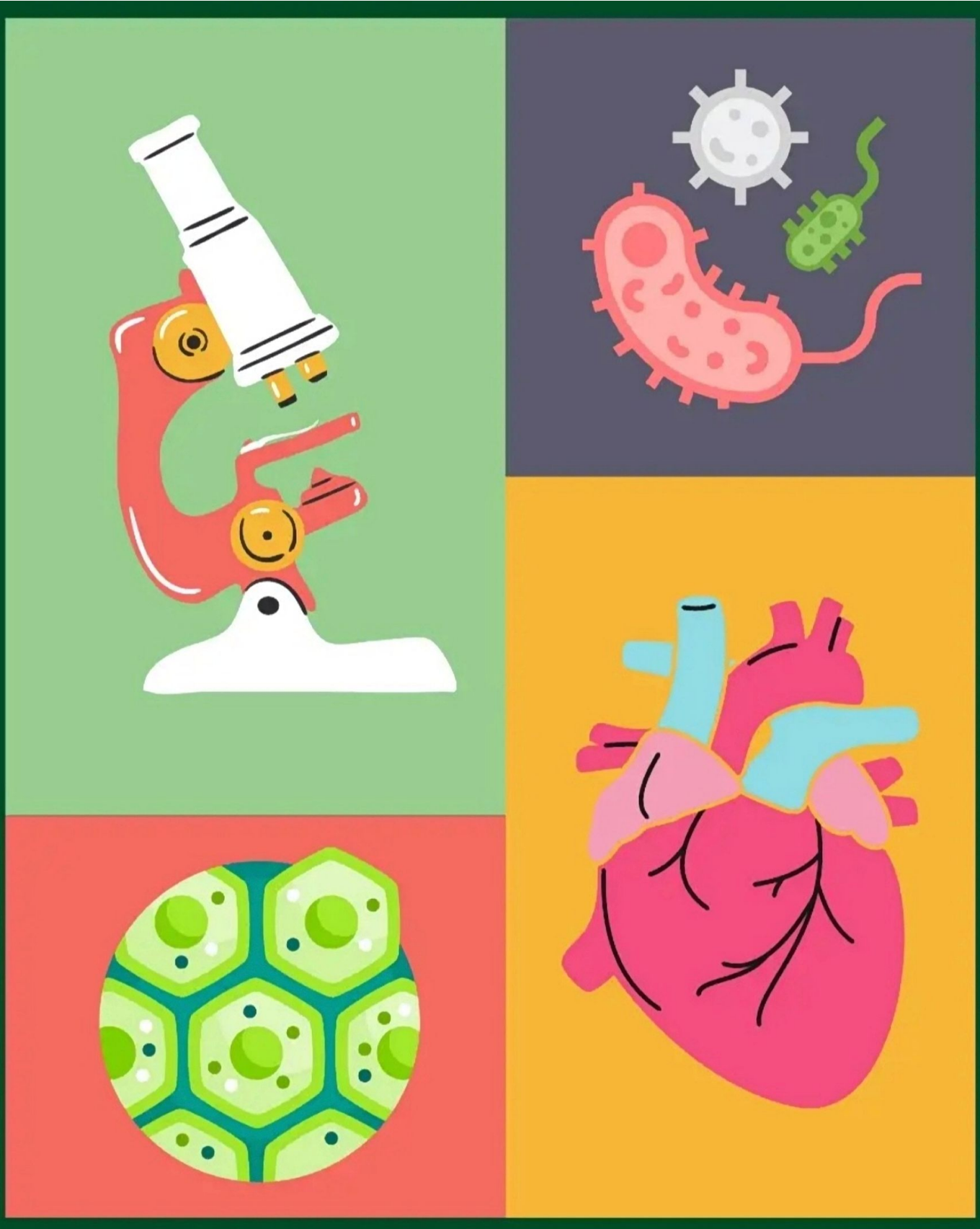


CLASS 10 NOTES

SCIENCE

Life Processes

#Keshav Kunal.

LIFE PROCESSES

What are Life Processes?

- **Life processes** encompass a set of interconnected activities within an organism that collectively contribute to its repair and maintenance. These crucial processes include Respiration (R), Excretion (E), Nutrition (N), and Transportation (T), forming the acronym RENT.
- **Nutrition** is the transformative process by which an organism acquires external sources of energy, commonly known as food, and transfers it internally for sustenance and vitality.
- **Respiration:** The process of acquiring oxygen from outside the body, and using it in the process of break-down of food sources for cellular needs, is called respiration.
- **Transportation** refers to the internal mechanism responsible for conveying nutrients and oxygen from one location to another within the body.
- **Excretion** is the process through which the body eliminates and expels waste by-products, ensuring their removal from the internal environment and subsequent disposal outside the organism.

- **Modes of Nutrition**

1. Autotrophic Nutrition.
2. Heterotrophic Nutrition.

Autotrophs are organisms that derive their nutrition from basic food materials acquired from inorganic sources such as carbon dioxide and water. Notable examples include green plants and certain bacteria.

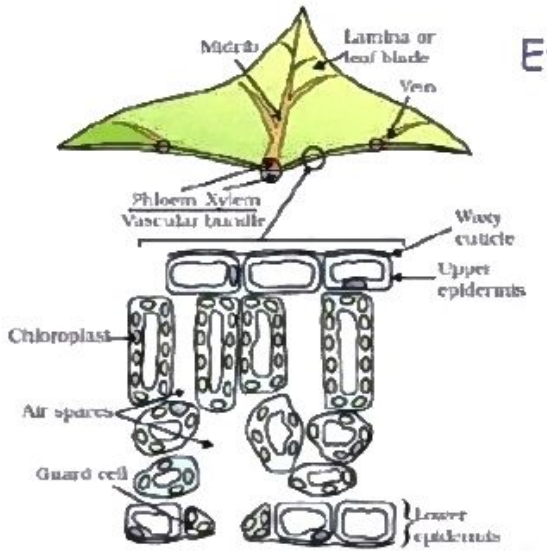
Heterotrophs, on the other hand, rely on complex substances for their nutritional needs. These intricate compounds must undergo breakdown into simpler forms before being utilized for the maintenance and growth of the organism. To facilitate this process, organisms employ bio-catalysts known as enzymes. Animals and fungi are examples of heterotrophs.

E.M.A

Autotrophic Nutrition:

1. Autotrophic organisms fulfill their carbon and energy requirements through photosynthesis.
2. **Photosynthesis** is the process whereby autotrophs absorb external substances and convert them into stored energy. This involves the conversion of carbon dioxide and water into carbohydrates in the presence of sunlight and chlorophyll.
3. Surplus carbohydrates produced through photosynthesis are stored in the form of starch.
4. Similarly, in our bodies, a portion of the energy derived from the food we eat is stored in the form of glycogen.

$$6CO_2 + 12H_2O \xrightarrow[\text{Sunlight}]{\text{Chlorophyll}} \underset{\text{(Glucose)}}{C_6H_{12}O_6} + 6O_2 + 6H_2O$$



Events Occurring during Photosynthesis:

1. Chlorophyll absorbing light energy.
2. Transformation of light energy into chemical energy.
3. Separation of water molecules into hydrogen and oxygen.
4. Conversion of carbon dioxide into carbohydrates through reduction.

- Chlorophyll is a crucial component for the process of photosynthesis.
- The iodine test results in a blue-black coloration in the leaf regions where photosynthesis occurs.

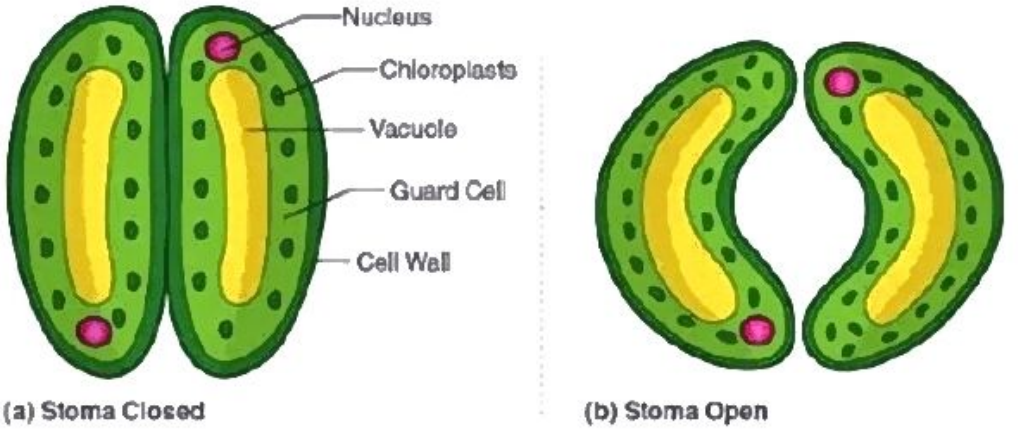
How the plant obtains carbon dioxide?

- Massive gaseous exchange occurs in leaves via stomatal pores for photosynthesis.
- Gas exchange extends across the surfaces of stems, roots, and leaves.
- Stomatal pores close to prevent excessive water loss when carbon dioxide is not needed for photosynthesis.
- The opening and closing of stomatal pores are regulated by guard cells.
- Guard cells swell with water influx, causing stomatal pores to open.
- Conversely, the pores close when guard cells shrink.

E.M.A

Stomata

- Stomata, pores on leaves, facilitate gas exchange.
- Predominantly located on the underside of leaves.
- Guard cells, regulating pore opening and closing, safeguard each stoma.
- The functionality of guard cells is influenced by their water content.



Heterotrophic Nutrition: E.M.A

Saprophytic Nutrition

Saprophytic nutrition refers to the feeding behavior of certain organisms that rely on consuming dead and decomposed organic matter.

The food is partially digested outside the body, and then it is absorbed.

E.g. Fungi are saprophytes.

Parasitic Nutrition

Parasitic nutrition involves organisms feeding at the expense of another, causing harm.

Parasites live on or within a host organism, extracting nutrients directly from the host's body.

Examples include leeches as ectoparasites, Ascaris as an endoparasite, and Cuscuta as a parasitic plant.

Holozoic Nutrition:

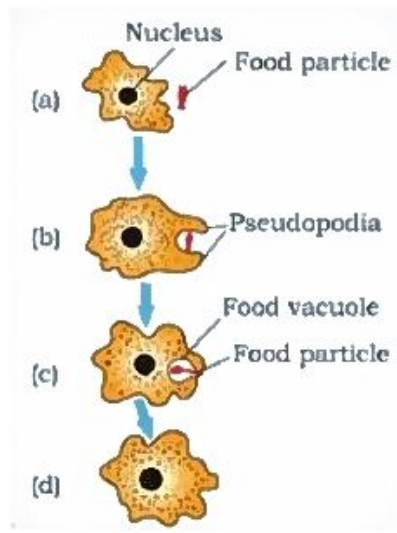
In holozoic nutrition, the digestion happens inside the body of the organism. i.e., after the food is ingested. Most of the animals follow this mode of nutrition.

How do Organisms obtain their Nutrition?

Single-celled organisms

E.M.A

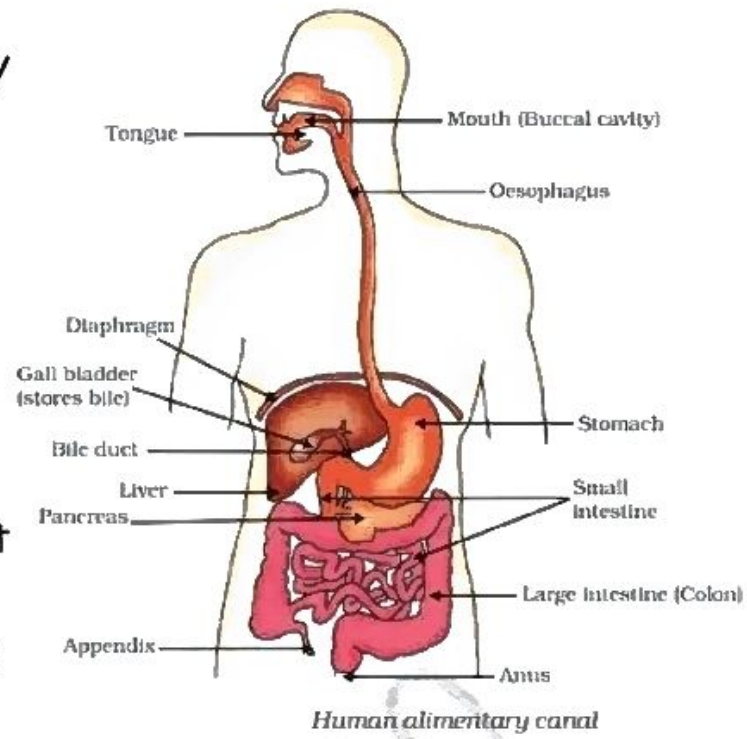
- **Amoeba** engulfs food through temporary extensions of its cell surface, creating a food-vacuole as these extensions merge over the food particle.
- Within the food-vacuole, complex substances undergo breakdown into simpler ones, facilitating their diffusion into the cytoplasm.
- Undigested material is transported to the cell surface and expelled by Amoeba.



- **Paramoecium,** a unicellular organism, maintains a distinct shape and ingests food at a designated location.
- The entire cell surface, covered with cilia, facilitates the movement of food to the specified intake spot.

Nutrition in Human Beings:

- The alimentary canal is a lengthy tube running from the mouth to the anus.
- Salivary glands secrete saliva, which contains the enzyme salivary amylase, breaking down complex starch into simple sugars.
- Muscles lining the canal contract rhythmically, facilitating peristaltic movements that push food forward throughout the digestive system.



Human alimentary canal

Digestion in the stomach:

- Gastric glands within the stomach wall secrete hydrochloric acid, the enzyme pepsin, and mucus.
- Hydrochloric acid establishes an acidic environment, enhancing the effectiveness of the protein-digesting enzyme, pepsin.
- Under normal conditions, mucus shields the stomach's inner lining from the corrosive effects of the acid.
- Pepsin functions as a protein-digesting enzyme.
- The release of food from the stomach into the small intestine is regulated by a sphincter muscle, allowing controlled passage in small amounts.

Length of small intestine:

- Herbivores, such as those consuming grass, require an elongated small intestine to facilitate the digestion of cellulose.
- Carnivores, like tigers, with a diet of easily digestible meat, possess shorter small intestines.
- The small intestine serves as the location for the thorough digestion of carbohydrates, proteins, and fats.
- Secretions from the liver and pancreas contribute to the digestive processes occurring in the small intestine.

Bile juice from the liver:

- Bile salts play a role in emulsifying fats, breaking large fat globules into smaller ones, thereby enhancing the efficiency of pancreatic enzymes.
- The initially acidic food entering the small intestine undergoes alkalization through the action of bile juice, promoting the effectiveness of pancreatic enzymes.

pancreatic juice from the pancreas:

- Pancreatic juice includes enzymes such as trypsin, responsible for protein digestion, and lipase, which is involved in breaking down emulsified fats.
- The small intestine walls house glands producing intestinal juice.
- Enzymes in the intestinal juice convert proteins to amino acids, complex carbohydrates to glucose, and fats to fatty acids and glycerol.
- The inner lining of the small intestine has numerous finger-like projections called villi.

Functions of Villi:

- Enhances the surface area available for absorption.
- Villi are abundantly supplied with blood vessels, facilitating the distribution of absorbed nutrients to every cell in the body.
- Unabsorbed food is directed to the large intestine, where its walls extract additional water from the material.

Respiration:

The process by which a living being utilises the food to get energy, is called respiration. Respiration is an oxidation reaction in which carbohydrate is oxidized to produce energy. Mitochondria is the site of respiration and the energy released is stored in the form of ATP (adenosine triphosphate). ATP is stored in mitochondria and is released as per need.

Steps of respiration:

- The **breakdown of glucose into pyruvate** occurs in the cytoplasm. During this process, a glucose molecule, with 6 carbon atoms, is transformed into pyruvic acid, which consists of 3 carbon atoms.

Fate of Pyruvic Acid in Mitochondria: Pyruvic acid undergoes further breakdown within the mitochondria, and the resulting molecules vary based on the type of respiration specific to the organism. Respiration is categorized into two types: aerobic respiration and anaerobic respiration.

Respiration involves

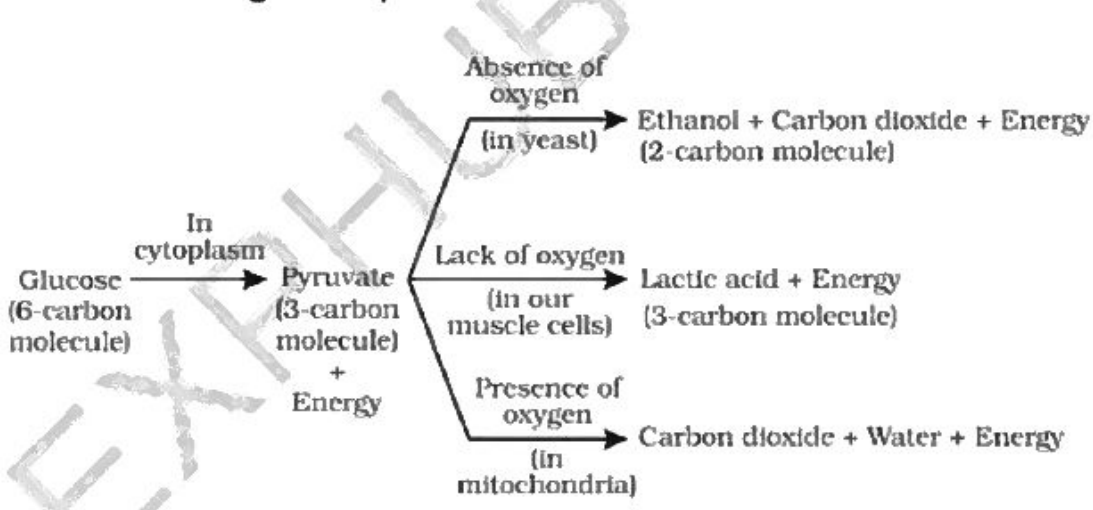
Gaseous exchange: Intake of oxygen from the atmosphere and release of CO_2 → Breathing.

Breakdown of simple food in order to release energy inside the cell → Cellular respiration

Types of Respiration

Aerobic Respiration: Aerobic respiration occurs in the presence of oxygen. Pyruvic acid undergoes conversion into carbon dioxide, releasing energy, and culminating in the formation of water molecules.

Anaerobic Respiration: Anaerobic respiration occurs in the absence of oxygen. Pyruvic acid is converted into either ethyl alcohol or lactic acid. Ethyl alcohol typically forms in microbes such as yeast or bacteria during anaerobic respiration. Lactic acid is produced in certain microbes and muscle cells during this process.



Break-down of glucose by various pathways

Pain in leg muscles while running:

- Intense running triggers anaerobic respiration in muscle cells, driven by an increased demand for energy.
- The process of anaerobic respiration produces lactic acid, contributing to a throbbing pain in the leg muscles.
- Resting after the activity helps alleviate the pain caused by the deposition of lactic acid in the muscles.

ATP

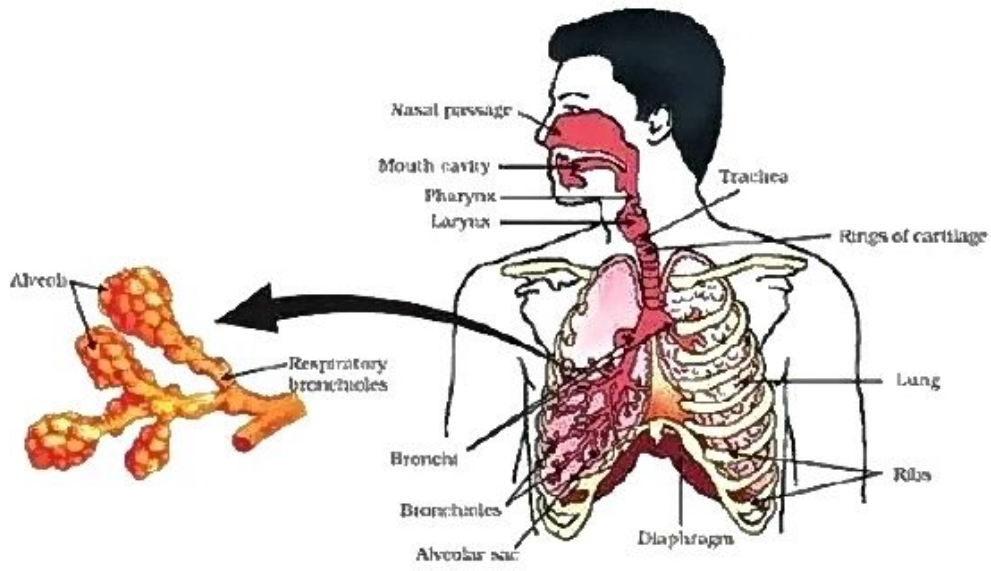
- ATP serves as the energy currency within cells.
- ATP is an acronym for Adenosine Tri-Phosphate.
- This molecule is generated as a byproduct of reactions such as photosynthesis and respiration.
- The three phosphate bonds in ATP are high-energy bonds, and their breaking releases a substantial amount of energy.
- The released energy is subsequently utilized for various metabolic reactions.

Respiration in Humans

- The human respiratory system is a complex network crucial for breathing, gas exchange, and cellular respiration.
- A well-organized respiratory system is essential for efficient breathing and gas exchange.
- Breathing involves inhaling oxygen and exhaling carbon dioxide.
- Gas exchange occurs in the lungs, where oxygen is supplied to all cells in the body.
- Cellular respiration takes place in every cell, contributing to overall energy production and cellular function.

Respiratory System

- The human respiratory system involves the nose, nasal cavities, pharynx, larynx, trachea/windpipe, bronchi, bronchioles and alveoli.
- Bronchioles and alveoli are enclosed in a pair of lungs.
- The rib cage, muscles associated with the rib cage and diaphragm all help in the inhalation and exhalation of gases.
- The exchange of gases takes place between an alveolar surface and surrounding blood vessels.
- Alveoli provide a large surface area for the exchange of gases.



1. Why do we feel pain or cramps in muscles after vigorous exercise?

Actively metabolizing cells of an extremely active skeletal muscle, during heavy exercise, carry oxidation in the anaerobic condition inside the muscle cell, we feel pain after a vigorous exercise because of production of ATP by anaerobic respiration in leg muscles

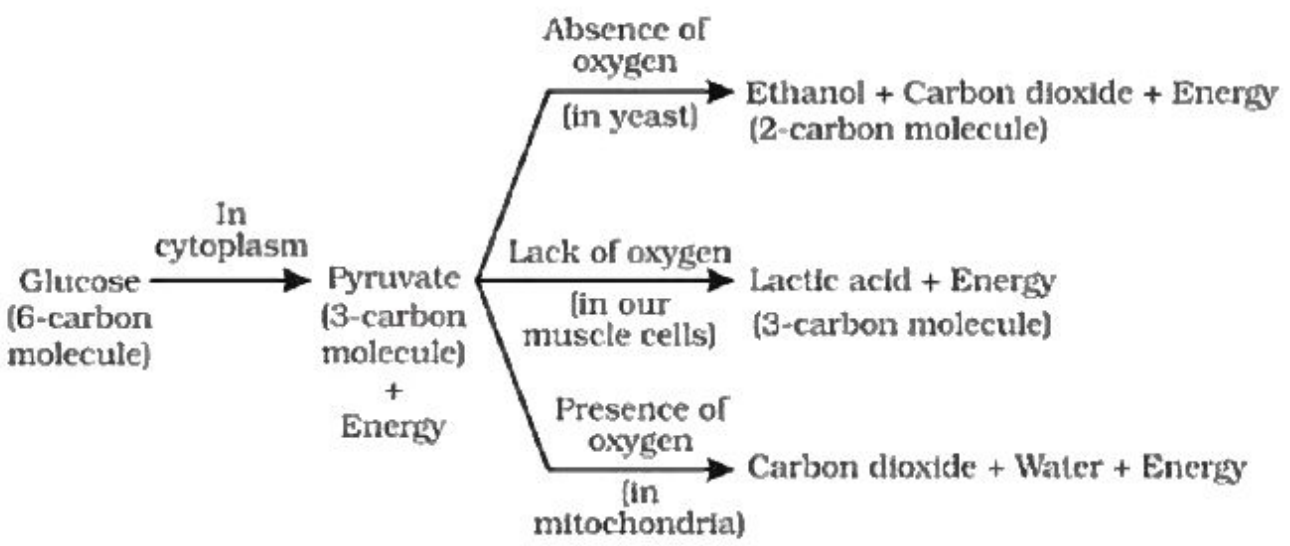
2. Describe the structure of the human heart briefly

Human heart is four chambered. The two upper chambers are called atria and they receive blood from large veins while the two lower chambers are called ventricles. Between left atrium and left ventricle as well as between right atrium and right ventricle are valve which allow blood to flow only from atrium to ventricle.

3. What is sequence of steps in photosynthesis? How is it different in desert plants and those in temperate regions?

Chloroplast (chlorophyll), on exposure to light energy, becomes activated by absorbing light energy, and splits water (photolysis of water) to oxygen and hydrogen. Hydrogen reduces CO_2 , and synthesizes glucose. In plants of temperate regions, stomata open during day to take in CO_2 and release O_2 Desert plants open stomata at night to check excessive loss of water hence sequence of steps of photosynthesis are slightly different. These plants take up carbon dioxide at night and prepare an intermediate which is acted upon by the energy absorbed by the chlorophyll during the day

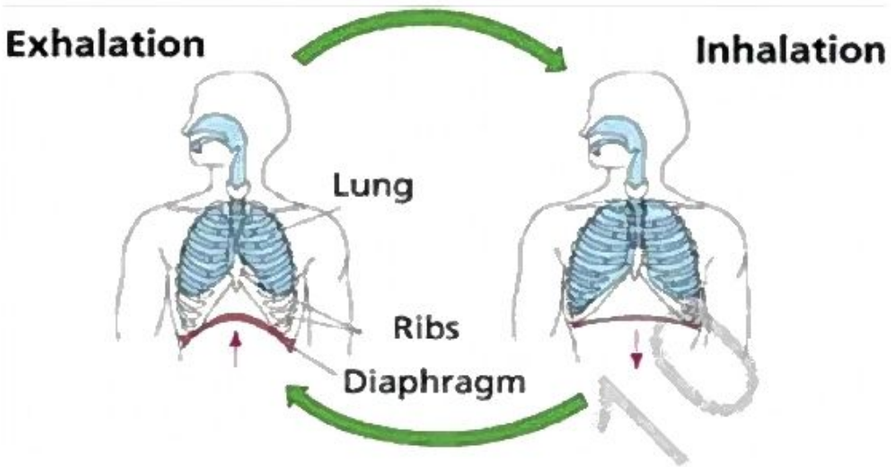
4.Give schematic representation of different pathways of breakdown of glucose molecule.



Break-down of glucose by various pathways

Inhalation and Exhalation

- Inhalation is the process of taking in air rich in oxygen.
- Exhalation is the process of expelling air rich in carbon dioxide.
- A single breath involves both inhalation and exhalation.
- Individuals breathe multiple times throughout the day.
- The frequency of breaths in one minute is referred to as the breathing rate.



Cellular Respiration

Cellular respiration involves a series of metabolic reactions within cells, transforming the biochemical energy derived from food into a chemical compound known as adenosine triphosphate (ATP).

Respiration in Plants

- In contrast to animals and humans, plants lack specialized structures for gaseous exchange.
- Gaseous exchange in plants occurs through stomata in leaves and lenticels in stems.
- Plant roots, stems, and leaves exhibit a considerably lower respiratory rate compared to animals.

Transportation:

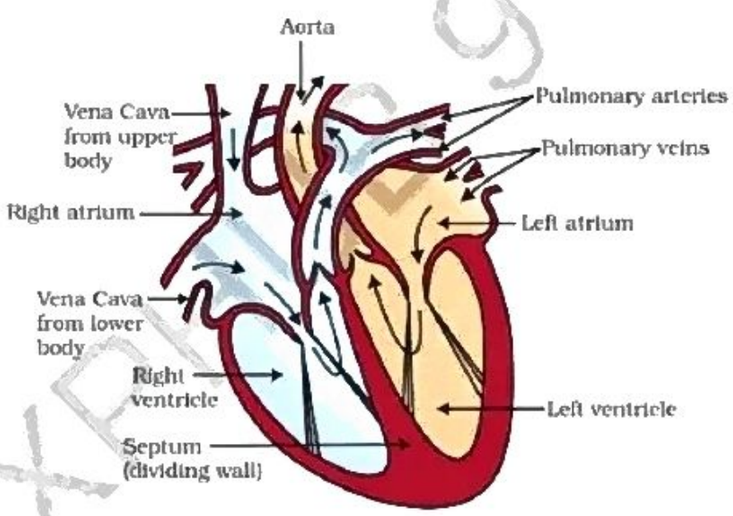
- All living organisms, including animals, rely on essential components like air, water, and food for survival, obtained through processes such as breathing, drinking, and eating.
- Transportation systems, like vascular tissue in plants and specialized circulatory systems in animals, facilitate the distribution of necessary substances to cells and tissues.

Transportation in Humans

- The circulatory system in humans serves as the primary transportation mechanism.
- Comprising blood, blood vessels, and the heart, it facilitates the supply of oxygen and nutrients while eliminating carbon dioxide and other excretory products.
- Additionally, the circulatory system plays a vital role in the body's immune response, aiding in the fight against infections.

HEART is a muscular organ, which is composed of cardiac muscles.

- The heart, compact enough to fit within an adult's wrist, serves as a vital pumping organ for blood circulation.
- Comprising four chambers—right atrium, right ventricle, left ventricle, and left atrium—the human heart orchestrates the rhythmic processes of systole (contraction of cardiac muscles) and diastole (relaxation of cardiac muscles).
- Through systole and diastole, the heart efficiently propels and circulates blood, ensuring essential oxygen and nutrients reach the body's tissues and organs.



ARTERIES

- Thick-walled blood vessels transport oxygenated blood from the heart to various organs, with the exception of pulmonary arteries.
- Pulmonary arteries deviate from the norm by carrying deoxygenated blood from the heart to the lungs, where the blood undergoes oxygenation.

VEINS

- These are thin-walled blood vessels which carry deoxygenated blood from different organs to the heart, pulmonary veins are exceptions because they carry oxygenated blood from lungs to the heart.
- Valves are present in veins to prevent back flow of blood.

Capillaries: are blood vessels distinguished by their single-cell walls.

- **Blood,** a connective tissue, functions as the carrier for various substances in the body and is comprised of three main components: 1. Plasma, 2. Blood cells, and 3. Platelets.
- **Blood Plasma:** This is a light-colored fluid primarily composed of water, constituting the matrix of blood.
- **Blood Cells:** There are two main types of blood cells: Red Blood Cells (RBCs) and White Blood Cells (WBCs).

Red Blood Cells (RBCs): These cells are red due to the presence of the pigment hemoglobin. Hemoglobin readily binds with oxygen and carbon dioxide, facilitating the transport of oxygen. Additionally, a portion of carbon dioxide is transported through hemoglobin.
White Blood Cells (WBCs): These cells are pale white and play a crucial role in the immune system.

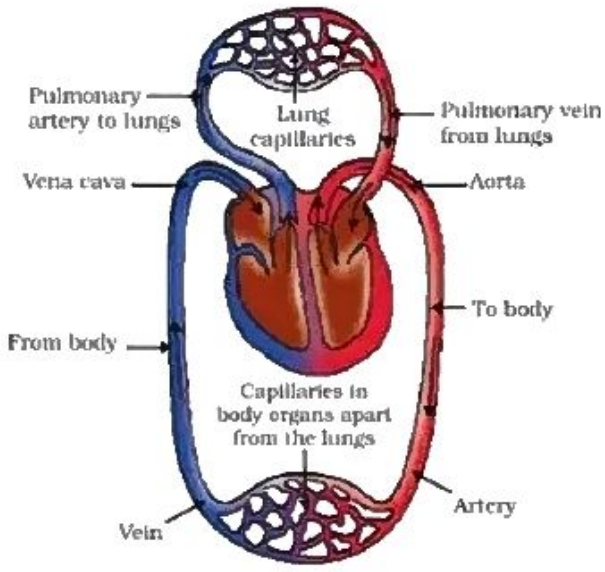
- **Platelets:** Responsible for blood coagulation, platelets serve as a defense mechanism preventing excessive blood loss in the event of an injury.

LYMPH

- Lymph resembles blood but lacks red blood cells (RBCs).
- Formed from leaked fluid in tissues, lymph is collected by lymph vessels and returns to blood capillaries.
- Lymph, a yellowish fluid with fewer proteins than blood, plays a vital role in the immune system.
- It flows from tissues to the heart, assisting in transportation and germ destruction.

Double circulation:

The heart receives oxygenated blood from the lungs, pumps it to various parts of the body, and then receives it back for another circulation. Consequently, the blood completes a full round through the body, passing once through the right half as deoxygenated blood and once through the left half as oxygenated blood.



Transportation in Plants

- Transportation is a crucial process in plants.
- It encompasses the movement of water and essential nutrients throughout the plant to support its survival.
- Plants conduct the transportation of food and water through distinct pathways.
- Xylem is responsible for transporting water.
- Phloem, on the other hand, is dedicated to the transportation of food.

Transport of water

- Root cells in contact with the soil actively absorb ions, establishing a concentration difference between the root and the soil.
- Water moves into the root from the soil to equalize this ion concentration difference. Additionally, the evaporation of water molecules from leaf cells generates suction, drawing water from the xylem cells in the roots.

Transpiration

- Transpiration refers to the loss of water in vapor form from the plant's aerial parts.
- This process aids in the absorption and upward transport of water and dissolved minerals from the roots to the leaves, contributing to temperature regulation.

Transport of food and other substances

- The movement of soluble products resulting from photosynthesis is termed translocation, and it takes place within the vascular tissue section called the phloem.
- Energy is harnessed to accomplish translocation in the phloem.
- Substances such as sucrose are actively transferred into phloem tissue, utilizing energy derived from ATP.

Xylem

- Transports water and minerals from the roots to various parts of the plant.
- No energy is used.

Phloem

- Transports the products of photosynthesis from the leaves to other parts of the plant.
- Energy is used from ATP (adenosine triphosphate).

Excretion

The human excretory system comprises two kidneys, two ureters, a urinary bladder, and a urethra.

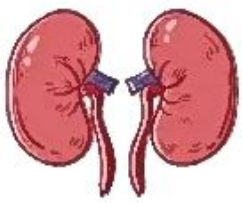
- Animals exhibit an advanced and specialized excretory system.
- In contrast, plants lack a well-developed excretory system similar to that of animals.
- Plants do not possess specialized organs for excretion.
- Consequently, excretion in plants is not as complex as it is in animals.

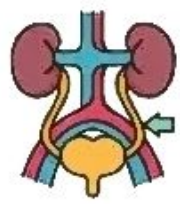
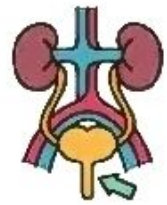
Human Excretory System

- The human excretory system consists of a pair of kidneys.
- Each kidney is connected to the urinary bladder by a tube called the ureter.
- Urine is gathered in the urinary bladder and expelled through the urethra as needed

Excretory system of human beings includes

A pair of kidneys, A urinary bladder, A pair of the ureter, A urethra.



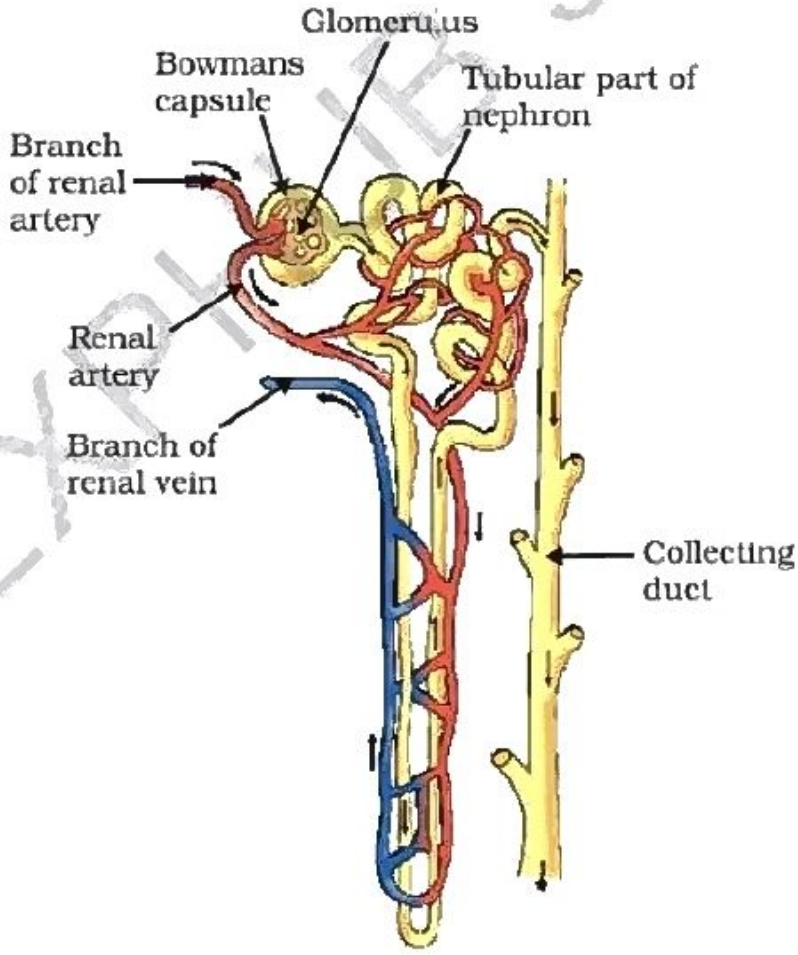



Kidney:

- The kidney, a bean-shaped organ, is situated near the vertebral column in the abdominal cavity.
- Comprising numerous filtering units known as nephrons.
- The nephron is recognized as the functional unit of the kidney.

Nephron Nephrons are the structural and functional unit of kidney.

- Each kidney comprises millions of nephrons, serving as the fundamental structural and functional unit.
- A nephron consists of two parts: the Malpighian body and the renal tubule.
- The Malpighian body includes Bowman's capsule, a cup-like structure, and the glomerulus, a cluster of capillaries.
- Working collaboratively, they filter waste materials and various useful substances.
- The renal tubule features three regions: proximal convoluted tubule, Loop of Henle, and distal convoluted tubule.
- These regions absorb useful substances back into the blood and filter the remaining waste substances.
- The collective output from nephrons is termed urine.



Haemodialysis

- Kidney failure leads to complications, and to address this, the technology of dialysis has been developed.
- Dialysis employs a machine filter known as a dialyzer or artificial kidney.
- The purpose is to eliminate excess water and salt, balance electrolytes, and remove metabolic waste products.
- Blood is extracted from the body and passes through tubes with a semipermeable membrane.
- On the other side of the membrane, a dialysate flows, drawing impurities through the membrane.

Excretion in Plants

- Cellular respiration, photosynthesis, and metabolic reactions in plants result in the production of various excretory products.
- Major plant excretory products include carbon dioxide, excess water from respiration, and nitrogenous compounds from protein metabolism.
- Plants release two gaseous waste products: oxygen during photosynthesis and carbon dioxide during respiration.
- Gaseous waste excretion in plants occurs through stomatal pores on leaves.
- Oxygen released during photosynthesis is utilized for respiration, while carbon dioxide from respiration is used for photosynthesis.
- Excess water is excreted through transpiration.
- Plants store organic by-products in different forms in various parts, including gums, oils, latex, and resins.
- These waste products are stored in plant parts like bark, stems, leaves, etc., and are eventually shed off.
- Examples of plant excretory products include orange oil, eucalyptus oil, jasmine oil, latex from rubber trees, papaya trees, and gums from acacia.
- At times, plants release excretory substances into the soil.

TOP 7 QUESTIONS

1.Differentiate between Photosynthesis and Respiration.

Respiration	Photosynthesis
• It occurs in all living cells.	• It occurs in only autotrophs.
• O2 reacts with food and energy is released.	• CO2 and H2O combine to form starch and water in the presence of light.
• It occurs in cytoplasm and mitochondria.	• Occur in plastidchloroplast

2. a. How is oxygen and carbon dioxide exchanged between blood and tissue? How are the gases transported in human being?
b. What is haemoglobin?

a. Exchange of gases in tissues occurs through diffusion. Oxygen is carried as oxyhaemoglobin from lungs to tissues. It dissociates and carbon dioxide diffuses out into blood from tissues. It is transported in dissolved form and reaches lungs where again it diffuses to alveoli.

b. Respiratory pigment: Haemoglobin is a red coloured protein present in red blood cells. Haemoglobin has affinity for O2.

3. What is excretion? Name some parts in our body involved in this life process?

Excretion means throwing out metabolic waste from living body. Many organs perform this process such as

a. Kidneys remove nitrogenous wastes like urea and uric acid in urine.
b. Sweat and oil by glands in skin.
c. Carbon dioxide and water vapor by lungs.
d. Faces or undigested food by large intestine.
e. Bile pigments by liver. It also converts toxic ammonia to urea.

4.Explain how the air is inhaled during breathing in humans.

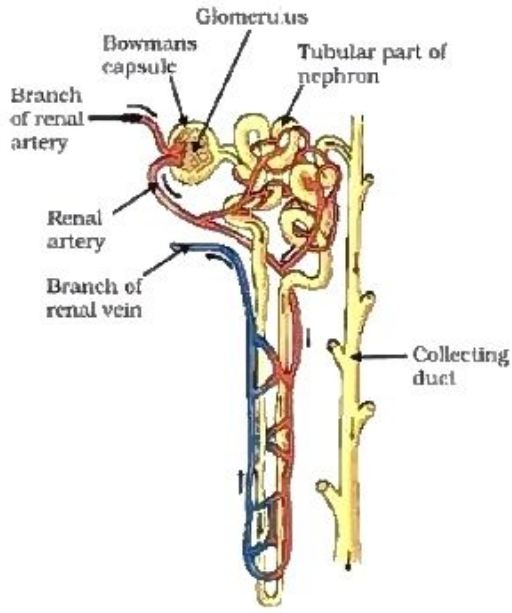
Mechanism of inhalation:
a. The diaphragm and rib muscles contract which make the throat move upwards and outwards.
b. The volume inside the thoracic cavity increases i.e., it expands.
c. Air pressure inside the thoracic cavity decreases. Thus, air from outside rushes into the lungs /
alveoli through nostrils, trachea and bronchi.

5.Leaves of a healthy potted plant were coated with Vaseline to block the stomata. Will this plant remain healthy for long? Stage three reasons for your answer.

No, the plant will not stay healthy for a long time. The reasons are:
a. It will not be able to exchange O2 and CO2, hence respiration will be affected adversely.
b. Photosynthesis will also be affected as CO2 will not be available.
c. Transpiration will not take place hence there will
be no ascent of sap, hence no water absorption from the soil.

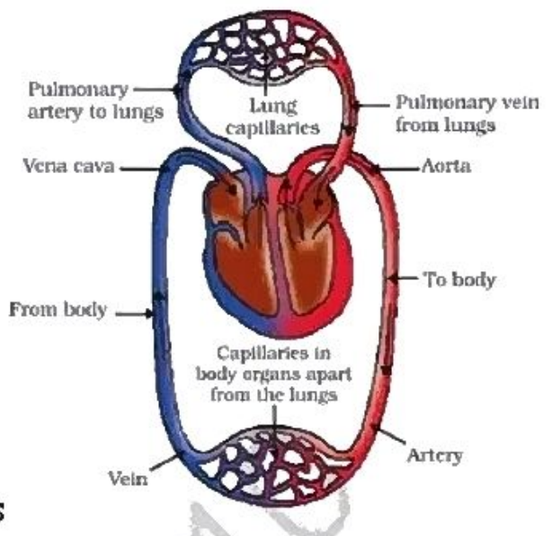
6.Draw neat and labeled diagram of nephron and describe the process of urine formation.

Within the kidney are small functional units called nephrons, which are made up of glomeruli, Bowman's capsule, proximal convoluted tubule, loop of Henley1s loop, distal convoluted loop, and collecting duct. Steps of urine formation: Each kidney is made of millions of nephron. Each nephron has a hollow cup like Bowman's capsule and a long tubule system following it. Arteriole branching from renal artery make bunches of capillaries, one of which is called a Glomerulus. The first step in the filtration process is when the blood enters the Glomerulus, where it is then pumped through the porous walls into the Bowman's space. This filtered plasma is mainly water, various salts, urea and glucose. The "glomerular filtrate" then
passes through the proximal convoluted tubule , Loop of Henle, the distal convoluted tubule so that useful substances are re-absorbed by blood present in the capillaries around them.



7.Describe double circulation in human beings. Name the group of animal with double circulation? How is it important for them?

Such a flow in which blood enters the heart twice is called double circulation. It helps in keeping the oxygenated and deoxygenated blood separate. The right atrium receives blood from the vena cava and pumps the blood into the right ventricle. Blood is sent to lungs, where it is oxygenated. Then, it is sent through the right and left pulmonary veins to the left atrium where it is pumped to the left ventricle. The blood then travels to the ascending aorta where it leaves the heart and delivers oxygen to different parts of the body.



Competency-Based Questions:

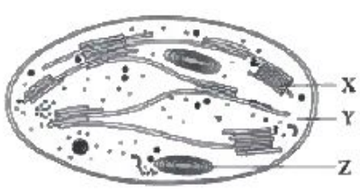
1. The green plants make their food, through photosynthesis and are therefore called autotrophs. All other organisms depend upon green plants for food and are referred to as heterotrophs. Green plants carry out photosynthesis by using light energy of sun. The first phase of reactions are directly light driven therefore called light reactions. The second phase of reactions are not directly light driven but are dependent on the products of light reactions and are called dark reactions.

(i) Which of the following is produced during the light phase of photosynthesis?
(a) ATP (b) NADPH (c) Carbohydrate (d) Both (a) and (b)

(ii) In the overall process of photosynthesis, the number of sugar molecules produced is
(a) 12 (b) 6 (c) 4 (d) 1.

(iii) A plant is provided with ideal conditions for photosynthesis and supplied with isotope $^{14}CO_2$. When the products of the process are analysed carefully, what would be the nature of products?
(a) Both glucose and oxygen are normal.
(b) Both glucose and oxygen are labelled.
(c) Only glucose is labelled and oxygen is normal.
(d) Only oxygen is labelled and glucose is normal.

(iv) Refer to the given diagrammatic representation of an electron micrograph of a section of chloroplast and answer the question.



Select the option which correctly depicts the functions of parts X, Y and Z.

	X	Y	Z
(a)	Dark reaction	Light reaction	Carbohydrate synthesis
(b)	Light reaction	Carbohydrate synthesis	Carbohydrate storage
(c)	Light reaction	Carbohydrate storage	Carbohydrate synthesis
(d)	Carbohydrate synthesis	Carbohydrate storage	Cytoplasmic inheritance

(v) Following table summarises the differences between light and dark reactions.

	Light reactions	Dark reactions
(I)	These are also called biosynthetic phase.	These are also called photochemical phase.
(II)	These reactions occur over thylakoids.	These reactions occur in stroma of chloroplasts.
(III)	These produce assimilatory power *i.e.*, NADPH and ATP.	These consume NADPH and ATP.
(IV)	These are directly dependent upon light.	They depend upon the products synthesised during light reactions.

Which of the following is correct group of differences?

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

2 .The small intestine is a tubular structure within the abdominal cavity that carries the food in continuation with the stomach up to the colon from where the large intestine carries it to the rectum and out of the body. The main function of this organ is to aid in digestion. All nutrients are usually absorbed into blood across the mucosa of the small intestine. In addition, the small intestine absorbs water and electrolytes, thus playing critical role in and acid-base balance. maintenance of body water

(i) Which of the following is incorrect regarding intestinal villi?

(a) They possess microvilli.
(b) They increase the surface area.
(c) They are supplied with capillaries and the lacteal vessels.
(d) They only participate in digestion of fats.

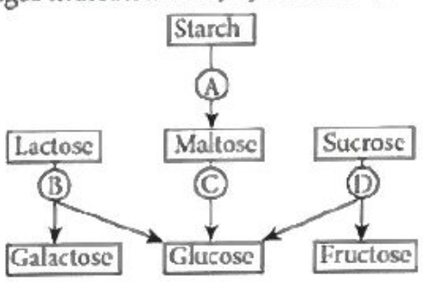
(ii) Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth as they move down the alimentary canal?

(a) Pancreatic amylase → Salivary amylase → Lipases
(b) Disaccharidase like maltase → Lipases → Nucleases
(c) Salivary amylase → Pancreatic amylase → Disaccharidases
(d) Salivary maltase → Carboxypeptidase → Trypsinogen

(iii) After surgical removal of an infected gall bladder, a person must be especially careful to restrict dietary intake of

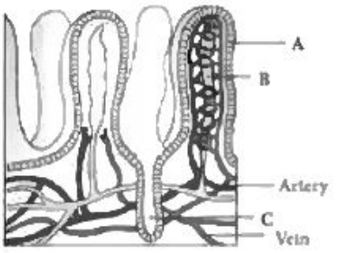
(a) starch (b) protein (c) sugar (d) fat.

(iv) The given flow chart shows the fate of carbohydrates during digestion in the human alimentary canal. Identify the enzymes acting at stages indicated as A, B, C and D and select the correct option.



(a) A - Amylase, B - Maltase, C - Lactase, D - Invertase
(b) A - Amylase, B - Maltase, C - Invertase, D - Lactase
(c) A - Amylase, B - Invertase, C - Maltase, D - Lactase
(d) A - Amylase, B - Lactase, C - Maltase, D - Invertase

(v) The given diagram represents a section of small intestinal mucosa. Identify A, B and C.



(a) A-Villi, B-Lacteal, C-Capillaries
(b) A-Lacteal, B-Villi, C-Capillaries
(c) A-Villi, B-Lacteal, C-Crypts
(d) A-Crypts, B-Lacteal, C-Capillaries