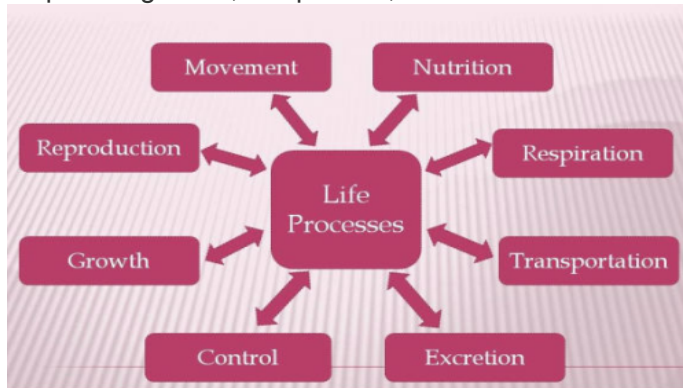


Ch 6 Life Processes

Important notes, Mind maps and diagrams

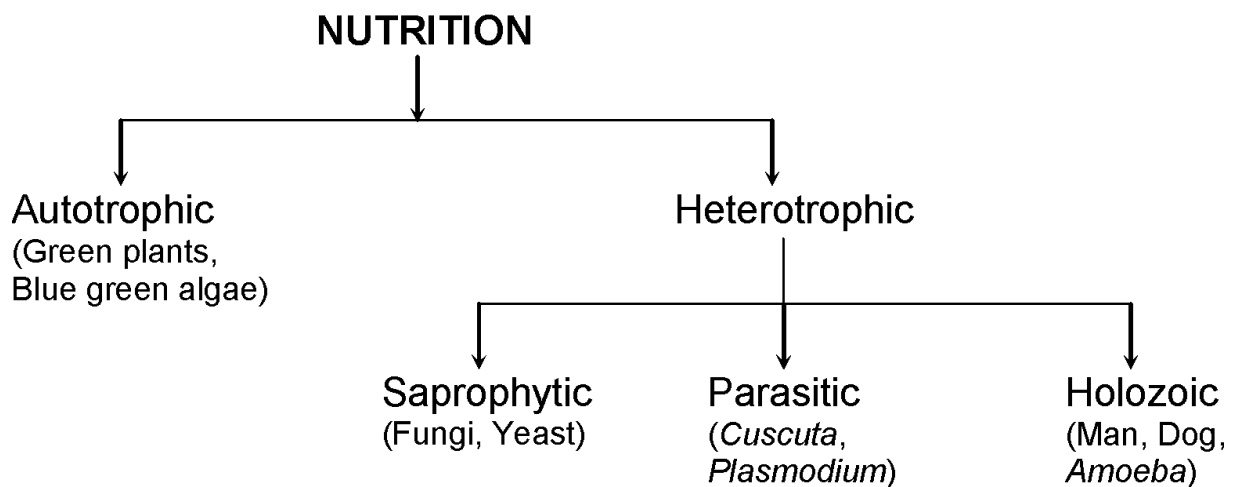
Life processes

- important processes for maintenance and repair in living organisms
- Some Examples- Digestion, Respiration, Circulation etc.



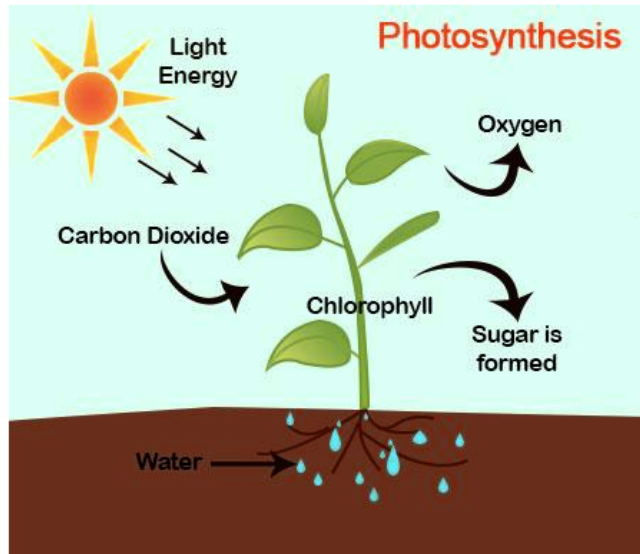
Nutrition

- Process of obtaining nutrients from the environment i.e. intake of food and then its digestion in the body.
- Two types – Autotrophic (self-sufficient for food) and Heterotrophic (dependent on others for food).



Autotrophic nutrition

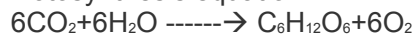
- Synthesis of food by photosynthesis- 'photo' means light and 'synthesis' means production. It is the production of food with the help of sunlight.



Raw materials for photosynthesis:

- (i) **Water:** Roots absorb it from the soil.
- (ii) **Carbondioxide:** Stomata in leaves allow the carbon dioxide gas to enter into the plant.
- (iii) **Chlorophyll:** It is already present in the leaves.
- (iv) **Sunlight:** From the sun.

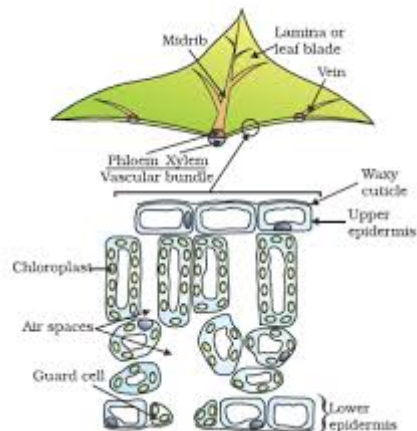
- Photosynthesis equation-



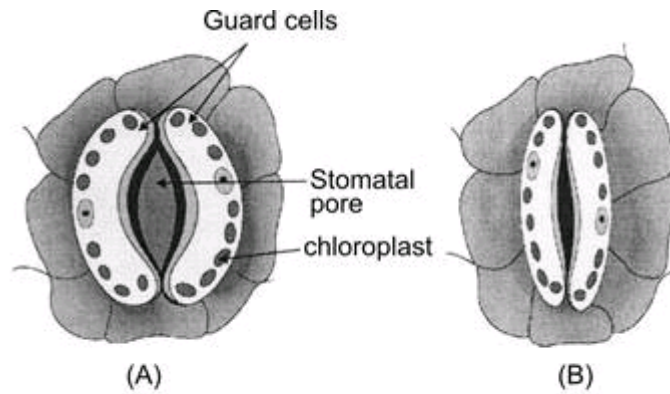
- Events of photosynthesis are as follows:

1. Absorption of light energy chlorophyll which is the green pigment and gives energy for activation of reaction.
2. Then the splitting of water into its constituent's hydrogen and oxygen
3. **Reduction of CO_2 to carbohydrates.**

Glucose is main product and is stored in the form of starch in plants



CROSS SECTION OF LEAF

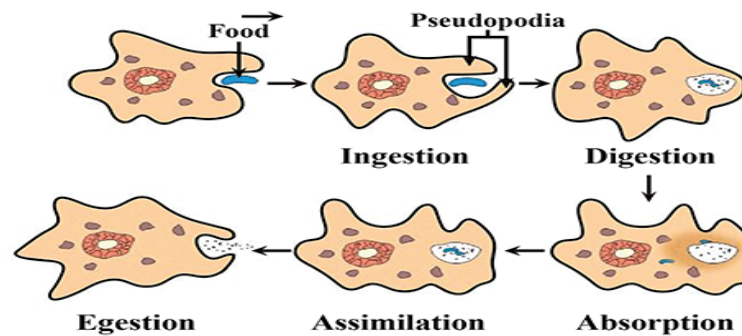


(A) Open and (B) closed stomatal pore

Heterotrophic nutrition

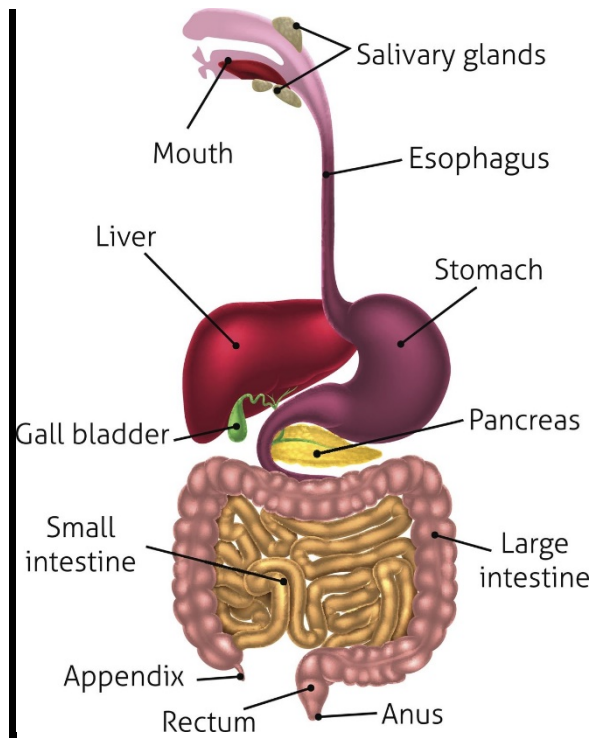
- Generally take up energy from plants and animals by using them as food.
- Mostly of three types—holozoic, parasitic, and saprophytic.
- Digestion- mechanical and chemical reduction of ingested nutrients which can be then converted to energy for use.

Nutrition in amoeba



- **Human digestive system**- consists of the long alimentary canal that includes mouth, pharynx, oesophagus, stomach, small intestine, large intestine, rectum and anus.
- Digestive glands-salivary glands, pancreas, liver

Nutrition in humans



HUMAN DIGESTIVE SYSTEM

- Saliva is secreted by salivary glands located under the tongue which contains digestive enzymes like salivary amylase, which break down starch into sugar. So, digestion of carbohydrates starts in the mouth itself.
- Tongue helps in chewing, moistening, rolling and swallowing of food.
- The food from mouth then goes down the oesophagus, which is the food pipe to the stomach, through the movement of walls of oesophagus (peristalsis)
- Stomach mixes the food hence received with various digestive juices.
- Inner lining of stomach secretes:
 - Mucus – protects the lining of stomach from being corroded by the acid.
 - Hydrochloric acid – creates an acidic medium and dissolves bits of food.
 - Digestive juices – break down protein into simpler substances.

The food from stomach eventually moves into the small intestine.

- Digestion in small intestine: It is the longest part (about 7.5 m long) of alimentary canal. It is the site where complete digestion of carbohydrates, proteins, and fats takes place. It gets intestinal juices from two different glands – liver and pancreas that help in the further digestion of food.

➤ Liver is the largest gland of the body and secretes bile juice. Bile juice is stored in the gall bladder and has a significant role in the digestion of fats.

➤ Pancreas has enzymes that help in total digestion of all food components.

- The digestive tract and associated glands together constitute the digestive system.

Summary of digestion

- Alimentary canal-
Mouth → Oesophagus → Stomach → Small intestine → Large intestine
- Important gland/juices

(Refer to figure 6.6 page no.97 of N.C.E.R.T Text book)

Organ	Gland	Enzyme/Juice	Function
Mouth	Salivary glands	Salivary Amylase	Converts starch into sugar
Stomach	Gastric glands	Gastric juice- (i) Hydrochloric acid → (ii) Pepsin → (iii) Mucus →	(a) Kills harmful bacteria that enters with the food. (b) Makes the medium alkaline for the action of Pepsin Digests proteins Protects the inner lining of the stomach from the corrosive action of Hydrochloric acid.
Small intestine	1) Liver 2) Pancreas	(i) Bile juice → (ii) Pancreatic Juice ▪ Amylase → ▪ Trypsin → ▪ Lipase →	(a) Makes the medium acidic for the action of Pancreatic enzymes. (b) Breaks down large fat molecules into smaller globules so that enzymes can act upon them. Converts Carbohydrates to glucose Converts Proteins to Amino acids Converts Fats into Fatty acids & Glycerol

Respiration

- It is the process of breakdown of glucose into energy in cells. It is of two types that are aerobic and anaerobic

Aerobic respiration

- Oxidation of food materials by oxygen
- Produces 36 ATP
- The steps followed in cellular respiration

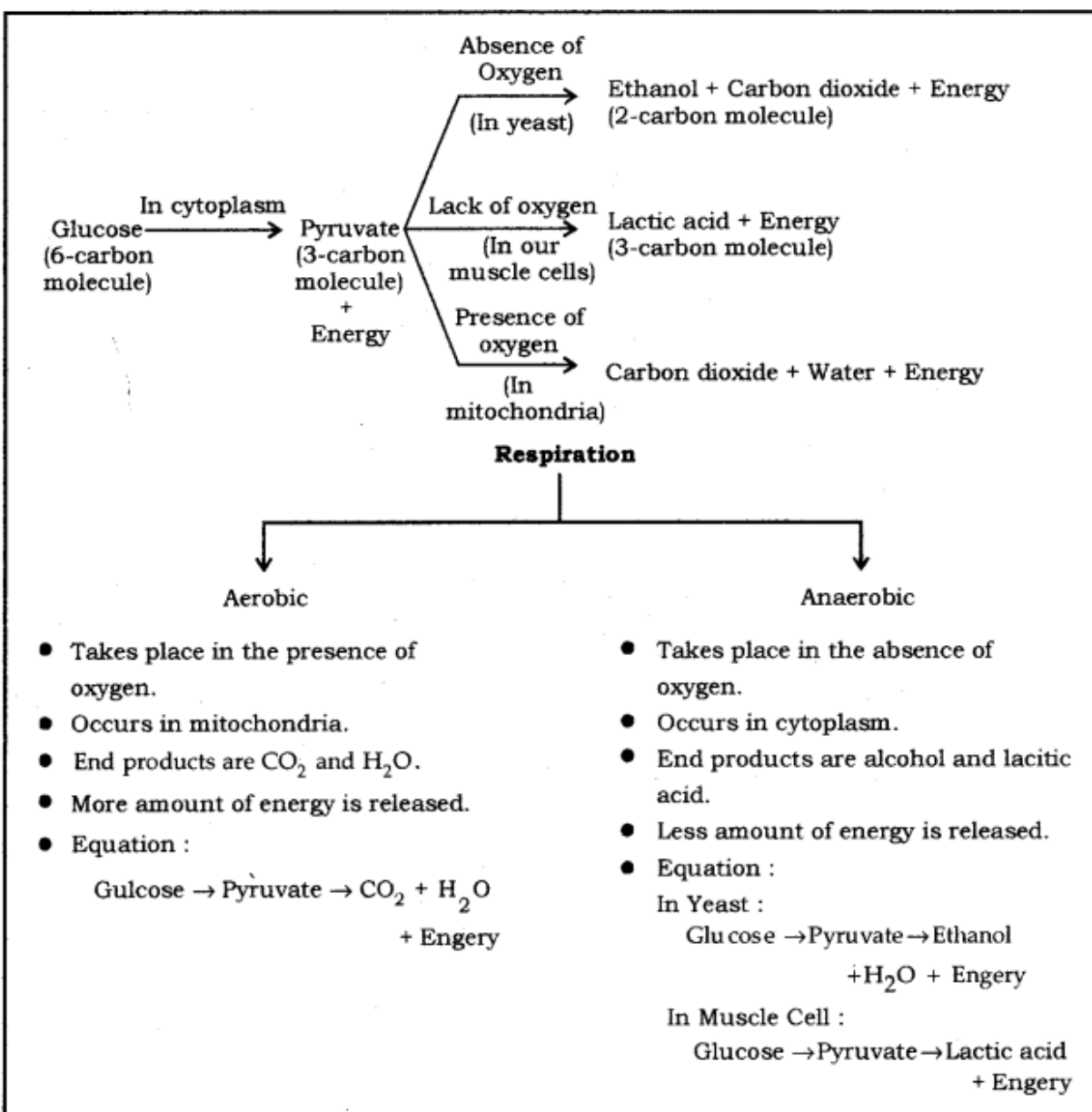
First step is breakdown of glucose into pyruvate in the cytoplasm(glycolysis)

Second step- Pyruvate is then broken down to CO₂ and water and it takes place in the mitochondria where energy is produced in ATP form.

Anaerobic respiration

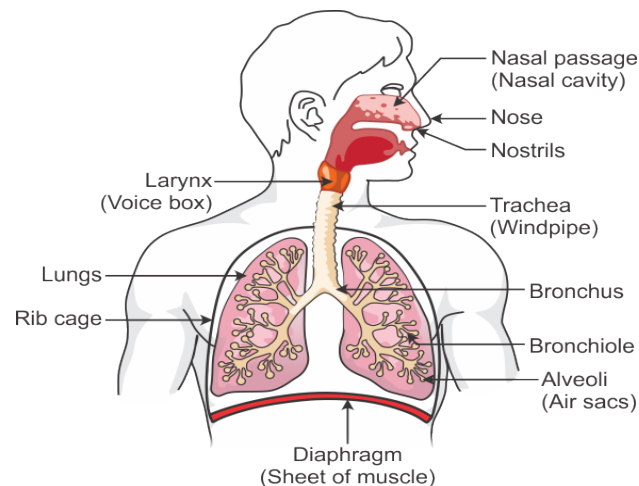
- It is the Oxidation of nutrients without using up the molecular oxygen
- It gives 2 ATPs.
- **First step-** glycolysis in cytoplasm, 2 pyruvate produced
- **Second step is the** break down of pyruvic acid into ethanol and water and energy (in yeast) and lactic acid and energy (in muscle cells)

Summary of respiration



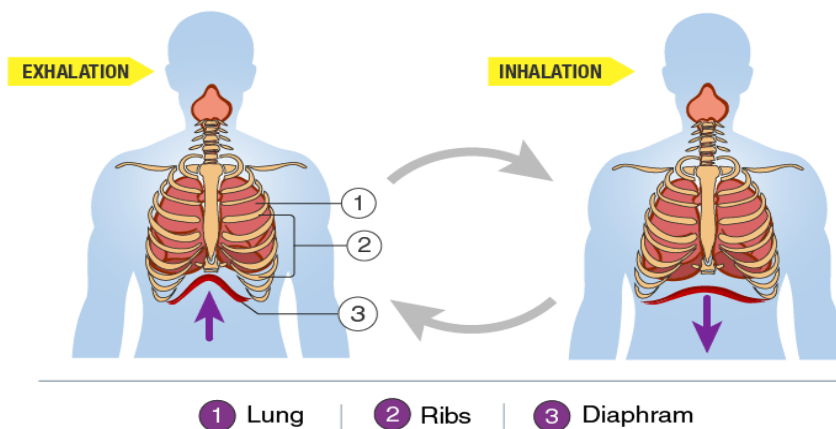
Human respiratory system

- It consists of the nose, pharynx, trachea, bronchi, bronchioles and alveoli



The human respiratory system

- Bronchioles then divide into many alveoli which are sites of gaseous exchange.
 - O_2 present in alveolar blood vessels is then transported to various cells of the body.
- Hemoglobin pigment present in blood is majorly responsible for transportation of carbon dioxide and oxygen.



Transportation

First and foremost things, a liquid medium blood is required always for transportation.

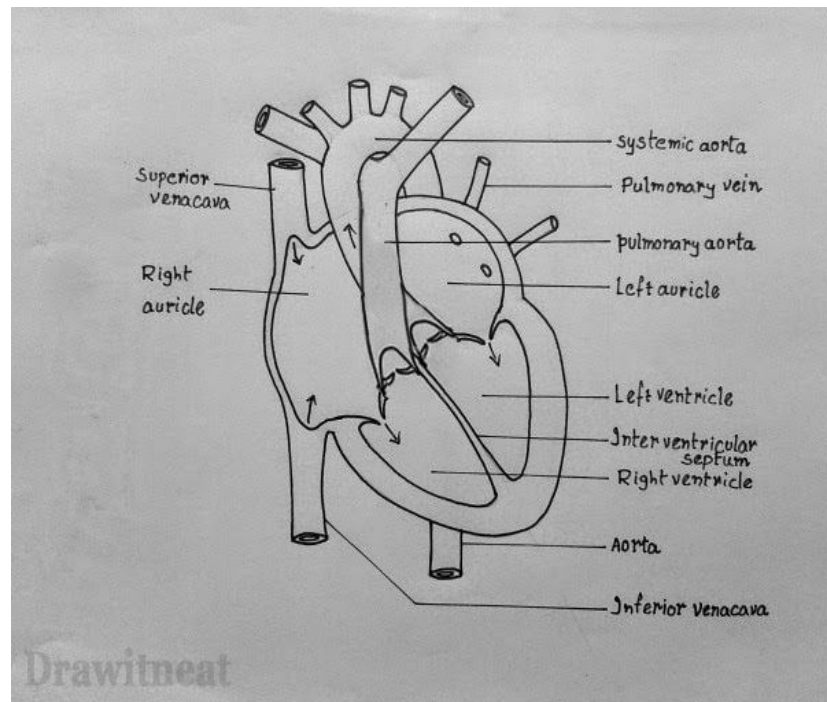
Transportation in humans

- Double circulation occurs in human beings i.e. the blood goes through the heart twice during each cardiac cycle.
- Blood and lymph are both involved in transportation
- Components of blood are RBCs, WBCs, platelets, and plasma.
- Three types of blood vessels are arteries, veins and capillaries.
- Arteries carry oxygenated blood in them, except one that is pulmonary artery
- Veins carry deoxygenated blood in them, except pulmonary vein
- Veins have valves to prevent backward flow of blood

Difference between Arteries and Veins

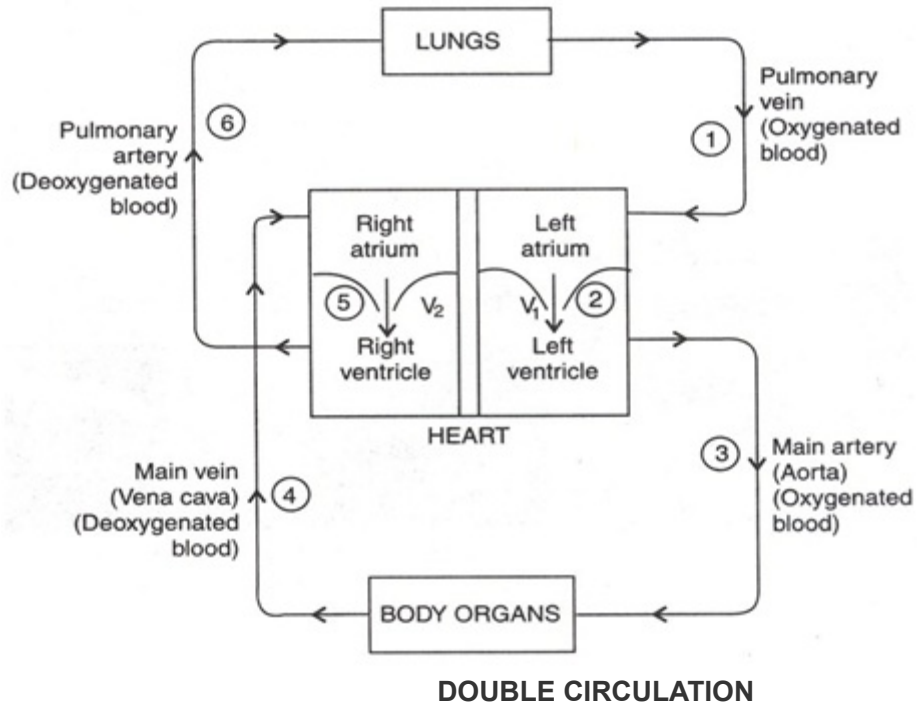
SrNo	Arteries	Veins
1	An artery carries blood away from heart	A vein carries blood towards the heart
2	An artery is thicker than a vein	A vein is comparatively thinner
3	The Pulmonary artery carries deoxygenated blood	The pulmonary vein carries oxygenated blood
4	Arteries have rigid walls	Veins have comparatively thinner walls
5	Blood flows under pressure through an artery	Blood flow through vein is much calmer
6	Lumen of arteries is narrow	Lumen of veins is comparatively wider

The Human heart is divided into four chambers – right auricle, right ventricle, left auricle, and left ventricle



- The Right side of the heart gets deoxygenated blood from different cells of the body
- The Left side of the heart receives oxygenated blood from lungs.
- Valves are present between different chambers of heart to prevent backflow of blood

Circulation of blood in human body



Transportation in plants

- Transportation of water is through xylem tissues
- Transport of water occurs due to transpiration pull, root pressure and difference in pressure gradient.
- Transport of food or translocation takes place through phloem and it requires energy.

Transport in Xylem

1. Water and mineral salts are transported.
2. The transport is generally passive.
3. Vessels and tracheids are dead cells.
4. Unidirectional transport

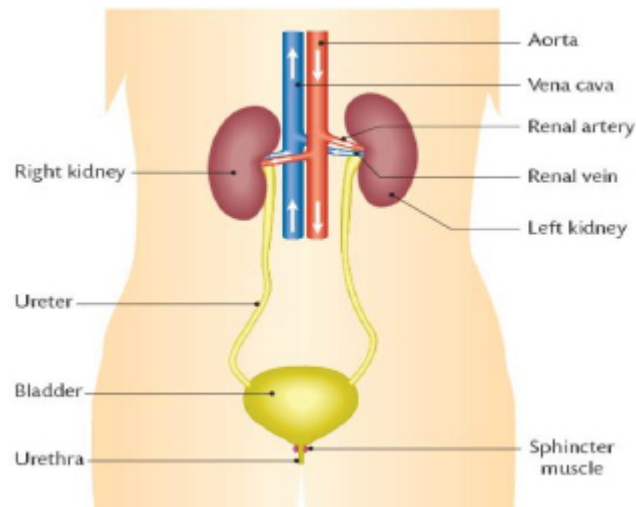
Transport In Phloem

- Food in aqueous form is translocated.
- The transport is active.
- Sieve tubes and companion cells are living cells.
- Movement occurs in all directions

Excretion

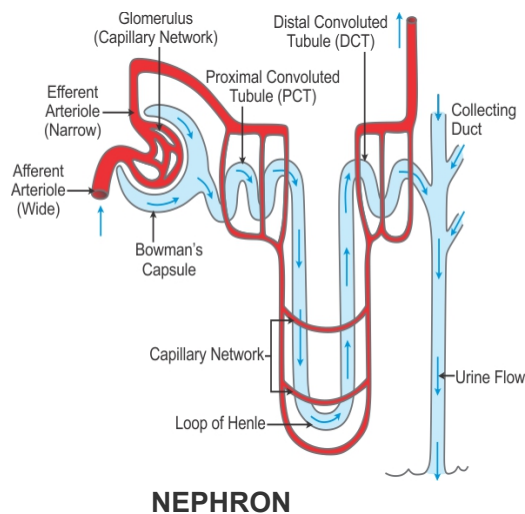
It involves the removal of harmful metabolic wastes from the body of organisms by various processes.

Excretion in humans



The excretory system consists of- a pair of kidneys, a pair of ureters, a urinary bladder, and a urethra.

- Nitrogenous wastes in the form of urea is removed
- Nephron- basic filtration unit
- Main components of the nephron - glomerulus, Bowman's capsule, renal tubule



- The process of Removing of nitrogenous wastes through artificial kidney is called **dialysis**.

Question answers

Q1. Why is diffusion insufficient to meet the oxygen requirements of multicellular organisms like humans?

Ans. In multicellular organisms all the cells may not be in direct contact with the surrounding environment. Hence diffusion will not meet all the requirements of all the cells.

Q2. What criteria do we use to decide whether something is alive?

Ans. Movement in response to external stimuli, breathing, growth etc.

Q3. What are outside raw materials used for by an organism?

Ans. Outside raw materials are used for maintenance and sustenance of life by an organism.

Q4. What processes would you consider essential for maintaining life?

Ans. All processes that perform the maintenance function of living organisms are called life processes. All life processes are essential for maintaining life.

Q5. What are the differences between autotrophic nutrition and heterotrophic nutrition?

Ans.

Autotrophic Nutrition

1. Food is made from inorganic components.
2. Chlorophyll and sunlight is required.
3. Photosynthesis takes place.
4. It occurs in green plants and some bacteria.

Heterotrophic Nutrition

- Food is obtained from organic components
- Chlorophyll and sunlight is not required.
- These processes do not occur.
- It occurs in animals and insectivorous plants.

Q6. Where do plants get each of the raw materials required for photosynthesis?

Ans. For photosynthesis plants obtain the following raw materials:

- (i) **Water:** Roots absorb it from the soil.
- (ii) **Carbon dioxide:** Stomata in leaves allow the carbon dioxide gas to enter into the plant.
- (iii) **Chlorophyll:** It is already present in the leaves.
- (iv) **Sunlight:** From the sun.

Q7. What is the role of acid in our stomach?

Ans. Acid (HCl) present in our stomach makes the medium acidic so as to facilitate the action of the enzyme pepsin and it kills the bacteria ingested with food.

Q8. What is the function of digestive enzymes?

Ans. Digestive enzymes act on the complex food to break them into simpler components.

Q9. How is the small intestine designed to absorb the digested food?

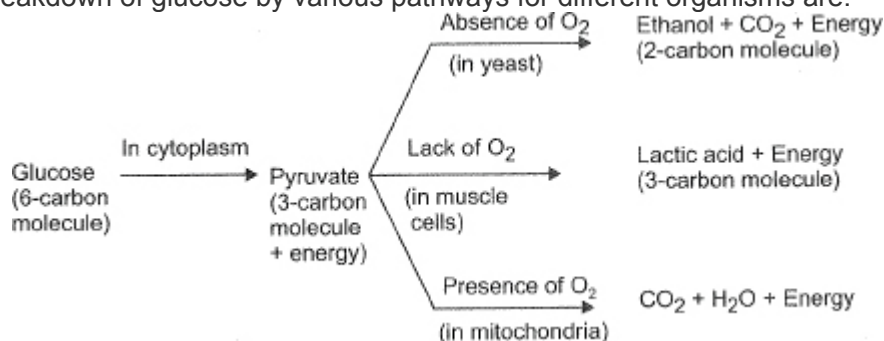
Ans. Small intestine has finger like projection in the inner lining which increases the surface area for absorption of food. These finger like projections are called villi. The villi are richly supplied with blood vessels which take the absorbed food to each and every cell of the body.

Q10. What advantages over an aquatic organism does a terrestrial organism have with regard to obtaining oxygen for respiration?

Ans. Aquatic organism takes in the oxygen dissolved in water which is in less percentage than the oxygen present in air. Terrestrial organism can take in more amount of oxygen at a time than aquatic organisms.

Q11. What are the different ways in which glucose is oxidised to provide energy in various organisms?

Ans. Breakdown of glucose by various pathways for different organisms are:



Q12. How is oxygen and carbon dioxide transported in human beings?

Ans. Oxygen is carried by haemoglobin present in the RBC of the blood, carbon dioxide is soluble in water and hence is transported by the blood in dissolved form.

Q13. How are lungs designed in human beings to maximise the area for exchange of gases?

Ans. In human beings lungs have the tubes called bronchioles which divide into smaller tubes and terminate into balloon like structures called alveoli. The alveoli provide large surface area where the exchange of gases can take place.

Q14. What are the components of transport system in human beings? What are the functions of these components?

Ans. In human beings the transport system consists of the following:

- (i) **Heart:** It acts as a pumping organ.
- (ii) **Blood:** It is the transport medium. It is made up of:
 - (a) Plasma—It carries food molecules, nitrogenous wastes, salts, carbon dioxide, hormones proteins etc. in a dissolved form.
 - (b) RBC—Consists of haemoglobin and transports oxygen.
 - (c) WBC—Helps to fight infection.
 - (d) Platelets—Helps in the clotting of blood.
- (iii) **Blood vessels:**
 - (a) Arteries—Carry oxygenated blood away from the heart to each and every cell.
 - (b) Veins—Bring de-oxygenated blood to heart for purification.

Q15. Why is it necessary to separate oxygenated and deoxygenated blood in mammals and birds?

Ans. Mammals and birds need large amount of energy for their life processes and hence the oxygenated blood can help them to obtain this energy by breaking down the food.

Q16. What are the components of the transport system in highly organised plants?

Ans. The components of the transport system are xylem. and phloem in highly organized plants.

Q17. How are water and minerals transported in plants?

Ans. Water and minerals are transported in plants with the help of xylem tissue. Roots absorb the water from the soil by actively taking up ions, creates the difference in the concentration of these ions between the root and the soil. Water enters the root cells. The water moves up creating a column of water that is steadily pushed upwards in vessels and tracheids of the roots, stem and leaves, and are interconnected to form a continuous system of water-conducting channels reaching all parts of the plant. The water loss by leaves through stomata is called transpiration. It creates a suction pull, which pulls water from the xylem cells of roots.

Q18. How is food transported in plants?

Ans. The transport of food in plants is called translocation. It takes place with the help of a conducting tissue called phloem. Phloem transports glucose, amino acids and other substances from leaves to root, shoot, fruits and seeds. Sieve tube and companion cells help in transporting the food in upward and downward directions. Sucrose like materials are transported using energy from ATP and osmotic pressure, which is caused due to water. This pressure moves the material in the phloem to tissues which have less pressure. This pressure helps in the movement of material in plants.

Q19. Describe the structure and functioning of nephrons.

Ans. Structure of nephrons: It consists of a Bowman's capsule in which glomerulus is present (cluster of capillaries). The afferent artery brings the impure blood to nephron. The cup shaped structure (Bowman's capsule) form a tubular part of nephron which leads to collecting duct.

Working of Nephron

(i) **Filtration:** The renal artery or afferent artery is wider and slowly it becomes a narrow tube in the glomerulus. Due to difference in the width, pressure difference is caused and water with dissolved impurities are squeezed out from the tube. It is collected in the Bowman's capsule which is cup like structure and passes into the tube.

(ii) **Reabsorption:** The above filtrate passes through the tubule where the major amount of water, glucose, amino acids are selectively reabsorbed by the capillaries which are surrounding the tubule.

(iii) **Urine formation:** The water and impurities which is not reabsorbed is sent to a collecting duct. This filtrate contains more of dissolved nitrogenous wastes i.e. urea and hence it is termed as urine. From here the urine enters the ureter and is collected in urinary bladder.

DIAGRAM of nephron is given in notes

Q20. What are the methods used by plants to get rid of excretory products?

Ans. Wastes excreted from plants are:

(i) Gaseous wastes—through stomata pores CO_2 is given out during respiration and O_2 is given out during photosynthesis.

(ii) Liquid wastes (water)—through stomata pores by transpiration.

(iii) Other wastes—are stored in leaves dead cells and the leaves fall off.

Some other waste products are stored as resins and gums in old xylem of the plant and other wastes are also thrown out from nodes into the soil.

Q21. How is the amount of urine produced regulated?

Ans. The amount of urine produced depends on how much excess water there is in the body and how much of dissolved waste there is to be excreted. On a hot day, when we sweat and lose a lot of body water and salts, most of the water and salts in kidney will be reabsorbed into the blood from the filtrate in the tubule. Thus the volume of urine produced will be less.

In winters, when we do not sweat a lot, the volume of urine produced will be more.

Thus there is perfect osmoregulation (regulation of water content) in the body.

Q22. How are the alveoli designed to maximize the exchange of gases?

Ans. The alveoli are present at the terminal of bronchioles. They are balloon shaped structures which increases the surface area for the exchange of gases and are richly supplied with blood vessels to take the oxygen to different cells.

Q23. Describe double circulation in human beings. Why is it necessary?

Ans. The heart of human beings consist of two sides right and left.

The right side of the heart receives de-oxygenated blood from the cells and tissues and sends it further for purification to lungs.

The left side of the heart receives oxygenated blood from lungs which is pumped further and sent to all the parts of the body through blood vessels. This is called double circulation. The energy demand of human beings is too large and hence it is necessary for the separation of oxygenated and deoxygenated blood to meet this energy demand.

Q24. How are fats digested in our bodies? Where does this process take place?

Ans. Fats are digested in the small intestine. The secretion of liver, called bile, breaks down the large globules of fat into smaller globules. This is called emulsification of fats. The bile also makes the medium alkaline so that the pancreatic enzyme containing lipase further digest fats to form fatty acids. The alkaline medium is required for pancreatic enzyme to act on lipase.

Q25. What is the role of saliva in the digestion of food?

Ans. Saliva contains enzymes, salivary amylase and is released in our mouth. It breaks down starch into sugar (complex carbohydrates into simpler ones).