CLASS 10

CBSE

NCERT

EXEMPLAR PROBLEMS

WITH

TEXT & VIDEO SOLUTIONS + CHAPTER-WISE MIND MAPS

MATHEMATICS • SCIENCE

Step-by-Step
Solution of Exemplar Problems
(Excluding Out-of-Syllabus)

Mastering Concepts
With Mind Maps and
Video Solutions

PYQ Focus
With Year Tags for
Targeted Practice

Based on Rationalised NCERT Syllabus

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MATHEMATICS

SCIENCE

Note: *Chapter 10 of Mathematics and Chapters 5, 14, and 16 of Science are out of NCERT syllabus.*

CHAPTER 6

Life Processes

Life Processes

Nutrition

Process by which organisms take food and convert it into energy

Types of Nutrition

Autotrophic Nutrition

- Synthesis of food from inorganic substances
- Uses sunlight/ chemical energy (e.g., photosynthesis)

Key events in photosynthesis

- 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** to **carbohydrates**.

Adaptations in Desert Plants for Photosynthesis

Due to closed stomata in daytime heat desert plants store CO_2 absorbed at night and utilize this for photosynthesis during the day.

Heterotrophic Nutrition

Organisms obtained their food from other organisms

Saprophytic Nutrition

- Obtain food from dead and decaying organisms
- Break down the food material outside the body and then absorb it. **E.g:** Bread mold (*Rhizopus*), yeast, and mushrooms.

Parasitic Nutrition

Derive nutrition from plant and animals without killing them. **E.g:** *Cuscuta*, lice, leeches etc.

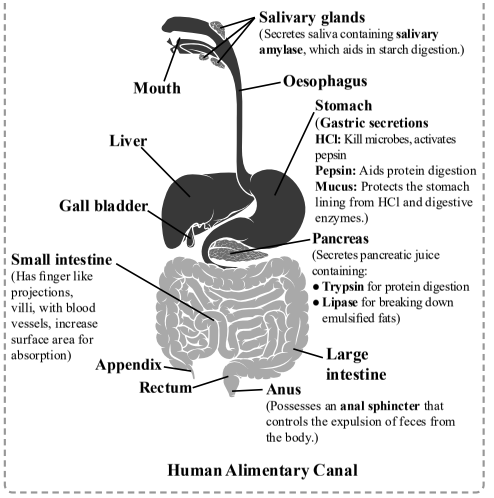
Holozoic Nutrition

Organisms ingest solid food and digest it internally.

E.g: *Amoeba*, Humans, Dog etc.

In Multicellular Organisms (Humans)

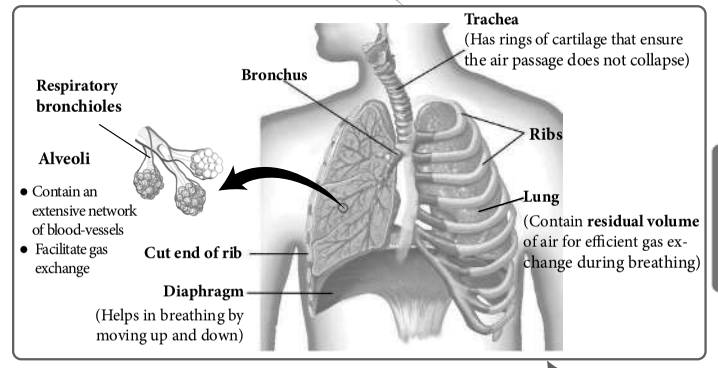
- Accomplished by the use of alimentary canal.
- Consist of following steps: **Ingestion, Digestion, Absorption, Assimilation** and **Egestion**



Human Alimentary Canal

In Animals

Human Respiratory System: Parts and its functions



Inhalation vs Exhalation

Inhalation	Exhalation
Diaphragm flattens and move downwards	Diaphragm become dome shaped and raised upwards
Chest cavity enlarges and ribs move upwards	Chest cavity reduces and ribs move downwards

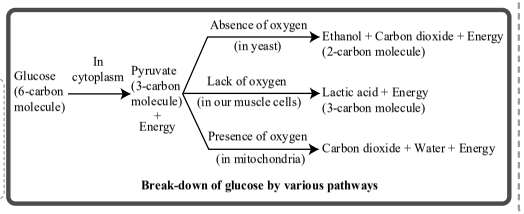
Aquatic vs Terrestrial

Aquatic organisms breathe faster than terrestrial due to less dissolved oxygen in water vs air.

Respiration

Involves utilisation of O_2 by cell and exchange of gases

Glucose Metabolism



Break-down of glucose by various pathways

Hemoglobin

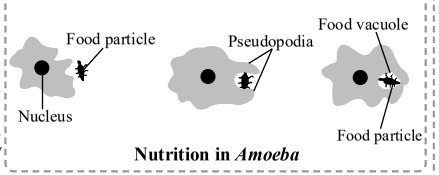
(Why it is needed in organisms with large body size?)

- Large bodies require more oxygen than diffusion alone can supply.
- It has a higher affinity for oxygen

In Unicellular Organisms

Food may be taken in by the entire surface

E.g: *Amoeba* and *Paramoecium*



Nutrition in *Amoeba*

In Plants

Occurs through

Stomata

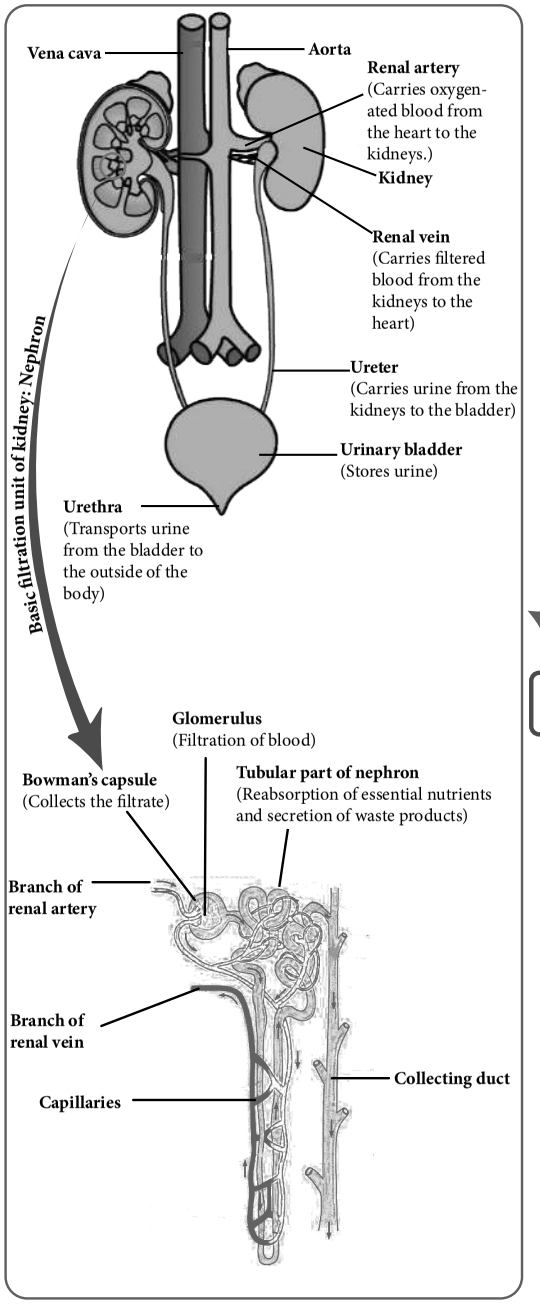
Tiny pores found on the surface of leaves

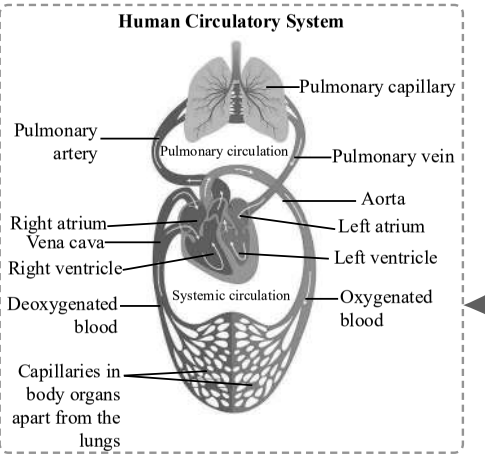
Opens when

- Needs CO_2 for photosynthesis
- Water flows into the guard cells
- Light is available

Closes when

- Does not needs CO_2 for photosynthesis,
- Water flows out of the guard cells
- Light is not available





Arteries
Carry oxygenated blood away from the heart except pulmonary arteries (carry deoxygenated blood).

Veins
Carry deoxygenated blood to the heart except pulmonary veins (carry oxygenated blood).

Capillaries
- Tiny blood vessels connecting arteries and veins
- Facilitating nutrient and waste exchange between blood and tissues.

Blood vessels

Heart
Muscular organ that pumps blood throughout the body.

Significance of Heart Chamber Separation in birds and mammals
- Prevents mixing of oxygenated and deoxygenated blood
- Ensures efficient oxygen supply to the body.
- Supports high energy requirements for body temperature regulation.

Circulatory System

Transportation
Process of transferring substances (water, nutrients, waste products, etc.) from one place to another

In Animals (Humans)

Lymphatic System

Lymph
- **Tissue fluid** similar to plasma.
- Formed by plasma, proteins, blood cells escape through capillary pores into intercellular spaces in the tissues.
- Colorless and contains less protein
- Drains into the lymphatic system and returns to veins

In Animals (Humans)

Life Processes

In Plants

Excretion
Process in which metabolic waste is eliminated from the body of an organism

In Plants

Different strategies for excretion of waste product in plants.
- Oxygen as a byproduct of photosynthesis
- CO_2 and excess water through transpiration
- Leaves shed to dispose waste
- Dead cells and cellular vacuoles in plant store waste
- Resins and gums in old xylem store additional waste

Phloem
Bidirectional movement of organic compounds, primarily sugars produced during photosynthesis, throughout the plant.

Accomplished by

Sieve tubes, aided by companion cells

Xylem
Upward transport of water and minerals from the roots to the leaves and other parts of the plant.

Accomplished by

Tracheids and vessels

NCERT Exemplar Problems & Solutions

Note: *Only questions from the Latest Syllabus are included; those from the Out of Syllabus are excluded.*

Scan for ▶ Sol.

Multiple Choice Questions

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

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

(*b*) They store carbohydrates in the form of starch

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

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

Sol. (*c*) Autotrophs, such as green plants, algae, and some bacteria, synthesize carbohydrates through the process of photosynthesis, which requires sunlight, chlorophyll, carbon dioxide, and water. Carbohydrates not used immediately are stored as starch, which acts as an energy reserve for the plant. In the absence of sunlight, photosynthesis cannot occur.

2. In which of the following groups of organisms, food material is broken down outside the body and absorbed? (*CBSE 2023*)

(*a*) Mushroom, green plants, *Amoeba*

(*b*) Yeast, mushroom, bread mould

(*c*) *Paramecium, Amoeba*, *Cuscuta*

(*d*) *Cuscuta*, lice, tapeworm

Sol. (*b*) Yeast, mushroom and bread mould are saprophytes that secrete digestive enzymes outside their body to break down complex organic matter into simpler substances, which they then absorb.

- Green plants make their own food. internally within their cells through photosynthesis.
- *Paramecium* and *Amoeba* digest food internally.
- *Cuscuta*, lice, and tapeworm directly derive nutrients from the host, not by external digestion.

3. Select the correct statement.

(*a*) Heterotrophs do not synthesise their own food

(*b*) Heterotrophs utilise solar energy for photosynthesis

(*c*) Heterotrophs synthesise their own food

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

Sol. (*a*) Heterotrophs are the organisms that depend on other organisms for obtaining their food and nutrition. For e.g., animals, fungi.

Autotroph, such as plants, can synthesize their own food using solar energy and convert carbon dioxide and water into carbohydrates through photosynthesis.

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

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

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

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

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

Sol. (*d*) The correct sequence of parts in the human alimentary canal is:

Mouth → Oesophagus → Stomach → Small intestine → Large intestine

Digestion starts in the mouth, where food is chewed and broken down. It then moves through the oesophagus into the stomach, where it mixes with digestive juices. The partially digested food moves to the small intestine for most digestion and nutrient absorption. Finally, the remaining waste enters the large intestine, where water is absorbed, and the rest undigested food is prepared for elimination.

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

(*a*) Proteins breaking down into amino acids

(*b*) Starch breaking down into sugars

(*c*) Fats breaking down into fatty acids and glycerol

(*d*) Absorption of vitamins

Sol. (*b*) Salivary amylase is an enzyme present in saliva that catalyzes the breakdown of starch into simpler sugars in the mouth cavity. If salivary amylase is absent, this process will be affected.

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

(*a*) Pepsin **(*b*) Mucus**

(*c*) Salivary amylase **(*d*) Bile**

Sol. (*b*) The stomach's inner lining produces mucus, which forms a protective layer. This layer prevents the strong hydrochloric acid in the stomach from damaging the stomach walls.

- Pepsin is an enzyme that helps digest proteins.
- Salivary amylase works in the mouth to digest starch into simpler sugars.
- Bile helps in digesting fats in the small intestine.

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

(*a*) Stomach **(*b*) Small intestine**

(*c*) Large intestine **(*d*) Oesophagus**

Sol. (*b*) The small intestine receives bile from the liver, which makes the food alkaline and emulsifies fats into smaller globules for efficient digestion.

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

(*a*) complex proteins **(*b*) simple proteins**

(*c*) fats **(*d*) starch**

Sol. (*d*)The blue-black color observed when iodine solution is added to rice water indicates the presence of starch, a complex carbohydrate. It does not react with proteins or fats in the same way.

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

(*a*) Stomach **(*b*) Mouth cavity**

(*c*) Large intestine **(*d*) Small intestine**

Sol. (*d*) The small intestine is the part of the alimentary canal where food is finally digested. Here, digestive juices from the liver (bile) and pancreas help to break down food into simpler substances that the body can use.

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

(*a*) Trypsin digests proteins and lipase carbohydrates

(*b*) Trypsin digests emulsified fats and lipase proteins

(*c*) Trypsin and lipase digest fats

(*d*) Trypsin digests proteins and lipase emulsified fats

Sol. (*d*) The pancreatic juice contains enzymes that help break down food in the small intestine. Trypsin helps to digest proteins. Lipase helps to digest emulsified fats. The combination of these enzymes ensures proper digestion of food in the small intestine.

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

(*a*) oxygen **(*b*) carbon dioxide**

(*c*) nitrogen **(*d*) water vapour**

Sol. (*b*) When air is blown from the mouth into a test tube containing lime water, the lime water turns milky because of the presence of carbon dioxide in the exhaled air. Carbon dioxide reacts with lime water to form a white substance called calcium carbonate, which makes the solution look milky.

12. The correct sequence of anaerobic reactions in yeast is

(*a*) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Mitochondria}}$ Ethanol + Carbon dioxide

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

(*c*) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Mitochondria}}$ Lactic acid

(*d*) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Cytoplasm}}$ Ethanol + Carbon dioxide

Sol. (*d*) Glucose $\xrightarrow{\text{Cytoplasm}}$ Pyruvate $\xrightarrow{\text{Cytoplasm}}$ Ethanol + Carbon dioxide

In yeast, during anaerobic respiration (fermentation), glucose(6C) is first broken down into pyruvate(3C) in the cytoplasm.

Then, in the absence of oxygen, the pyruvate is converted into ethanol and carbon dioxide, occurring in the cytoplasm. This process is known as alcoholic fermentation.

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

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

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

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

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

Sol. (*d*) In aerobic respiration:

1. Glucose is broken down in the cytoplasm through glycolysis to form pyruvate and release some amount of energy.
2. Pyruvate enters the mitochondria, where it is completely broken down into carbon dioxide (CO_2) and water (H_2O), releasing a large amount of energy in the form of ATP.

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

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

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

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

(*iv*) Alveoli increase surface area for exchange of gases

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

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

Sol. (*d*) Statement (i) is false. During inhalation, the ribs move outward and the diaphragm moves downward to increase the chest cavity's volume, allowing air to enter the lungs.

Statement (iii) is false. Haemoglobin has a greater affinity for oxygen than carbon dioxide.

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

(*a*) Nostrils → Larynx → Pharynx → Trachea → Lungs

(*b*) Nasal passage → Trachea → Pharynx → Larynx → Alveoli

(*c*) Larynx → Nostrils → Pharynx → Lungs

(*d*) Nostrils → Pharynx → Larynx → Trachea → Alveoli

Sol. (*d*) The correct sequence of air passage during inhalation is: Nostrils →Pharynx → Larynx →Trachea → Alveoli

During inhalation, air enters through the nostrils, passes into the pharynx (throat), then through the larynx (voice box), followed by the trachea (windpipe), and finally reaches the alveoli in the lungs, where gas exchange occurs.

16. During respiration exchange of gases take place in

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

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

Sol. (*b*) The alveoli are tiny air sacs in the lungs where the actual exchange of gases occurs. Oxygen from the inhaled air taken up by blood in the alveolar blood vessels to be transported to all the cells in the body, and carbon dioxide carried by the blood from the rest of the body diffuses into the alveoli to be exhaled.

17. Which of the following statement (s) is (are) true about heart? (*CBSE 2024*)

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

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

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

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

(*a*) (*i*) **(*b*) (*ii*)**

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

Sol. (*c*) Statement (i) is false: Left atrium receives oxygenated blood via pulmonary veins from lungs, not different parts of body; right atrium receives deoxygenated blood via vena cava from different parts of body, not lungs.

Statement (iii) is false: Left atrium transfers oxygenated blood to the left ventricle, not right ventricle; right ventricle pumps deoxygenated blood via pulmoary artery to lungs, not different body parts.

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

(*a*) Valves in heart

(*b*) Thick muscular walls of ventricles

(*c*) Thin walls of atria

(*d*) All of the above

Sol. (*a*) The valves in the heart prevent the backflow of blood during contraction. These valves ensure that blood flows only in one direction.

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

(*a*) *Labeo, Chameleon,* Salamander

(*b*) *Hippocampus, Exocoetus, Anabas*

(*c*) *Hyla, Rana, Draco*

(*d*) Whale, Dolphin, Turtle

Sol. (*b*) Single circulation, where blood flows through the heart only once during one cycle of passage through the body, is exhibited by certain fish that have two-chambered hearts such as *Hippocampus* (seahorses),

Exocoetus (flying fish), and *Anabas* (climbing perch), where the heart consists of one atrium and one ventricle.

Labeo, Chameleon, Salamander, Hyla, Rana, and *Draco* have incomplete double circulation, where oxygenated and deoxygenated blood from different body parts mix in a single ventricle. In contrast, Whale, Dolphin, and Turtle have complete double circulation, with separate ventricles for oxygenated and deoxygenated blood, ensuring no mixing.

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

(*a*) Pisces and amphibians

(*b*) Amphibians and reptiles

(*c*) Amphibians only

(*d*) Pisces only

Sol. (*d*) In Pisces (fish), the heart is two-chambered and pumps only deoxygenated blood to the gills for oxygenation. The oxygenated blood then directly flows to the body parts from where deoxygenated blood is returned to the heart.

Amphibians and reptiles (except crocodile) have a three-chambered heart with two atrium and a single ventricle, which pumps a mix of oxygenated and deoxygenated blood to different parts of the body.

21. Choose the correct statement that describes arteries. (*CBSE 2025*)

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

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

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

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

Sol. (*d*)

- Arteries have thick elastic walls to withstand the high pressure of blood pumped by the heart.
- They carry oxygenated blood (except the pulmonary artery) away from the heart to different parts of the body.
- They do not have valves, as the blood flows under high pressure, preventing backflow.

22. The filtration units of kidneys are called

(*a*) ureter **(*b*) urethra**

(*c*) neurons **(*d*) nephrons**

Sol. (*d*) Nephrons are the basic filtration units of the kidneys, responsible for filtering blood to remove waste products, excess salts, water, and forming urine.

Ureter is a tube that carries urine from the kidneys to the bladder. Urethra is the duct through which urine is excreted from the bladder out of the body. Neurons are nerve cells responsible for transmitting electrical signals.

23. Oxygen liberated during photosynthesis comes from

(*a*) water **(*b*) chlorophyll**

(*c*) carbon dioxide **(*d*) glucose**

Sol. (*a*) Oxygen released during photosynthesis comes from the splitting of water molecules during the light-dependent reaction. This process releases oxygen as a byproduct.

- Chlorophyll absorbs sunlight but does not release oxygen.
- Carbon dioxide is used in glucose formation, not as a source of oxygen.
- Glucose is the product of photosynthesis, not the source of oxygen.

24. The blood leaving the tissues becomes richer in

(*a*) carbon dioxide **(*b*) water**

(*c*) haemoglobin **(*d*) oxygen**

Sol. (*a*) When blood leaves the tissues, it becomes richer in carbon dioxide because cells produce carbon dioxide as a waste product during cellular respiration. This carbon dioxide is then transported by the blood to the lungs, where it is exchanged for oxygen.

25. Which of the following is an incorrect statement?

(*a*) Organisms grow with time

(*b*) Organisms must repair and maintain their structure

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

(*d*) Energy is essential for life processes

Sol. (*c*) The statement "Movement of molecules does not take place among cells" is incorrect because the movement of molecules (oxygen, nutrients, and waste products) within and between cells is crucial for maintaining life processes such as respiration, transport, and excretion.

26. The internal (cellular) energy reserve in autotrophs is (*CBSE 2023*)

(*a*) glycogen **(*b*) protein**

(*c*) starch **(*d*) fatty acid**

Sol. (*c*) Autotrophs, like plants, store energy in the form of starch, which acts as their internal energy reserve. This starch is broken down into glucose when the organism needs energy.

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

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

(*b*) $6CO_2 + H_2O + \text{Sunlight} \rightarrow C_6H_{12}O_6 + O_2 + 6H_2O$

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

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

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

This equation represents the process of photosynthesis, where carbon dioxide and water, in the presence of chlorophyll and sunlight, are converted into glucose and oxygen, with water also being produced.

28. Choose the event that does not occur in photosynthesis

(*a*) Absorption of light energy by chlorophyll

(*b*) Reduction of carbon dioxide to carbohydrates

(*c*) Oxidation of carbon to carbon dioxide

(*d*) Conversion of light energy to chemical energy

Sol. (*c*) In photosynthesis, following events occurs :

(*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(such as glucose)

Oxidation of carbon to carbon dioxide does not occur in photosynthesis.

29. The opening and closing of the stomatal pore depends upon ***(CBSE 2024, 2023)***

(*a*) oxygen

(*b*) temperature

(*c*) water in guard cells

(*d*) concentration of CO_2 in stomata

Sol. (*c*) The opening and closing of stomatal pores depend on the amount of water in the guard cells. When the guard cells take in water, they swell and open the stomata. When they lose water, they shrink and close their stomata.

30. Choose the forms in which most plants absorb nitrogen

(*i*) Proteins

(*ii*) Nitrates and Nitrites

(*iii*) Urea

(*iv*) Atmospheric nitrogen

(*a*) (*i*) and (*ii*) **(*b*) (*ii*) and (*iii*)**

(*c*) (*iii*) and (*iv*) **(*d*) (*i*) and (*iv*)**

Sol. (*b*) Plants absorb nitrogen primarily in the form of nitrates (NO_3^-) and nitrites (NO_2^-) from the soil, which are produced by nitrogen-fixing bacteria and nitrification processes.

Urea can be directly absorbed by plants or it is broken down into ammonium (NH_4^+) and then converted into nitrates.

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

(*a*) Pepsin **(*b*) Cellulase**

(*c*) Amylase **(*d*) Trypsin**

Sol. (*c*) Amylase is the first enzyme to mix with food in the digestive tract. It is present in saliva that is secreted by the salivary glands in the mouth and begins the process of digestion by breaking down starches into simpler sugars as food is chewed.

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

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

(*ii*) Fermentation takes place in aerobic bacteria

(*iii*) Fermentation takes place in mitochondria

(*iv*) Fermentation is a form of anaerobic respiration

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

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

Sol. (*c*)

- Fermentation typically occurs in anaerobic conditions (when oxygen is not available), not in aerobic bacteria.
- Fermentation takes place in the cytoplasm, not in mitochondria.

33. Lack of oxygen in muscles often leads to cramps among cricketers.

This results due to

(*a*) conversion of pyruvate to ethanol

(*b*) conversion of pyruvate to glucose

(*c*) non conversion of glucose to pyruvate

(*d*) conversion of pyruvate to lactic acid

Sol. (*d*) When muscles lack oxygen, they switch to anaerobic respiration, where pyruvate is converted into lactic acid instead of being fully oxidized to produce energy. The accumulation of lactic acid in the muscles leads to fatigue and cramps.

34. Choose the correct path of urine in our body

(*a*) kidney → ureter → urethra → urinary bladder

(*b*) kidney → urinary bladder → urethra → ureter

(c) kidney → ureters → urinary bladder → urethra

(d) urinary bladder → kidney → ureter → urethra

Sol. (*c*) Urine is produced in the kidneys, then passes through the ureters to the urinary bladder, where it is stored. When the bladder is full, the urine is expelled from the body through the urethra.

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

(a) cytoplasm **(b) chloroplast**

(c) mitochondria **(d) golgi body**

Sol. (*a*) During oxygen deficiency, pyruvic acid is converted into lactic acid through anaerobic respiration, which occurs in the cytoplasm of the cell.This process, known as lactic acid fermentation, occurs when oxygen is not available for aerobic respiration.

Short Answer Questions

36. Name the following

(a) The process in plants that links light energy with chemical energy

(b) Organisms that can prepare their own food

(c) The cell organelle where photosynthesis occurs

(d) Cells that surround a stomatal pore

(e) Organisms that cannot prepare their own food

(f) An enzyme secreted from gastric glands in stomach that acts on proteins.

Sol. (a) Photosynthesis is the process by which plants convert light energy into chemical energy, producing glucose and oxygen, using chlorophyll and sunlight.

(b) Autotrophs are organisms (like plants and algae) that synthesize their own food using light (photosynthesis), without relying on other organisms.

(c) Chloroplasts are specialized organelles in plant cells that contain chlorophyll, where light energy is converted into chemical energy through photosynthesis.

(d) Guard cells are specialized cells surrounding the stomatal pore, controlling its opening and closing to regulate gas exchange and water loss in plants.

(e) Heterotrophs are organisms that rely on consuming other organisms for their nutrition since they cannot synthesize their own food. For e.g., Animals

(f) Pepsin is an enzyme produced by gastric glands that breaks down proteins in the acidic environment of the stomach.

37. "All plants give out oxygen during day and carbon dioxide during night". Do you agree with this statement? Give reason.

Sol. I do not agree with the statement.

Reason:

During the day:

- Plants perform photosynthesis, using carbon dioxide and releasing oxygen as a by-product.
- The carbon dioxide produced during respiration is utilized for photosynthesis, So, it is not noticeable, making oxygen release the major activity.

During the night:

- Photosynthesis stops, and plants rely on respiration only.
- Plants take in oxygen and release carbon dioxide, making carbon dioxide elimination the primary exchange activity.

38. How do the guard cells regulate opening and closing of stomatal pores? (*CBSE 2024*)

Sol. The guard cells regulate the opening and closing of stomatal pores as follows:

1. Opening of Stomatal Pores:
   - When water flows into the guard cells, they swell.
   - This causes the stomatal pore to open, allowing gaseous exchange and water loss.
2. Closing of Stomatal Pores:
   - When water moves out of the guard cells, they shrink.
   - This causes the stomatal pore to close, reducing water loss when photosynthesis is not active.

39. Two green plants are kept separately in oxygen free containers, one in the dark and the other in continuous light. Which one will live longer? Give reasons.

Sol. The plant kept in continuous light will live longer.

Reason:

- Plant in continuous light:
  - It can perform photosynthesis, producing oxygen as a by-product, which is essential for its respiration. This allows the plant to survive longer.
- Plant in the dark:
  - Without light, photosynthesis cannot occur, so no oxygen is produced. The plant relies solely on stored oxygen for respiration, which will deplete quickly, leading to its death.

40. If a plant is releasing carbon dioxide and taking in oxygen during the day, does it mean that there is no photosynthesis occurring?

Justify your answer.

Sol. No, it does not mean that photosynthesis is not occurring.

- During the day, plants perform both photosynthesis and respiration.
- If a plant is releasing carbon dioxide, it indicates that the rate of respiration (which produces CO_2) is higher than the rate of photosynthesis (which uses CO_2).

Thus, photosynthesis may still be occurring, but it is not sufficient to completely balance or exceed the carbon dioxide produced by respiration.

41. Why do fishes die when taken out of water?

Sol.
- Fishes use gills for respiration, which are adapted to absorb oxygen dissolved in water.
- Gills have a rich supply of blood capillaries that make this absorption efficient.
- When taken out of water, fishes cannot absorb oxygen from the air as they are not adapted for gaseous oxygen.
- As a result, they cannot breathe and die.

42. Differentiate between an autotroph and a heterotroph. **(*CBSE 2019*)**

Sol.

	Autotroph	**Heterotroph**
1.	Organisms that can produce their own food	Organisms that depend on other organisms for food, either directly or indirectly
2.	They have chlorophyll to capture sunlight.	They lack chlorophyll
3.	Example: Plants, algae, and some bacteria.	Example: Animals, fungi, and most bacteria.

43. Is 'nutrition' a necessity for an organism? Discuss.

Sol. Yes, nutrition is essential for organisms because:

- It provides the necessary energy to carry out vital metabolic activities like respiration, digestion, and movement.
- It supports the growth of new cells and aids in repairing or replacing damaged or worn-out cells.
- It helps build resistance against diseases by supplying essential nutrients that strengthen the immune system.

44. What would happen if green plants disappear from earth? Explain.

Sol. If green plants disappeared from Earth, the consequences would be:

Oxygen depletion: Green plants produce oxygen through photosynthesis. Without them, oxygen levels would drop, affecting all aerobic life forms.

Disruption of the Food Chain: Green plants form the base of the food chain by producing their own food (via photosynthesis) and providing energy for herbivores, which in turn consumed by carnivores. Without plants, herbivores would die out, disrupting the entire food web and affecting all life forms dependent on plants for nutrition.

Disruption in carbon cycle: Plants absorb carbon dioxide for photosynthesis. Without them, carbon dioxide levels would increase, intensifying global warming and disrupting climate patterns.

45. Leaves of a healthy potted plant were coated with vaseline. Will this plant remain healthy for long? Give reasons for your answer

Sol. No, the plant will not remain healthy for a long time.

Reasons:

- Vaseline blocks stomata, preventing the exchange of gases, including oxygen needed for respiration.
- The coating stops the entry of carbon dioxide, which is essential for photosynthesis to produce food.
- Transpiration is inhibited, disrupting the upward movement of water and minerals from the roots to other parts of the plant.

46. How does aerobic respiration differ from anaerobic respiration?

Sol.

Aerobic Respiration	**Anaerobic Respiration**
Occurs in the presence of oxygen.	Occurs in the absence of oxygen.
It takes place in cytoplasm and inside mitochondria.	It takes place in cytoplasm only.
Glucose is completely broken down into carbon dioxide and water.	Glucose is partially broken down, producing either lactic acid or ethanol and carbon dioxide.
Releases a large amount of energy.	Releases less energy.
Example: Most plants and animals.	Example: Yeast, some bacteria, and human muscles during vigorous exercise.

47. Match the words of Column (A) with that of Column (B)

Column (A)		Column (B)	
(*a*)	**Phloem**	**(i)**	**Excretion**
(*b*)	**Nephron**	**(ii)**	**Translocation of food**
(*c*)	**Veins**	**(iii)**	**Clotting of blood**
(*d*)	**Platelets**	**(iv)**	**Deoxygenated blood**

Sol.

Column (A)		Column (B)	
(*a*)	Phloem	(ii)	Translocation of food
(*b*)	Nephron	(i)	Excretion
(*c*)	Veins	(iv)	Deoxygenated blood
(*d*)	Platelets	(iii)	Clotting of blood

48. Differentiate between an artery and a vein.

Sol.

Artery	Vein
Carries blood away from the heart.	Carries blood towards the heart.
Usually carries oxygenated blood (except pulmonary artery).	Usually carries deoxygenated blood (except pulmonary vein).
Thick, elastic, and muscular walls to withstand high pressure.	Thin, non - elastic walls with valves to prevent backflow.
Blood flows under high pressure.	Blood flows under low pressure.

49. What are the adaptations of leaf for photosynthesis?

Sol. The adaptations of a leaf for photosynthesis include:

- Leaves provide a large surface area for maximum light absorption.
- Leaves are arranged at right angles to the light source in a way that avoids overlapping, ensuring maximum light exposure.
- The extensive network of veins enables quick transport of substances to and from the mesophyll cells.
- Presence of numerous stomata facilitates gaseous exchange.
- The chloroplasts are more in number on the upper surface of leaves to absorb sunlight efficiently.

50. Why is small intestine in herbivores longer than in carnivores?

Sol. The small intestine in herbivores is longer than in carnivores because herbivores consume plant-based food, which contains a high amount of cellulose. Cellulose is difficult to digest and requires more time and surface area for its breakdown and absorption. The longer small intestine allows for efficient digestion and nutrient absorption.

In contrast, carnivores eat meat, which is easier to digest, so they require a shorter small intestine.

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

Sol. Gastric glands in the stomach release hydrochloric acid, enzyme pepsin and mucus. Mucus protects the inner lining of the stomach from the action of hydrochloric acid under normal conditions. If mucus is not released, it will lead to erosion of the inner lining of the stomach, leading to acidity and ulcers.

52. What is the significance of emulsification of fats?

Sol. Significance of emulsification of fats:

- Breaks large fat globules into smaller globules:
  - Bile salts from the liver break down large fat globules into smaller ones, making it easier for enzymes to act on them.
- Increases efficiency of enzyme action:
  - Emulsifation of fats increases surface area, enabling enzymes like lipase (from pancreatic juice) to effectively digest fats into fatty acids and glycerol.

53. What causes movement of food inside the alimentary canal? (*CBSE 2024*)

Sol. The movement of food inside the alimentary canal is caused by peristalsis, a rhythmic contraction and relaxation of the muscles in the gut wall. These movements push food forward and mix it with digestive juices, ensuring proper digestion and absorption.

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

Sol. Reasons for absorption of digested food occurring mainly in the small intestine:

(*i*) Digestion is completed in the small intestine:

It is the site where the digestion of carbohydrates, proteins, and fats is completed with the help of secretions from the liver, pancreas and intestinal glands.

(*ii*) Large surface area:

The inner lining of small intestine has numerous finger-like projections called villi, which increase the surface area for absorption.

(*iii*) Rich blood supply:

The villi contain a network of blood capillaries that help in efficient transport of absorbed nutrients.

55. Match Group (A) with Group (B)

Group A		Group B	
(*a*)	Autotrophic nutrition	(i)	Leech
(*b*)	Heterotrophic nutrition	(ii)	*Paramecium*
(*c*)	Parasitic nutrition	(iii)	Deer
(*d*)	Digestion in food vacuoles	(iv)	Green plant

Sol.

Group A		Group B	
(*a*)	Autotrophic nutrition	(iv)	Green plant
(*b*)	Heterotrophic nutrition	(iii)	Deer
(*c*)	Parasitic nutrition	(i)	Leech
(*d*)	Digestion in food vacuoles	(ii)	*Paramecium*

56. Why is the rate of breathing in aquatic organisms much faster than in terrestrial organisms?

(*CBSE 2024*)

Sol.
- Aquatic organisms, such as fishes, extract oxygen from water in its dissolved state using their gills.
- The amount of dissolved oxygen in water is significantly lower compared to the oxygen available in the air.
- To meet their oxygen requirements, aquatic organisms breathe at a much faster rate.
- This ensures a continuous flow of water over the gills for efficient oxygen absorption, which is essential for their survival.

57. Why is blood circulation in human heart called double circulation? (CBSE 2023)

Sol. Blood circulation in the human heart is referred to as double circulation because blood flows through the heart twice during a single complete cycle.
- First, deoxygenated blood from the body enters the right side of the heart and is sent to the lungs for oxygenation.
- Then, oxygenated blood from the lungs returns to the left side of the heart and is pumped to the rest of the body through the aorta and other arteries to deliver oxygen and nutrients to all cells and tissues..

  This mechanism prevents the mixing of oxygen-rich and oxygen-poor blood, ensuring efficient delivery of oxygen and nutrients to all parts of the body.

58. What is the advantage of having four chambered heart? (*CBSE 2023*)

Sol. In a four-chambered heart, the left and right halves are completely separated by septa. This separation prevents the mixing of oxygenated and deoxygenated blood. It allows a highly efficient supply of oxygenated blood to all parts of the body and transport of carbon dioxide-rich blood to the lungs for the removal. Such a system is essential for animals with high energy requirements, like birds and mammals, as it supports their active lifestyles by providing sufficient oxygen for cellular respiration and use the energy produced to maintain their body temperature.

59. Mention the major events during photosynthesis

Sol. The major events during photosynthesis are:
- Absorption of light energy by chlorophyll.
- Conversion of light energy into chemical energy and splitting of water molecules into hydrogen and oxygen.
- Reduction of carbon dioxide into carbohydrates, which are stored as energy sources in plants.

These events collectively ensure the synthesis of food in plants while releasing oxygen into the atmosphere.

60. In each of the following situations what happens to the rate of photosynthesis?

(*a*) Cloudy days

(*b*) No rainfall in the area

(*c*) Good manuring in the area

(*d*) Stomata get blocked due to dust

Sol. (a) On cloudy days, there is less sunlight, which means reduced light energy for photosynthesis, leading to a slower rate of photosynthesis.

(b) Lack of rainfall leads to water scarcity, which is essential for photosynthesis. Without enough water, the plant cannot maintain its turgidity, and stomata may close, reducing the intake of carbon dioxide, thus slowing down photosynthesis.

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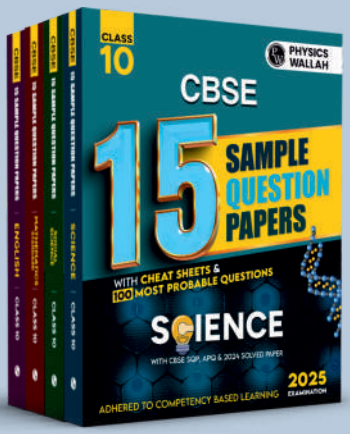

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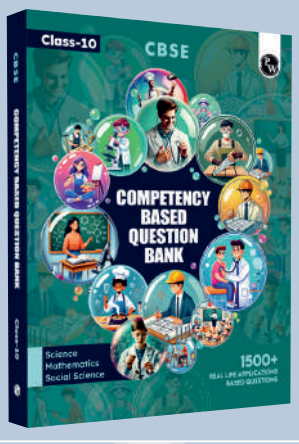

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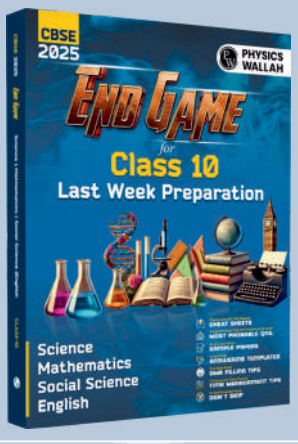

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