Next Toppers

आरंभ BATCH

ACP

AARAMBH CHAPTERWISE PROBLEMS

Class-10th



Life Processes

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(Options acche se padhna)

VERY SHORT QUESTIONS (1 Mark)

(A) Multiple Choice Questions (MCQ's)

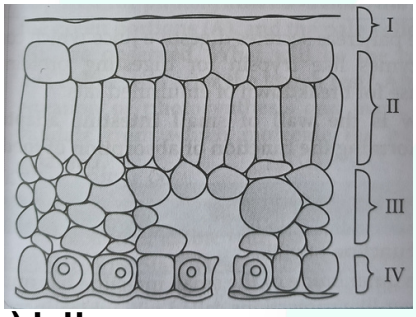
1. Generally food is broken and absorbed within the body of organisms. In which of the following organisms is it done outside the body? [2023-24, SQP]

a) Ameoba
b) Mushroom
c) Paramecium
d) Lice

2. A sportsman , after a long break of his routine exercise, suffered muscular cramps during a heavy exercise session. This happened due to: [2023-24, SQP]

a) Lack of carbon dioxide and formation of pyruvate
b) Presence of Oxygen and formation of ethanol.
c) Lack of oxygen and formation of lactic acid.
d) Lack of oxygen and formation of carbon dioxide.

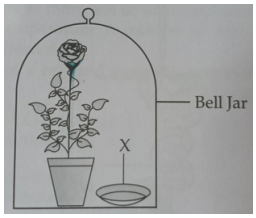
3. In the given transverse section of the leaf identify the layer of cell where maximum photosynthesis occurs. [2022-23, SQP]



a) I, II
b) II, III
c) III, IV
d) I, IV

4. Observe the experimental set up Shown below. Name the chemical indicated as 'X' that can absorb the gas which is evolved as a by product of respiration. [2023, SQP]





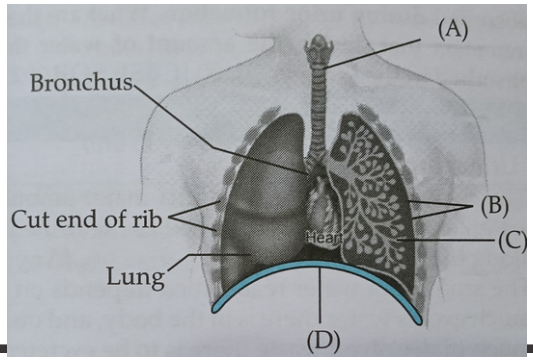
a) NaOH
b) KOH
c) $Ca(OH)_2$
d) K_2CO_3

5. In which of the following groups of organisms, blood flows through the heart only once during one cycle of passes through the body? [2021-22, SQP]
a) Rabbit , Parrot, Turtle
b) Frog, crocodile, Pigeon
c) Whale, Labeo, Penguin
d) Shark, dog fish, sting ray

6. What is common between extensive network of blood vessels around wall of alveoli and in glomerulus of nephron? [2021-22, SQP]
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.

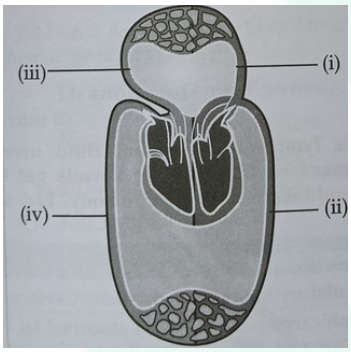
7. Plants use completely different process for excretion as compared to animals. Which one of the following processes is NOT followed by plants for excretion? [2021-22, SQP]
a) They can get rid of excess water by transpiration.
b) They selectively filter toxic substances through their leaves.
c) Waste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

8. Carefully study the diagram of the human respiratory system with label A, B, C and D. Select the option that gives the correct identification and main function or characteristic. [2021-22, SQP]



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

9. 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? [2022, SQP]



a) Pulmonary Vein - takes impure blood from body part.
b) Pulmonary artery - takes blood from lungs to heart.
c) Aorta - takes blood from heart to body parts.
d) Vena cava - takes blood from body parts to right auricle.

10. Identify the phase of circulation which is represented in the diagram of heart given below. Arrow indicates contraction of the chamber shown. [2022, SQP]



a) Blood transferred to the right ventricle and left ventricle simultaneously.
b) Blood transferred to lungs for oxygenation and is a pumped into various organs simultaneously.
c) Blood transferred to the right auricle and left auricle simultaneously.
d) Blood transferred from lungs after oxygenation and is received from various organs of the body.

11. In a person , the tubule part of the nephron is NOT functioning at all. What will it effect beyond urine formation? [2021, SQP]
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.

12. i) Which is the universal source of energy in all cells? [2017]
ii) If no apparent work is being done by an organism, why does it still take in food?

13. i) State the role of pancreas in digestion of food.
ii) Out of a goat and a tiger, which one will have a longer small intestine? Justify
iii) Mention any one point of difference between pepsin and trypsin. [2018, 20,21]

14. i) Veins are thin walled and have valves. Justify.
ii) Name a common nutrient that is absorbed in the small intestine and also reabsorbed by the kidney tubules. 2019, 21]

15. Name the components of blood which transport:
i) Food, carbon dioxide and nitrogenous wastes.
ii) Oxygen

16. i) Mention the respiratory unit of lungs and excretory unit of kidneys.
ii) Mention the pathway of urine starting from the organ of its formation. [2017]

17. i) Explain in brief two ways by which leaves of a plant help in excretion.
ii) Name two excretory products of plants other than oxygen and carbon dioxide.
iii) Why is it said that kidneys help in the process of osmoregulation? Explain.
iv) Name the substance 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 kidneys?
v) State the functions of Bowman's capsule and the glomerulus."
vi) The left kidney is placed a little higher than right kidney. Give suitable reason for this statement.

18. i) Why is it important to prevent oxygenated and deoxygenated blood from mixing in birds and mammals?
ii) Which animals can tolerate some mixing of the oxygenated and deoxygenated blood stream? On what factor does the body temperature of the animals depend? [2023]

19. Two green plants are kept separately in oxygen free containers, one in the dark and other in sunlight. It was observed that the one kept in the dark could not survive as long. [2023]

20. How is the wall of small intestine adopted for performing the function of absorption of food? [2020]

आरंभ BATCH

21. In the process of digestion of food in human beings, two protein-digesting enzymes are secreted. Name the enzymes along with the glands that secrete them. [2023]

22. State the role of pancreas in digestion of food. [2021]

(yaha Marks katate h)

Assertion and Reason type of Questions

In the following questions a statement of Assertion is followed by a statement of Reason.
Mark the correct choice as two statements are given one labeled Assertion (A) and the other labeled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
(a) Both A and R are true, and R is correct explanation of the assertion.
(b) Both A and R are true, but R is not the correct explanation of the assertion.
(c) A is true, but R is false.
(d) A is false, but R is true.

23. Assertion: Amphibians can tolerate mixing of oxygenated and deoxygenated blood.

Reason: Amphibians are animals with two chambered heart. [2022]

24. Assertion: Resins and gums are stored in old xylem tissue in plants.

Reason: Resins and gums facilitate transport of water molecules. [2021]

25. Assertion: Human beings are truly aerobic.

Reason: They produce lactic acid from muscles.

26. Assertion: Plasma of blood transports food, carbon dioxide and nitrogenous wastes.

Reason: Red blood corpuscles carry oxygen.

27. Assertion: The effect of root pressure in transport of water is more important at night.

Reason: During the day the transpiration pull acts as major driving force in the movement of water in the system.

(ho jaayenge aaram se)

SHORT ANSWER TYPE QUESTIONS (2 and 3 Marks)

28.[i] Patients whose gall bladder are removed are recommended to eat less oil food. Why? [2022]
[ii] Bile juice does not have any digestive enzymes but still plays a significant role in the process of digestion. Justify the statement. [2021]

29. [i] Explain the processes of aerobic respiration in mitochondria of a cell and anaerobic respiration in yeast and muscle with the help of word equation.
[ii] State the events occurring during the process of photosynthesis. Is it essential that these steps take place one after the other immediately? [2021]
[iii] The leaves of a plant were covered with aluminium foil, how would it affect the physiology of the plant? [2022]

30. Explain the ways in which glucose in break down in absence of oxygen. [2018]

31. What is the purpose of making urine in the human body? Name the organs that stores and releases the urine. [2023]

32. Why do arteries have thick and elastic walls whereas veins have valves. [2023]

33. 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]

34. How is lymph an important fluid involved in transportation? If lymphatic vessels get blocked, how would it affect the human body? Elaborate. [2022]

35. [i] Explain where and how urine is produced? [2020]
[ii] List three difference between arteries and veins. [2018]

36. What is photosynthesis? Explain its mechanism. [Delhi 2019]

OR

State the events occurring during the process of photosynthesis. Is it essential that these steps take place one after the other immediately? [SQP, 2020-21]

OR

List the events in proper sequence that take place during the process of photosynthesis. [2023]

37. Write three types of blood vessels. Give one important feature of each. [Delhi 2019]

(pahle points socho firr likho)

LONG ANSWER TYPE QUESTIONS (5 Marks)

38. (i)Describe the process of human double circulation system.
ii) How are CO_2 and O_2 transported in human beings? (CBSE 2018-19)

39. Write the function of the following in the human alimentary canal. (CBSE 2018-19)
(i) Saliva
ii) HCl in Stomach
iii) Bile juice
iv) Villi

40. Write one function of each of the following enzymes.
i) Pepsin
ii) Lipase

41. Draw a well labelled diagram of Nephron. Explain the process of formation of urine in the human kidney.

42. Why is energy needs in plants is very less as compared to animals? Explain.

43. Draw the diagram showing Human Respiratory System. Label the following parts.
a) Alveolus
b) Trachea
c) Bronchus
d) Lungs

(pahle points socho firr likho)

Case Study/Source Based Question

44. Usman performed an experiment where he added saliva to starch and then tested it with iodine after a few minutes. No blue-black color appeared.

[i] What was the purpose of Usman's experiment?

[ii] Why didn't the solution turn blue-black?
[ii] Name the enzyme in saliva and state its function.

45. Riya was studying the human circulatory system and came across the concept of double circulation. Her science teacher explained that in humans, blood passes through the heart twice in one complete cycle—once for oxygenation in the lungs, and once to supply oxygen to the body. She also learned that the human heart is four-chambered, ensuring that oxygenated and deoxygenated blood do not mix. This separation is crucial for warm-blooded animals like humans, who have high metabolic needs. The teacher also showed a model of the heart and labelled parts like the left atrium, right atrium, ventricles, and major blood vessels such as the aorta, vena cava, and pulmonary arteries and veins.

[i] What is meant by double circulation in humans?
A. Blood circulates once in the heart during one cycle
B. Blood flows in arteries and veins simultaneously
C. Blood passes through the heart twice in one complete cycle
D. Blood moves only through lungs and heart

[ii] Why is it important to keep oxygenated and deoxygenated blood separate in humans?
A. To increase body temperature
B. To allow efficient oxygen supply to organs
C. To reduce heart rate
D. To improve food digestion

[iii] Which blood vessel carries oxygenated blood from the lungs to the heart?
A. Pulmonary artery
B. Aorta
C. Pulmonary vein
D. Vena cava

[iv] Which chambers of the heart receive blood from the body and the lungs respectively?
A. Right ventricle and left ventricle
B. Left atrium and right atrium
C. Right atrium and left atrium
D. Left ventricle and right atrium

[v] Why do ventricles have thicker walls than atria?
A. They carry less blood
B. They store oxygen
C. They pump blood with higher pressure
D. They receive blood from lungs

PK Special [KBC]



46. A person is breathing rapidly but shallowly. Predict how this may affect the gaseous exchange in the alveoli. Justify your answer.

47. Why is it important for the diaphragm and intercostal muscles to work in coordination during inhalation and exhalation? What could happen if one fails to function properly?

48. Why do athletes develop better lung capacity over time? Link this to changes in their breathing mechanism and muscle efficiency.

49. Why is unidirectional flow of water over gills in fishes more efficient than the bidirectional flow of air in human lungs?

50. A person accidentally inhales food particles while eating. Which structure in the respiratory system failed to function, and what could be the consequences?

51. Blood from the lungs enters which chamber of the heart, and why is this blood different from the blood entering the right atrium? Explain in terms of oxygen content and source.

52. A patient has a blockage in his lymphatic vessels. What effects might this have on tissue fluid balance and immunity?

53. Fish die quickly outside water, whereas amphibians like frogs survive longer. Give a reason based on respiratory adaptations.

54. Why does the human heart need to separate oxygenated and deoxygenated blood, whereas this is not required in a fish?

55. A leaf is boiled in alcohol during a starch test. Why is this step necessary, and what safety precautions should be taken?

Kitne Questions kar paaye?

SOLUTIONS

SOLUTIONS

VERY SHORT ANSWER TYPE QUESTIONS:

1. (b)

2. (c)

3. (b)

4. (b)

5. (d)

6. (d)

7. (b)

8. (c)

9. (d)

10. (b)

11. (d)

12. [i] Adenosine Triphosphate (ATP) is the universal source of energy in all cells.
[ii] Even if no visible work is being done, the body needs energy to maintain basic life processes like breathing, heartbeat, digestion, cell repair, and temperature regulation. Food provides the energy required for these internal activities.

13 [i] The pancreas secretes pancreatic juice into the small intestine. This juice contains enzymes like amylase (digests carbohydrates), trypsin (digests proteins), and lipase (digests fats), which help in the digestion of food.
[ii] A goat will have a longer small intestine.
🔹 Justification: Goats are herbivores, and plant-based food is rich in cellulose, which takes longer to digest. A longer small intestine gives more time and surface area for absorption. In contrast, tigers are carnivores, and meat is easier to digest, so they have a shorter small intestine.

SOLUTIONS

iii) Pepsin acts in the stomach and works in an acidic medium.
Trypsin acts in the small intestine and works in an alkaline medium.

14. [i] Thin walls: Veins carry blood at a lower pressure compared to arteries. Due to this low pressure, their walls do not need to be thick and muscular like arteries.
Valves: Veins contain valves to prevent the backflow of blood and ensure that it flows in one direction toward the heart, especially from the lower parts of the body against gravity.
[ii] Glucose is a common nutrient that is:
Absorbed in the small intestine into the bloodstream during digestion.
Reabsorbed by the kidney tubules during urine formation to ensure it is not lost from the body.

15. [i] Plasma
Plasma is the liquid part of blood. It transports:

- Food (digested nutrients) like glucose, amino acids
- Carbon dioxide (mostly in dissolved form as bicarbonates)
- Nitrogenous wastes like urea

[ii]Red Blood Cells (RBCs)

- RBCs contain hemoglobin, a protein that binds with oxygen and transports it from the lungs to the body tissues.

16. [i] Respiratory unit of lungs: Alveoli
Excretory unit of kidneys: Nephron
[ii]Kidneys (formation of urine)

- ↓
- Ureters (transport urine to bladder)
- ↓
- Urinary bladder (storage of urine)
- ↓
- Urethra (urine is expelled out of the body)

17. [i]Transpiration: Leaves lose excess water in the form of water vapor through stomata. This is a form of excretion.

- Shedding of leaves: Plants store waste products like resins and tannins in aging leaves. When these leaves fall off, the wastes are also removed from the plant body

SOLUTIONS

[ii] Resins and Gums (Other examples: latex, oils, alkaloids)
[iii]Osmoregulation is the control of water and salt balance in the body. Kidneys regulate the amount of water and salts reabsorbed or excreted during urine formation. This maintains the osmotic pressure and balance of fluids in body tissues and blood.
[iv]Glucose and amino acids
Two parameters that decide the amount of water reabsorbed:

1. **Amount of excess water in the body**
2. **Concentration of dissolved waste (like urea) in the blood**

[v]Bowman's capsule: It collects the filtrate that is forced out of the blood from the glomerulus.

- **Glomerulus: A network of capillaries that filters blood under pressure, removing waste, water, and small molecules.**

[vi] Because the right kidney is slightly pushed down by the large size of the liver on the right side of the body.

18. [i]Birds and mammals are warm-blooded animals (endotherms).

- **They require a constant and high energy supply to maintain a stable body temperature.**
- **Mixing of oxygenated and deoxygenated blood would reduce the efficiency of oxygen transport, resulting in less energy (ATP) production during cellular respiration.**
- **So, complete separation ensures efficient oxygen delivery and high metabolic rate necessary for temperature regulation.**

[ii]Amphibians and reptiles can tolerate some mixing of oxygenated and deoxygenated blood.

- **Their body temperature depends on the environment.**
- **Such animals are called cold-blooded (ectothermic) — they cannot regulate their own body temperature internally and rely on the surrounding temperature.**

19. Two green plants were placed in oxygen-free containers — one in dark, and the other in sunlight. The plant kept in the dark did not survive for long.
Reason:

- **In the absence of sunlight, the plant kept in the dark could not perform photosynthesis, which is the process that produces oxygen and glucose (food).**
- **Since the container was oxygen-free, and the plant couldn't produce its own oxygen through photosynthesis, it could not carry out aerobic respiration, which is essential for energy production.**
- **As a result, the plant lacked both oxygen and food, leading to its early death.**

SOLUTIONS

20. The inner wall of the small intestine has finger-like projections called villi which:

- **Increase the surface area for maximum absorption.**
- **Have a rich supply of blood capillaries to quickly transport absorbed nutrients into the bloodstream.**
- **The epithelium of villi is thin, allowing easy and efficient diffusion of nutrients.**
- **Villi also contain lacteals (lymph vessels) that help in the absorption of fats.**

21.Pepsin

- **Secreted by: Gastric glands in the stomach**
- **Function: Begins the digestion of proteins in an acidic medium**

Trypsin

- **Secreted by: Pancreas (as trypsinogen, then activated in the small intestine)**
- **Function: Further digests proteins into smaller peptides in the small intestine**

22.The pancreas is a digestive gland that secretes pancreatic juice into the small intestine.
Pancreatic juice contains digestive enzymes that help break down all major food components:

1. **Trypsin – digests proteins into peptides**
2. **Amylase – breaks down starch into maltose (a sugar)**
3. **Lipase – breaks down fats into fatty acids and glycerol**

These enzymes work best in the alkaline medium of the small intestine, created by bile.

ASSERTION AND REASON TYPE QUESTIONS:

23. [c]

24. [c]

25. [b]

26. [b]

27. [a]

SOLUTIONS

SHORT ANSWER TYPE QUESTIONS:

28. [i] The gall bladder stores and concentrates bile, which helps in the emulsification of fats (breaking down large fat globules into smaller ones for easier digestion).

When the gall bladder is removed, bile is still produced by the liver, but it is not stored or released in sufficient quantity at once.

As a result, the digestion of fatty/oily food becomes less efficient, so patients are advised to eat less oily food to avoid indigestion and discomfort.

[ii]Bile juice, secreted by the liver, does not contain digestive enzymes, but it still plays a crucial role in digestion by:

1. **Emulsifying fats – It breaks large fat globules into smaller droplets, increasing the surface area for lipase enzyme to act on.**
2. **Neutralizing stomach acid – Bile is alkaline and helps neutralize the acidic chyme coming from the stomach into the small intestine, providing a suitable pH for the action of intestinal enzymes.**

Thus, bile juice aids in the efficient digestion and absorption of fats even without containing enzymes.

29. [i] Aerobic respiration in mitochondria (in the presence of oxygen): This process occurs in the mitochondria of cells and produces energy by breaking down glucose using oxygen.

Word equation: Glucose + Oxygen → Carbon dioxide + Water + Energy (ATP)

Anaerobic respiration:

- **In yeast (fermentation): Occurs in the absence of oxygen and results in the production of alcohol and carbon dioxide.**

Word equation: Glucose → Lactic acid + Energy

[ii] Events occurring during photosynthesis: Photosynthesis occurs mainly in the chloroplasts of green plant cells and includes the following steps:

- **Absorption of light energy by chlorophyll.**
- **Conversion of light energy to chemical energy, and splitting of water molecules into hydrogen and oxygen.**
- **Reduction of carbon dioxide using the hydrogen to form glucose.**

No, it is not essential that all these steps occur immediately one after the other. The light-dependent reactions (steps 1 and 2) can occur during daylight and store energy temporarily. The light-independent reactions (Calvin cycle – step 3) can

SOLUTIONS

then use the stored energy even when light is not present.
[iii] Covering the leaves with aluminium foil blocks light from reaching the leaf surface. This will:
Inhibit photosynthesis, as light is essential for the process.
Reduce glucose production, which affects plant growth and energy storage.
Over time, the covered leaves may turn yellow or die due to lack of chlorophyll renewal and food synthesis.

30. When oxygen is not available, glucose is broken down anaerobically to release energy. This process occurs differently in various organisms:
1. In Yeast (Alcoholic Fermentation):
- Yeast cells break down glucose without oxygen to produce alcohol (ethanol) and carbon dioxide, along with some energy.
- This process is used in brewing and baking industries.

Word equation: Glucose → Alcohol + Carbon dioxide + Energy
2. In Human Muscle Cells (During Vigorous Exercise):
- When muscles work very hard (like during running), oxygen may not be available fast enough.
- Glucose is broken down to form lactic acid and a small amount of energy.
- Accumulation of lactic acid causes muscle fatigue and cramps.

Word equation: Glucose → Lactic acid + Energy
These anaerobic processes release less energy than aerobic respiration because glucose is incompletely broken down

31. The main purpose of making urine is to remove waste products and excess substances (like water, salts, and urea) from the body. This helps in:
- Excretion of harmful metabolic wastes (especially urea).
- Maintaining water balance and salt levels in the body.
- Regulating blood pressure and pH balance.

Organs that store and release urine:
- Urinary bladder – stores the urine.
- Urethra – releases the urine out of the body.

32. Arteries carry oxygen-rich blood away from the heart under high pressure.
Their walls are thick and elastic to:
  - Withstand the high pressure of the blood pumped by the heart.
  - Stretch and recoil to maintain smooth blood flow.

SOLUTIONS

Veins carry deoxygenated blood back to the heart at low pressure.
Valves are present in veins to:
Prevent backflow of blood.
Ensure one-way flow of blood toward the heart, especially against gravity (e.g. legs)

33. Substances other than water that are reabsorbed during urine formation:

- Glucose
- Amino acids
- Salts (ions like sodium, potassium, etc.)

These are reabsorbed from the filtrate back into the blood in the kidneys because they are useful to the body.

Two parameters that decide the amount of water reabsorbed in the kidney:

1. Amount of excess water in the body
   - If there is too much water in the body, less water is reabsorbed, and more is passed out in urine.
2. Amount of dissolved waste (especially urea) in the body
   - If the concentration of waste is high, more water is reabsorbed to maintain balance and prevent toxicity.

34. Lymph is a clear, yellowish fluid that plays a crucial role in the body's transport system. It is formed from the fluid that leaks out of blood capillaries into the tissues (tissue fluid). Lymph is collected by lymphatic vessels and returned to the blood circulation.
Functions of lymph:

- Transports nutrients, hormones, and oxygen to the body cells where blood capillaries are absent or limited.
- Removes waste products and carbon dioxide from tissues.
- Transports fats and fat-soluble vitamins from the small intestine to the blood (via lacteals).
- Helps in defense by carrying white blood cells (especially lymphocytes) that fight infections.

If lymphatic vessels are blocked, it leads to a condition called lymphatic obstruction or lymphedema. Here's how it affects the body:

- Swelling of body parts (usually arms or legs) due to accumulation of lymph in tissues.
- Poor drainage of tissue fluid, causing heaviness, discomfort, and restricted movement.

SOLUTIONS

- Increased risk of infections, as immune cells can't reach tissues efficiently.
- Delayed wound healing and tissue damage due to reduced waste removal and oxygen delivery.

35. [i] Urine is produced in the kidneys through a process called urine formation, which involves three main steps:

1. **Filtration:**
   - **Occurs in the glomerulus of the nephrons (functional units of kidneys).**
   - **Blood is filtered under pressure, and water, salts, glucose, and urea pass into the Bowman's capsule.**
2. **Reabsorption:**
   - **Useful substances like glucose, amino acids, salts, and most of the water are reabsorbed back into the blood from the tubules.**
3. **Secretion:**
   - **Additional waste substances like excess ions and urea are secreted into the tubule.**

[ii]

Feature	Arteries	Veins
Direction of flow	Carry blood away from the heart	Carry blood toward the heart
Wall structure	Thick and elastic to handle high pressure	Thin and less elastic
Valves	No valves (except near the heart)	Have valves to prevent backflow
Type of blood (general)	Usually carry oxygenated blood	Usually carry deoxygenated blood

36. Photosynthesis is the process by which green plants make their own food using sunlight, carbon dioxide, and water. It occurs in the chloroplasts of plant cells, which contain the green pigment chlorophyll.

Equation: $6CO_2 + 6H_2O \rightarrow$ (sunlight & chlorophyll) $\rightarrow C_6H_{12}O_6 + 6O_2$

SOLUTIONS

Mechanism / Events of Photosynthesis (in proper sequence):

- Absorption of light energy by chlorophyll.
- Conversion of light energy into chemical energy (in the form of ATP and NADPH).
- Splitting of water molecules (photolysis) into hydrogen and oxygen:
- Oxygen is released as a by-product.
- Reduction of carbon dioxide using hydrogen (from water) to form glucose (a simple sugar).

Do these steps need to happen one after another immediately?

- No, it is not essential for all steps to happen one after the other immediately.
- The light-dependent reactions (steps 1 to 3) occur in the presence of sunlight.
- The light-independent reaction (step 4, also called the Calvin Cycle) can occur even when sunlight is not directly available, as it uses the energy stored in ATP and NADPH produced earlier.

37. Arteries

- Feature: Have thick and elastic walls to carry blood away from the heart under high pressure.

Veins

- Feature: Have valves to prevent backflow of blood as they carry it toward the heart at low pressure.

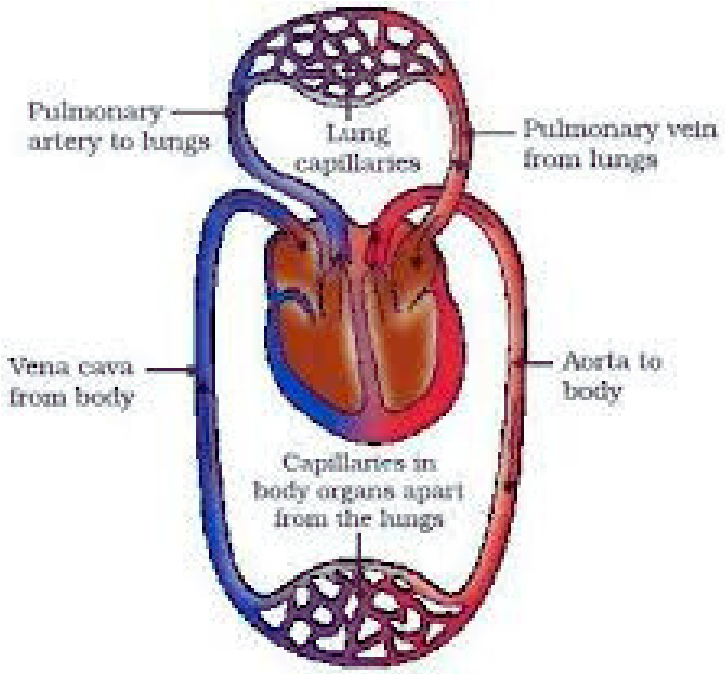
Capillaries

- Feature: Have thin, one-cell-thick walls to allow exchange of gases, nutrients, and waste between blood and body tissues.

LONG ANSWER TYPE QUESTIONS:

38. Double circulation describes the fact that blood flows twice in the heart before it completes one full round. One is pulmonary circulation and the other is systemic circulation. Pulmonary circulation starts from the pulmonary artery which divides into two branches which enter the respective lungs. Pulmonary veins collect the oxygenated blood from the lungs and carry it back to the left auricle of the heart. Systemic circulation starts with aorta that arises from the left ventricle. The aorta arches back and continues behind as aorta. The aorta sends arteries to various parts of the body and tissues. From there, blood is collected by veins and sent back to the heart.

SOLUTIONS



Double Circulation

39. The Function of the following in the human alimentary canal are:
i) Saliva: An enzyme in saliva called amylase begins to break down into maltose sugar.

(ii) HCl in the stomach: The main function of hydrochloric acid in food is to kill bacteria that may enter the stomach with food. It also helps in creating the acidic environment or acidic pH required for the activation of inactive pepsinogen.

(iii) Bile juice: It performs two major functions: It makes the acidic food coming from the stomach alkaline so that the pancreatic enzymes can act on it. Also, the bile salts break down the fats present in the food into small globules making it easy for the enzymes to act and digest them.

(iv) Villi: Absorption of digested food occurs mainly in the small intestine because it consists of many finger-like projections called villi that are supplied with numerous blood vessels. They provide a large surface area for the absorption of food.

SOLUTIONS

40. The Function of the following enzymes are:
(i) Pepsin: Pepsin helps in the digestion of proteins into amino acids

(ii) Lipase: It is an enzyme that acts on emulsified fats (lipids) into digestible form.

41.The process of urine formation in the kidneys, which is a crucial part of the excretory system, involves three main steps:

•Glomerular Filtration: This is the initial stage where blood enters the kidney's nephrons, and the glomerulus filters out waste products, ions, and water from the blood. This filtered fluid is known as the glomerular filtrate. Importantly, substances like red blood cells and proteins are not filtered out due to their large size.

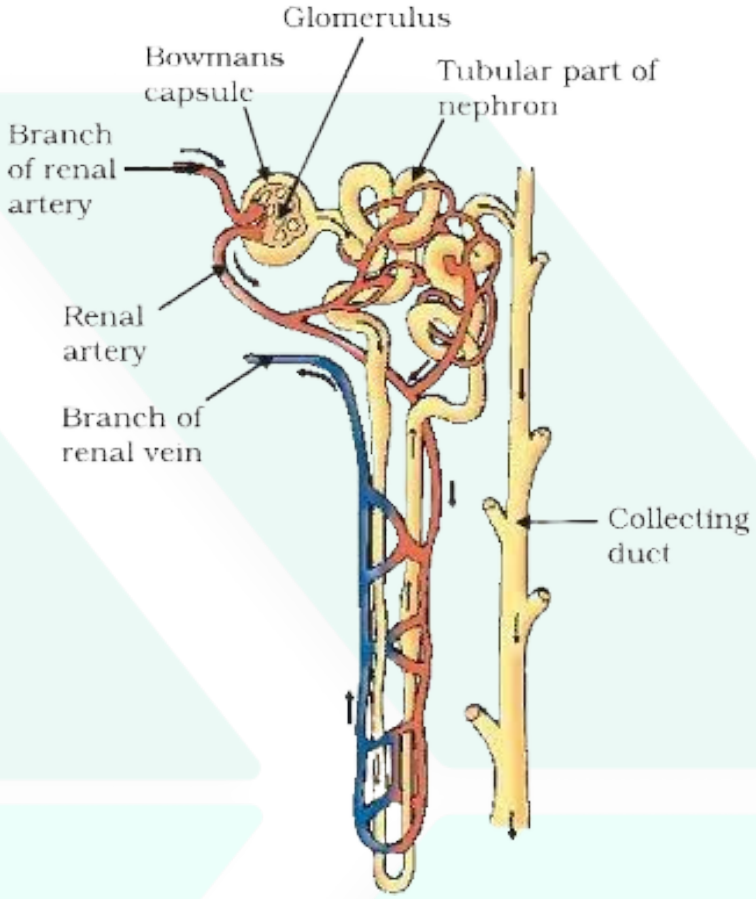
•Tubular Reabsorption: As the glomerular filtrate moves through the renal tubules, essential substances such as glucose, amino acids, and most of the filtered water are reabsorbed back into the bloodstream. This reabsorption occurs mainly in the proximal convoluted tubule and the loop of Henle. The reabsorption of water is crucial for maintaining the body's water balance.

•Tubular Secretion: In this step, certain substances, such as hydrogen ions, potassium ions, and certain drugs, are actively secreted from the bloodstream into the renal tubules. This process helps in the elimination of excess ions and substances that were not filtered out initially.

After these processes, the remaining fluid, now called urine, flows through the collecting ducts and into the renal pelvis, eventually being excreted from the body through the ureters, bladder, and urethra.

These steps ensure that the body maintains proper fluid balance, electrolyte levels, and eliminates waste products effectively.

SOLUTIONS



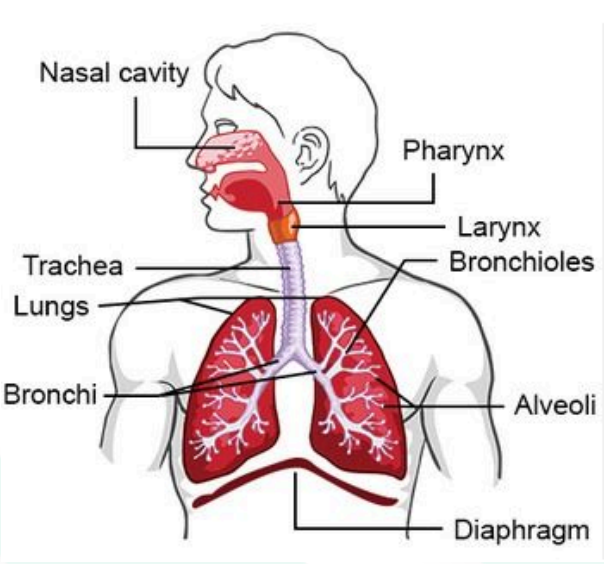
Nephron

42. Animals require more energy than plants.This is due to various reasons. Some are :
i) Animals are motile organisms whereas plants are non-motile. Being motile requires more energy.
ii) Plants have many dead tissues whereas this is not in the case of animals. Hence, again animals need more energy.

Plants being sessile stay at one place and lack the basic process of locomotion while animals move from one place to another in search of food, shelter and mates. The physical activity performed by the plants is also less when compared to animals.
Animals need more energy than plants as they eat complex food so more energy is needed to synthesise it whereas plants need simple food substances like water and carbon dioxide and in this less energy is needed for synthesis as compared to animals.

SOLUTIONS

43.



Human Respiratory System

CASE STUDY/SOURCE BASED QUESTION:

44. [i] The purpose of the experiment was to demonstrate the action of the enzyme salivary amylase (present in saliva) on starch, and to observe how this enzyme breaks down starch into simpler sugars. The iodine test is used to check for the presence of starch — if starch is still present, iodine turns blue-black; if it's digested, no color change occurs.

[ii] The solution didn't turn blue-black because the starch was already broken down by the salivary amylase into maltose (a sugar). Since iodine only reacts with starch and not with simple sugars, no color change was observed, indicating that the starch was digested.

[iii] Enzyme: Salivary amylase (also called ptyalin)

Function: It breaks down complex starch molecules into maltose, a simpler sugar, beginning the process of carbohydrate digestion in the mouth.

SOLUTIONS

45. [i] c
[ii] b
[ii] c
[iv] c
[v] c

SOLUTIONS

PK SPECIAL [KBC] :

46. Rapid, shallow breathing reduces the volume of air reaching the alveoli during each breath. This leads to inefficient gaseous exchange because:

- **Less fresh air enters the alveoli.**
- **Carbon dioxide may accumulate.**
- **Oxygen intake is reduced.**

Result: Lower oxygenation of blood and possible shortness of breath or fatigue.

47. The diaphragm and intercostal muscles work together to expand and contract the chest cavity for effective breathing.

- **During inhalation, the diaphragm contracts (moves down), and intercostal muscles lift the ribs up and out.**
- **During exhalation, both relax to reduce the chest volume.**

If one fails:

- **Reduced lung expansion = less air intake.**
- **May cause shallow or labored breathing and reduced oxygen supply.**

48. Athletes develop better lung capacity because of consistent physical training, which:

- **Strengthens diaphragm and intercostal muscles.**
- **Increases tidal volume (air per breath).**
- **Improves oxygen uptake efficiency.**
- **Enhances capillary density in muscles and lungs.**

Result: More oxygen available to tissues, better endurance, and improved breathing control.

49. Unidirectional flow in fishes allows continuous contact of fresh water (rich in oxygen) over gills.

- **Countercurrent exchange maximizes O_2 absorption.**
- **Humans have bidirectional flow, where air moves in and out through the same path, causing mixing of fresh and stale air.**

Thus, fish gill system is more efficient for oxygen extraction from water.

50. The epiglottis failed to function properly.

- **It should close the trachea during swallowing to prevent entry of food.**
- **Consequences:**
  - **Choking**

SOLUTIONS

- Cough reflex
- Risk of aspiration pneumonia (if food enters lungs)

51. Blood from the lungs enters the left atrium.
- It is oxygenated blood, rich in oxygen.
- Blood entering the right atrium comes from the body and is deoxygenated.

Thus, the left atrium receives freshly oxygenated blood, while the right atrium receives oxygen-poor blood from tissues.

52. Blockage in lymphatic vessels can lead to:
- Fluid accumulation (edema/swelling) due to impaired drainage of tissue fluid.
- Reduced immune response, since lymph nodes filter pathogens and house white blood cells.

Result: Swelling and higher risk of infections.

53. Fishes rely solely on gills for breathing, which require water flow to function.
- Outside water, gills collapse and stop gas exchange.

Amphibians like frogs can also breathe through their moist skin and lungs, allowing survival on land for a longer time.

54. Humans are warm-blooded and have high energy demands, requiring efficient oxygen delivery.
- Double circulation keeps oxygen-rich and oxygen-poor blood separate, ensuring maximum oxygen supply to organs.

Fish are cold-blooded with lower energy needs, and their single circulation suffices for survival.

55. Boiling in alcohol:
- Removes chlorophyll, making the leaf pale so the iodine-starch reaction is visible.

Safety precautions:
- Alcohol is flammable – use a water bath instead of direct flame.
- Perform the step under adult supervision and in a well-ventilated area.