absorbed by root hairs from the soil by the process of osmosis and take in minerals by the process of diffusion. Thus, a difference in concentration of ions is created between the oots and the soil which enables the water to enter into roots to compensate the difference in concentration. The water, alongwith dissolved minerals from root hairs, passes into xylem vessels through cells of the cortex, endodermis and pericycle and then ascent of sap (i.e., upward movement of water and mineral salts from roots to the aerial parts of the plant against the gravitational force) takes place from xylem of the roots to the xylem of stem and leaves through vessels and tracheids. Evaporation of water molecules from the cells of leaves creates a suction pressure which pulls the water from xylem cells.
(b) Plants are autotrophic and do not have to move from one place to another in search of their food. Movements in a plant occur at the cellular level and hence they require less amount of energy. Whereas animals are heterotrophic and move in search of food and other activities, hence require higher amount of energy than plants.

72. The functions of human heart are as follows:
(i) Heart maintains the blood pressure.
(ii) Heart pumps vital substances and nutrients to different body parts.
(iii) Heart pumps the oxygen-rich blood to the whole body and CO2-rich blood to the lungs for purification.
(iv) Heart is responsible for removing metabolic waste such as CO2 from all the tissue of the body. The heart of human beings consists of two sides - right and left. The right side of the heart receives deoxygenated blood and sends it further for purification to lungs. The left side of heart receives oxygenated blood from the lungs which is pumped further and sent to all the parts of the body through blood vessels. This is called double circulation. The energy

demands for human beings is too high and hence the separation of oxygenated and deoxygenated blood is necessary to meet high energy demands.

73. The phloem cells transport the soluble food materials to all parts of plant. The transport of food from leaves to different parts of plant is termed as translocation. Components of phloem are sieve tubes, companion cells, phloem parenchyma and phloem fibres. The food is manufactured in the mesophyll cells (or photosynthetic cells) of a leaf. The manufactured food enters into sieve tubes of the phloem and is transported as a dilute aqueous solution either in upward or downward direction. Food is transported to all non-green parts of the plant for their growth and metabolic activities. Besides food molecules, phloem also transports amino acids, hormones synthesised in the shoot tips and root tips and other metabolites.In this process, glucose is transferred to phloem tissue using energy from ATP. This increases the osmotic pressure of the tissue causing the water to move into it (endosmosis). Soluble material is then transferred from phloem tissue to other tissues which have less pressure than in the phloem. Thus, according to plant's requirement, the material is translocated from higher osmotic pressure areas to lower osmotic pressure areas.

74. (i) Xylem is a specialised plant conducting tissue that transports water and minerals from roots to all aerial parts of plants which occurs against gravitational force with the help of ascent of sap.
(ii) Phloem transports food that is prepared in the leaves, through photosynthesis, to various parts of plant. This process is called translocation. It also transports amino acids, hormones synthesised in the shoot tips and root tips and other metabolites.
(iii) Pulmonary vein present in human circulatory system brings oxygenated blood from lungs to the left atrium of the heart.
(iv) Vena cava transport deoxygenated blood collected by all veins of body except pulmonary vein and pass it to the right atrium of heart.
(v) Pulmonary artery transports deoxygenated blood from right atrium of heart to lungs for oxygenation.
(vi) Aorta transports oxygenated blood from left atrium to systemic arteries which further take the blood to various body parts and organs.

75. Refer to answer 69 (b).

76. (i) Minerals and water needed by the plants are absorbed by roots. The root hairs absorb water from the soil by the process of osmosis and take in minerals by the process of diffusion. Thus, a difference in concentration of ions is created between the roots and the soil which enables the water to enter into roots to compensate the difference in concentration. This water along with dissolved minerals from the root hairs passes into xylem vessels through cells of cortex, endodermis and pericycle and then ascent of sap takes place from xylem of roots into the xylem of stem and finally leaf veins through vessels and tracheids.
(ii) Bleeding leads to a loss of pressure which reduces the efficiency of the pumping system. When an injury is caused, the blood platelets in blood release certain chemicals which are called the platelet factors (e.g., thromboplastin). These platelet factors help in the clotting of blood.

77. (a) Since ventricles have to pump blood into various organs with high pressure, they have thicker walls than atria.
(b) Transport system in plants is less elaborate than in animals, as plants are less active, so their cells do not need to be supplied with materials quickly.
(c) The aquatic vertebrates like fish have gills to oxygenate blood. The flow of blood in a fish is single circulation because the blood passes through the heart only once in one complete cycle of body. The terrestrial vertebrates like birds and humans have double circulation as the blood travels heart twice in one complete cycle of blood and they have lungs for oxygenation of blood.
(d) During daytime, water and minerals travel faster through xylem because rate of transpiration is higher during daytime.
(e) The lumen of veins have valves, which allow the blood to flow in only one direction. Thus prevents back flow of blood.

78. (a) Fishes have only two chambers in their heart, the blood is pumped to the gills for oxygenation and from there it passes directly to rest of the body. Thus, the blood goes only once through the heart during one cycle of passage through the body. This type of circulation is termed as single circulation. In human beings, during circulation blood travels twice through the heart in one complete cycle of the body and is called double circulation. The pathway of blood from the heart to the lungs and back to the heart is called pulmonary circulation and the pathway of blood from the heart to the rest of the body and back to heart is called systemic circulation.

(b) In human beings, deoxygenated blood from the body tissues is poured into right atrium. Contraction of heart forces it into right ventricle. From right ventricle, deoxygenated blood flows to the lungs through pulmonary artery. Oxygenated blood from lungs is returned into left atrium and then into left ventricle. The left ventricle forces the oxygenated blood to the whole body. Thus, for making one complete round or circulation circuit around all body parts, the blood passes through the heart twice. This is known as double circulation of blood.

79. (a) Two components of blood are blood plasma and blood corpuscles.
(b) Oxygenated blood from lungs → Pulmonary veins → Left atrium of heart → Left ventricle → Aorta → Arteries → Body parts
(c) When blood is pumped, valves prevent back flow of blood between ventricles and atria. They open and allow the right amount of blood to flow from one chamber to the other.
(d) Structural difference between veins and arteries is as follows:

Veins	Arteries
Veins have thin, less elastic and less muscular walls. They have valves to prevent back flow of blood.	Arteries have thick, elastic and muscular walls with no valves.

80. (d) A Right kidney, B - Vena cava, C - Aorta and D - Urinary bladder.

81. (b) In plants, waste products is removed in the form of dry leaves that fall off, resins and gums, and water whereas urea is removed as waste product in animal.

82. (i) (c) The semi-permeable lining of the tubes of haemodialyser allow the passage of waste products such as urea, creatinine, etc., from the blood to the dialysing fluid.
(ii) (c) Artificial kidney is not involved in the reabsorption of essential nutrients from the blood.
(iii) (a): The used dialysing fluid/solution is rich in waste products like urea and excess salts because during the passage of patient's blood through tubes with a semi- permeable lining, the waste products from the blood pass into the

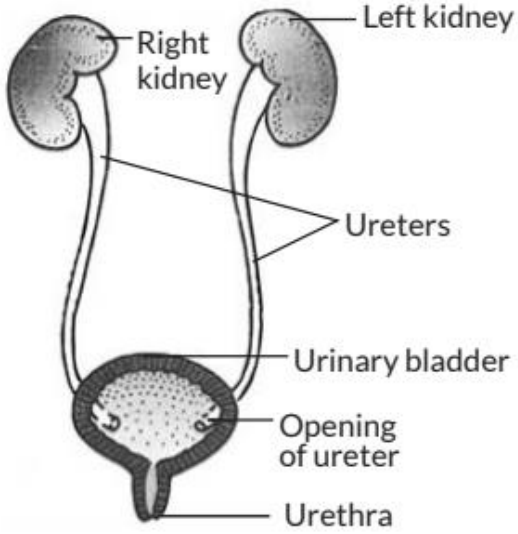
dialysing fluids by diffusion.
(iv) (c): The function of tubules of nephron is to allow the selective reabsorption of useful substances like glucose, amino acids, salts and water into the blood capillaries.

83. (i) Renal artery carries blood from aorta to kidneys for filtration.
(ii) Urethra receives urine stored in bladder and releases it outside.
(iii) Glomerulus filters the blood passing through it and initiates urine formation.
(iv) Tubular part of nephron allow selective reabsorption of useful substances like glucose, amino acids, salts and water into the blood capillaries.

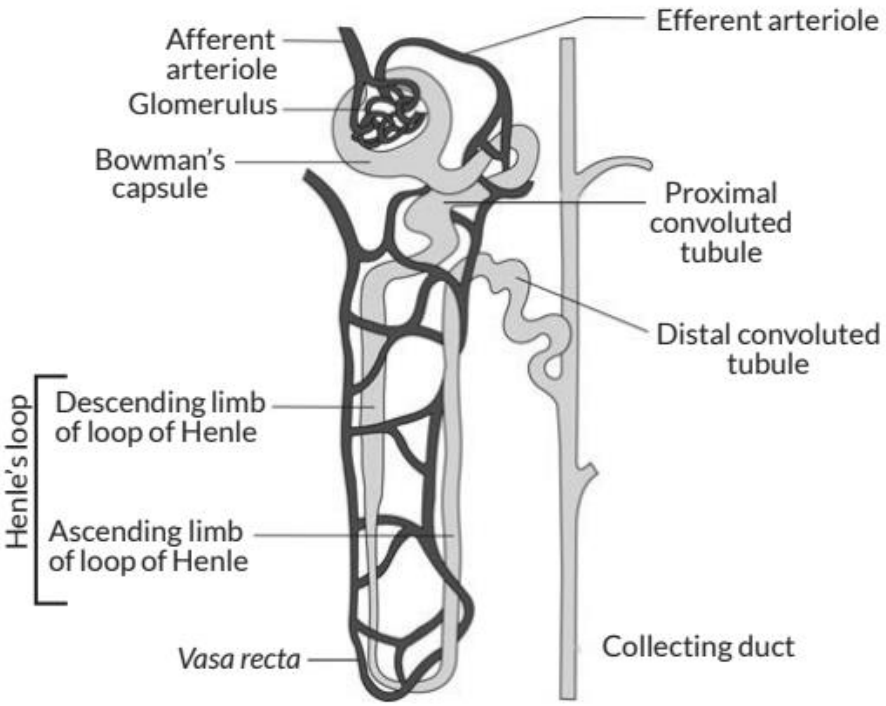
84. Most of carbon dioxide is released through stomata in leaves. Plants can get rid of excess water by the process of transpiration i.e., evaporative loss of water. Many plant waste products are stored in leaves which get excreted when they are shed off.

85. (a) Excretion is a biological process by which harmful metabolic wastes like nitrogenous substances are removed from the body. Metabolic activities produce waste products like water, salts, CO_2, uric acid and urea. Accumulation of these excretory wastes beyond a certain limit inside the body is harmful to the body.
(b) A pair of kidneys are the main excretory organs in human being. It helps excrete nitrogenous waste in the form of urea, toxins, excess of salts, water soluble vitamins, etc. and then eliminates it in the form of urine.

86. Diagram of human excretory system is as follows:



87. Nephrons are the functional unit of kidney. Each kidney has about one million nephrons. Each nephron consists of a cup-shaped structure called Bowman's capsule containing a bunch of capillaries called glomerulus. Bowman's capsule leads into tubular structure which ultimately joins the transverse collecting tubule. Structure of nephron showing blood vessels duct and tubule is as follows:



Function: The function of nephron is filtration of blood and elimination of waste material from it. Blood is filtered from the blood capillaries into Bowman's capsule and pour the filtrate into the renal tubule. In this part, large amount of water and useful substances like glucose, amino acid, minerals ions, etc., are reabsorbed. Nitrogenous waste along with little amount of water is sent to the urinary bladder through the ureters, which later expels the urine to the outside through urethra.

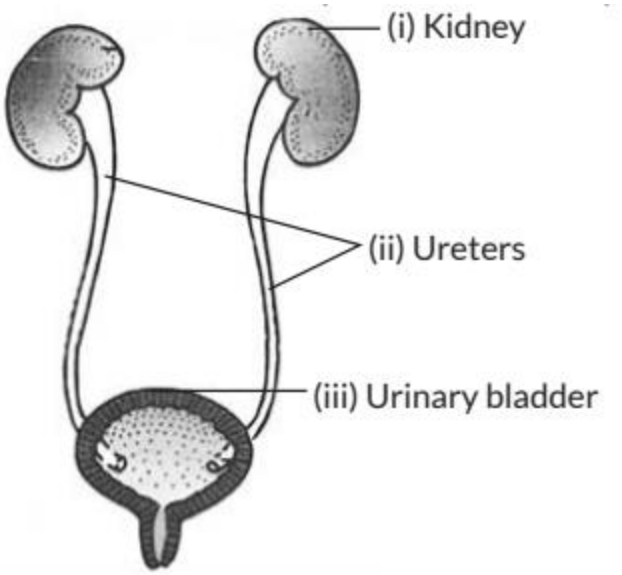
88. (a) Refer to answer 87.
(b) The amount of urine produced is regulated by antidiuretic hormone (ADH) or vasopressin hormone, i.e., secreted from the posterior pituitary gland. The function of this hormone is to reabsorb water from the nephric filtrate. If enough water is present in blood, smaller amount of ADH is secreted and less amount of water will be reabsorbed from nephric filtrate and hence

more urine is formed. If less amount of water is present in the blood, more ADH will be secreted, more water will be reabsorbed from the nephric filtrate by blood capillaries surrounding the nephron and hence less urine will be produced.

89. (a) Excretory system (urinary system) in human beings consists of a pair of kidneys, a pair of ureters, urinary bladder and urethra.
(b) In the kidney, the wastes are converted to urine by three processes:
(i) Ultrafiltration: Large amount of water along with certain harmful substances like urea, uric acid, K+, ammonium salts, creatinine, etc., and certain useful substances like glucose, amino acids, Na+, etc., pass through glomerular capillaries and glomerular membrane into cavity of Bowman's capsule of nephrons under pressure. The filtrate so formed is called nephric filtrate which is moved towards ureter.
(ii) Selective reabsorption : Large amount of water and sodium, whole of glucose and amino acids and small amount of urea are passed back from nephric filtrate into blood capillaries. It occurs either by back diffusion (i.e., water and urea) or active transport (i.e., Na*, glucose and amino acids). It generally occurs in PCT (Proximal convoluted tubule) of nephrons.
(iii) Tubular secretion : Certain harmful chemicals like uric acid, creatinine, K+, etc., are passed from blood capillaries surrounding the nephron into nephric filtrate by active transport. It generally occurs in DCT (Distal convoluted tubule) of nephrons. Now, the fluid is termed as urine and is excreted out of the excretory organs.

90. (a) The biological process involved in the removal of wastes, produced during various metabolic activities in the body of an organism is called excretion.
(b) Basic filtration unit present in kidney is nephron.

(c)



(i) Kidney - Form urine
(ii) Ureter - A long tube that collect urine from kidney
(iii) Urinary bladder - Store urine until it is passed out.

91. (a) Refer to answer 86.
(b) Nephrons are the functional unit of kidney. Each kidney has about one million nephrons. Each nephron consists of a cup-shaped structure called Bowman's capsule containing a bunch of capillaries called glomerulus. Bowman's capsule leads into tubular structure which ultimately joins the transverse collecting tubule. Filtration of blood and formation of urine in nephron involves the following steps:
(i) The blood along with waste and excess water is brought to kidney by renal arteries. Blood is filtered from the blood capillaries into Bowman's capsule.
(ii) As the nephric filtrate passes through the tubular part of nephron, useful substances like glucose, amino acid, mineral ions, water, etc., are reabsorbed by blood capillaries surrounding the nephron.
(iii) Tubular secretion occurs mainly in the renal tubule and the collecting duct of the nephron where additional wastes are excreted from the blood stream into the filtrate.
(iv) The fluid that flows through collecting tubule is urine which consists of water, urea, uric acid, mineral ions like sodium, potassium, chloride, phosphates, etc.

CBSE Sample Questions

1. (b): Layer II and III consist of cell organelles called chloroplast which contain chlorophyll to absorb the light energy. Hence, maximum photosynthesis occurs here. (1)

2. (b): In oral cavity (i), the food is mixed with saliva which contains an enzyme salivary amylase that breaks down starch into simple sugars. In stomach (ii), gastric glands secrete gastric juice having protein digesting enzyme pepsin.
(iii) Pancreas secretes pancreatic juice containing enzyme trypsin. (0.80)
3. (d): The guard cells are specialised cells which controls the opening and closing of stomata. The guard cells shrink, by losing water, causing the stomata to close. The guard cells swell when water flows into them, causing the stomatal pore to open. (0.80)
4. (b): (i) represents oral cavity where initial phase of starch breakdown occurs by salivary amylase.
(ii) represents liver, which secrete bile. Bile salts help in the digestion of fats in the small intestine by increasing the efficiency of lipase enzyme action.
(iii) and (iv) represent small intestine, where digestion of proteins, carbohydrates and fats completes. Also, the length of small intestine is different in herbivores, carnivores, etc., depending on the food they eat. (0.80)

5. (b) Saprotrophic nutrition, is a form of nutrition where organism obtain their nourishment by first breaking down decomposed organic matter outside the body and further, the absorption of simpler products takes place through general body surface. E.g., yeast, mushroom, bread mould. (0.80)

6. (i) (c): In this experimental set up, destarching is done by placing the healthy plants in the dark for 72 hours. Further, use of KOH will allow the absorption of CO_2 in set up 'X'. Then, both set up 'X' and 'Y' are allowed to perform photosynthesis by keeping them in a limited (presence or absence of KOH) air tight condition and iodine test is performed to detect the presence of starch in both. The result will finally prove that CO_2 is an essential requirement of photosynthesis. (0.80)
(ii) (b): Potassium hydroxide (KOH) commonly called caustic potash is basic in nature and used to absorb acidic gases like CO_2. (0.80)
(iii) (b): In experimental set up 'X', the destarched plant is allowed to do

photosynthesis in a air tight condition with no CO_2 around. While, in set up 'Y' the destarched plant is allowed to do photosynthesis in the presence of CO_2. When iodine test is performed on the leaf from plant X and Y, blue-black colour is obtained on the leaf of plant Y and no change in colour seen on leaf of plant X. This suggest that starch formation in plant during photosynthesis occurred only in set up Y but not in set up 'X'. It proves that CO_2 is essential for photosynthesis. (0.80)
(iv) (c): To make an apparatus air tight, we place the plants on glass plate and cover it with a bell shaped glass jar. Further, applying vaseline to seal the bottom of jar will prevent any kind of movement of gases from the outside environment. (0.80)

7. The pancreas secretes pancreatic juice which contains enzymes like amylase for digesting starch, trypsin for digesting proteins and lipase for breakdown of emulsified fats. (1)

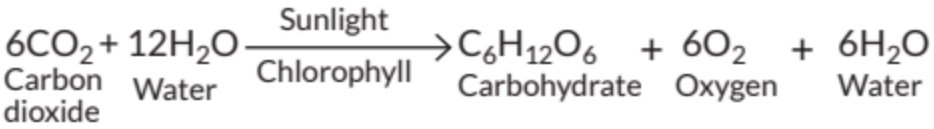
8. The small intestine is the main region for the absorption of digested food because the inner lining of the small intestine has numerous finger-like projections called villi. The villi increase the surface area for absorption. (1)

9. Goat will have longer intestine because herbivores eat grass and need a longer small intestine to allow the cellulose present in grass to be digested completely. (1)

10. Gall bladder stores bile which helps in emulsification of lipids. (1)
In the absence of stored bile, emulsification of fats will be negligible or less and thus fat digestion will be slow. Hence, there are such diet restrictions. (1)

11. Bile juice makes the acidic food coming from the stomach alkaline for the action of pancreatic enzymes. Bile salts break the large globules of fats in the intestine to smaller globules and thus increasing the efficiency of enzyme action. (2)

12. The following events occur during the process of photosynthesis:
(i) Absorption of light energy by chlorophyll.
(ii) Conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.
(iii) Reduction of carbon dioxide to carbohydrates. (1)

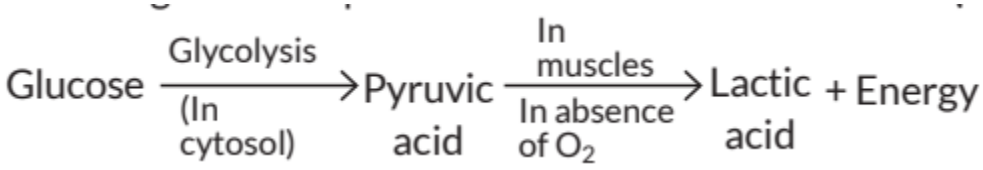


The three steps in photosynthesis need not take place one after the other immediately. They can take place at different times. (1)

13. (b) The given experiment shows that carbon dioxide is necessary for photosynthesis. CO_2 is a gas that is released as a byproduct of respiration in both humans and plants. KOH (X) is kept here in a watchglass under a bell jar to absorb all CO_2 present in bell jar. Carbon dioxide (CO_2) is slightly acidic in nature, hence KOH, which is a base, dissolves CO2 to form $K2CO_3$. The reaction involved is $2KOH(aq) + CO2_{(g)} \rightarrow K2CO_3 + H_2O(1)$ (1)

14. (c) In the given diagram, (i) is trachea, a straight tube supported by cartilaginous rings to ensure the smooth conduction of inspired air. (ii) is pleural membrane, a two layered (outer pleura and inner pleura) membranous structure which cover the lungs.
(iii) is alveoli, a thin walled rounded sac like structure where exchange of gases takes place. (iv) is diaphragm, a dome-shaped, muscular and membranous structure, upon inhalation our ribs lift up and diaphragm got flattens. (0.80)

15. (i) (b) Tissue or cellular respiration is used by higher plants and animals to obtain energy. This respiration involves release of energy in the form of ATP. (1)
(ii) (b): Anaerobic respiration occurs inside the muscles during vigorous muscular activities. It involves the following overall equation: (1)



(iii) (b) (1)
(iv) (c) During anaerobic respiration, lactic acid, CO_2 and energy are released. (1)
(v) (a) Aerobic respiration takes place in both cytoplasm and mitochondria while anaerobic respiration takes place in cytoplasm. (1)

16. (c) Amphibians contain a three-chambered heart with two atria and one ventricle. (1)

17. (d) In the given diagram, (i) is pulmonary vein which takes pure (oxygenated) blood from lungs to the left atrium which in turn pumps it to different body parts through aorta (ii). The impure (deoxygenated) blood coming from the body through vena cava (iv) enters to the right atrium. As the right atrium contracts, the right ventricle dilates, in turn it pumps the blood to the lungs for oxygenation through pulmonary artery (iii). (0.80)

18. (b) Contraction of lower chambers of heart (right ventricle and left ventricle) leads to the transfer of blood to lungs for oxygenation and pumping of pure blood into various organs simultaneously. (0.80)

19. (c) Resins and gums are waste products that are stored in old xylem tissue in plants. They do not facilitate transport of water molecules. (0.80)

20. (d) In single circulation, the blood flows through the heart only once during one cycle of passage through the body. This is present in organisms with 2-chambered heart, e.g., shark, dog fish, sting ray. (0.80)

21. Veins have thin, less elastic and muscular walls because the blood flowing through them is no longer under pressure instead they have valves to ensure that the blood flows in one direction only. (1)

22. Covering of leaves with foil paper will have following effects:
(i) No photosynthesis will occur, so no glucose will be made. Also no respiration will take place as no oxygen will be taken in.
(ii) No transpiration will occur, so there would be no upward movement of water or minerals from the soil as there will be no transpirational pull.
(iii) Temperature regulation of leaf surface will be affected. (2)

23. Lymph carries digested and absorbed fat from the intestine and drains excess fluid from extracellular space back into the blood. (1)
Blockage of lymphatic system will lead to water retention and poor fat absorption in the body. (1)

24. The separation of left and right sides of heart in birds and mammals prevent mixing of oxygenated and deoxygenated blood and allow a highly efficient supply of oxygen to the body. This is useful in animals that have high

energy needs (birds and mammals) which constantly use energy to maintain their body temperature. (2)

25. (d) Thin walled capillaries are present around alveoli and glomerulus of nephron. These tiny blood vessels allow the exchange of oxygen and other dissolved substances in a very efficient manner. (0.80)

26. (b) Plants do not have any specialised excretory organs unlike animals. Excess CO2 and O2 are excreted from plants through the stomata in the leaves. Excess water is evaporated by transpiration. (0.80)

27. (d) The tubule part of nephron is the site of reabsorption of water and useful solutes from the tubule back into the plasma. When this part is not functioning at all, the urine will be more diluted. (0.80)

28. Glucose, amino acids, salts and a major amount of water are selectively reabsorbed as the urine flows along the tube. The amount of water reabsorbed depends on how much excess water there is in the body, and on how much of dissolved waste there is to be excreted. (2)

29. Urine is produced in the kidneys, passes through the ureters into the urinary bladder. The major processes involved in the formation of urine are:
(i) Blood passes through filtration units in the kidney called nephron that has a cup shaped Bowman's capsule. It contains a bundle of very thin walled blood capillaries, called glomerulus. The blood passing into the glomerulus carries waste materials which are filtered out in the Bowman's capsule (ultrafiltration).
(ii) Filtrate initially has glucose, amino acids, water, salts and nitrogenous waste.
(iii) Selective reabsorption of substances, i.e., water (as per the need of the body), glucose and amino acids from the filtrate takes place.
(iv) Secretion of excess water, salts and urea (nitrogenous waste) takes place which makes the urine. (3)