ALAKH Sir ke Fanney

LIFE PROCESSES

LIFE PROCESSES:- The Basic and essential functions/process performed by living organisms to maintain their life.

Nutrition:- The process of obtaining and utilisation of food.

Respiration:- The process of breaking down of food to obtain energy.

Transportation The process of transfer of substances from one part of the body to other parts.

Excretion:- The process of removal of waste materials produced in the cells of their body.

NUTRITION

Autotrophic Nutrition

- The organism makes its own food from simple inorganic materials.

Example:- Green plants. Autotrophic Bacteria.

Heterotrophic Nutrition

- Organism cannot make (or synthesize) its own food from simple inorganic materials. They depend on other organisms for their food.

Holozoic:- Organisms consume and internally digest complex organic food substances.

e.g:- Human beings Dog cat ,Amoeba

Saprophytic:- organisms feed on dead and decaying organic matter.

e.g fungi (Bread moulds, yeast mushroom)

Parasitic:- Organisms derive nutrition from another living organism (host), often causing harm to the host.

e.g: lice, leech, tapeworm, cascuta (amar-bel)

PHOTOSYNTHESIS:-

The process by which plants make their own food from carbon dioxide and water by using sunlight energy in the presence of chlorophyll is called Photosynthesis.

conditions necessary for photosynthesis:-

A) sunlight B) carbondioxide
C) chlorophyll D) Water.

$6CO_2 + 12H_2O \xrightarrow[\text{sunlight}]{\text{chlorophyll}} C_6H_{12}O_6 + 6H_2O + 6O_2$ (Glucose)

Absorption of light energy by chlorophyll.

↓

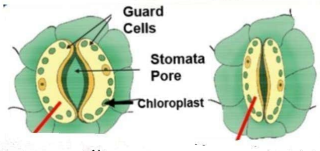
conversion of light energy to chemical energy and splitting of water molecules into hydrogen and oxygen.

↓

Reduction of carbon dioxide to carbohydrates.

site of photosynthesis:- chloroplasts

chlorophyll is present in the green coloured organelles called 'chloroplasts' inside the plant cells. The leaves are green because they contain chloroplasts.

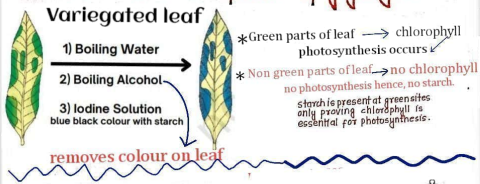


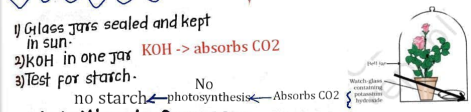
Absorb H_2O : swell; open H_2O lost; shrink; closed

- CO_2 enters through stomata.
- stomata tiny pores present on the surface of the leaves.

WATER-TAKEN UP BY ROOTS FROM SOIL

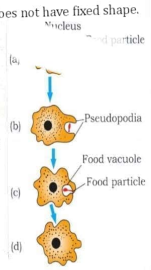
- Nitrogen, phosphorous, magnesium, and iron are also taken.
- Nitrogen is taken in form of nitrates and nitrites.
- Food is stored in the form of starch in plants, In animals stored in the form of glycogen.





Nutrition in AMOEBA (Unicellular Organism)

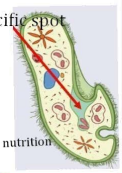
Holozoic nutrition



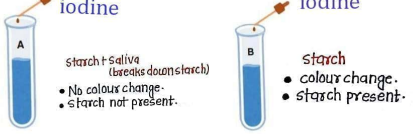
1) Amoeba takes in food using temporary finger like extensions of the cell surface called Pseudopodia.
2) Food Vacuoles- complex substance → simpler substances
3) Absorption of digested food in cytoplasm by diffusion.
4) undigested food: moves to cell surface and thrown out.

Nutrition in Paramecium:-

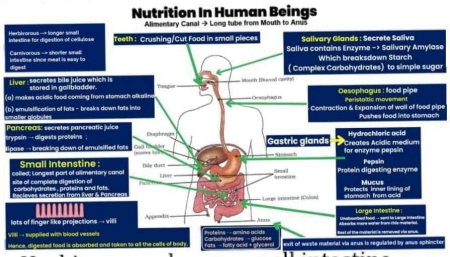
(Unicellular Organism)



1) The cell has a definite shape (like slipper).
2) Food is moved to a specific spot by the movement of cilia (hair like structure).



CONCLUSION:- Saliva causes breaks down of starch.



Herbivorous - longer small intestine for digestion of cellulose.
Carnivorous -shorter small intestine since meat is easier to digest.

RESPIRATION

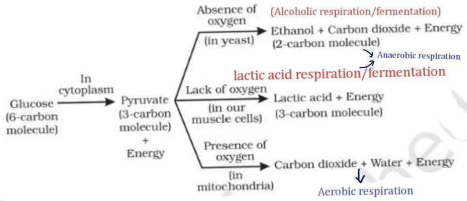
The process of releasing energy from food is called Respiration.

BREATHING

- Physical process
- process of inhaling and exhaling the air.
- No released instead energy is required.
- Happens in lungs.

RESPIRATION

- chemical process.
- process of breaking down of food to produce energy.
- Energy is released in form of ATP
- Happens in cells.



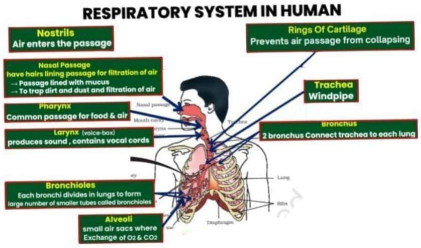
The buildup of lactic Acid in our muscles durning sudden Activity causes cramps.

AEROBIC RESPIRATION:-

- oxygen is Required
- More energy produced
- complete oxidation and breakdown of glucose.
- occurs in cytoplasm and mitochondria
- End products: $CO_2 + H_2O$

ANAEROBIC RESPIRATION:-

- oxygen not required.
- less Energy produced
- Incomplete oxidation and breakdown of glucose.
- occurs only in cytoplasm.
- End products: CO_2 + ethanol/lactic acid,



The diaphragm is a large, dome-shaped muscle that separates the chest from the abdomen.

Residual volume:- Amount of air always remaining in lungs (to provide sufficient time to absorb O_2 and release CO_2)

Haemoglobin:- pigment present in RBCs to carry oxygen.

Inhalation/Inspiration

- Diaphragm contracts.
- Diaphragm moves downward and Becomes flat.
- chest cavity become larger.
- Air is sucked into the lungs.

Exhalation / Expiration

- Diaphragm relaxes.
- Diaphragm moves upward and becomes dome - shaped.
- chest cavity becomes smaller.
- Air is pushed out from the lungs.

RESPIRATION IN PLANTS

Exchange of gases → occurs through stomata.

DAYTIME:

Photosynthesis → Oxygen produced
Respiration → carbon dioxide is produced.
This CO_2 is used in Photosynthesis
Net Result → O_2 is given out.

NIGHTTIME

No photosynthesis
Respiration → Carbondioxide is produced
Net Result → CO_2 is given out

BREATHING IN FISH

Fish → take in water through Mouth
↓
Force it past the gills
↓
dissolved O_2 is taken by blood

Terrestial Organisms	Aquatic Organisms
• Breathe oxygen in atmosphere	• Use dissolved oxygen in water.
• Rate of breathing is less	• Rate of breathing is more.

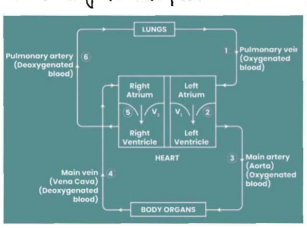
TRANSPORTATION IN HUMANS

The process of transfer of substances from one part of the body to other parts.
* circulatory system
* lymphatic system

The circulatory system consists of the heart, blood and blood vessels (Lord · a artery a away)

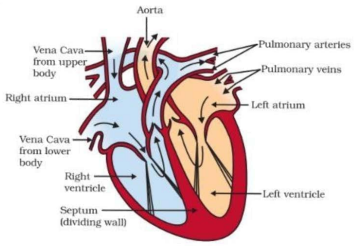
HEART

The heart is a muscular organ that is as big as our fist.



Largest artery - Aorta
Largest vein - Vena cava

- Septum separates heart's chambers and prevents the mixing of oxygenated and deoxygenated blood.
- Ventricles have thicker walls than atria to withstand high pressure of blood



Arteries- carry oxygenated blood away from heart.

Veins- Carry deoxygenated blood to the heart.

Pulmonary Artery- carries deoxygenated blood.

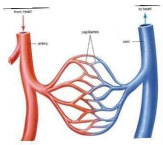
Pulmonary Vein:- carries oxygenated blood.

Feature	Arterise	Veins	Capillarise
Direction of Blood Flow	Carries blood away from the heart	Returns blood to the heart	Helps in exchange of substances
Oxygen	Rich in oxygenated blood	Contains deoxygenated blood	Transport both oxygenated & deoxygenated blood
Pressure	High pressure	Low pressure	Moderate pressure
Walls	Thick and elastic walls	Thin and less elastic walls	Very thin (one cell thick)
Valves	Not present	Present (to prevent backflow)	Absent

Exception:-
Pulmonary artery - carries deoxygenated blood
Pulmonary Vein - Carries oxygenated blood.

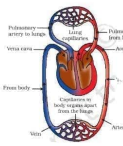
Valves are present in veins to prevent backflow of blood.

Animal Group	Heart Chambers	Circulation Type	Body Temperature Regulation
Birds (Aves), Mammals	4	Complete double circulation	Yes (Warm-blooded)
Amphibians, Reptiles	3	Partial double circulation	No (Cold-blooded)
Fishes (Pisces)	2	Single circulation	No (Cold-blooded)



Single circulation:-
Blood passes only once through the heart in a complete cycle.

Double circulation:-
Blood flows twice through the heart before completing a full circuit.



BLOOD COMPONENTS :-

RBCs: Contain haemoglobin and transport oxygen.
WBCs: Fight infections. produce antibody to kill pathogens.
Platelets: clotting of blood.
Plasma:- Fluid medium, transport Food, carbon dioxide & nitrogenous waste.

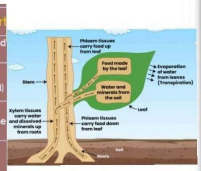
LYMPH or TISSUE FLUID

- Lymph is a part of lymphatic system.
- Formed from leaked components of blood (plasma, proteins and blood cells) through pores in walls of capillaries.
- colourless fluid.
- Contains less protein than blood.
- carries digested and absorbed fat from intestine.
- Drains excess fluid back into the blood.

TRANSPORTATION IN PLANTS

Xylem and Phloem are independent conducting tubes.

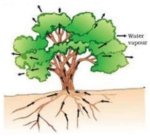
Feature	Xylem Transport	Phloem Transport
Transports	Water and minerals	Food, amino acids and other substances
Direction of Flow	Unidirectional (upwards from roots to aerial parts)	Bidirectional (both upward and downward)
Process Involved	Physical forces (such as root pressure and transpirational pull)	Active transport (requires energy in the form of ATP)
Main Tissues Involved	Xylem vessels, tracheids	Sieve tubes, companion cells



Plants do not move and have a large proportion of dead cells in many tissues. Hence they have low energy needs and use slow transport systems.
but, transportation distance can be very large.

Transport of water

Root pressure- Roots take up ions from soil which creates difference in the concentration of these ions. water from soil moves into the roots. there is a constant movement of water into root xylem and water is steadily pushed upwards.



Transpiration - The loss of water in the form of vapours from the aerial parts of the plant is called transpiration.

Transpiration helps in
- Absorption and upward movement of water and minerals from roots to leaves.
- temperature Regulation.

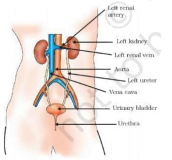
Daytime - Major force is transpirational pull.
Night time - Root pressure.

Transport of food
Translocation

- The transfer of food from leaves to other parts of the plant is called translocation.
- Phloem translocates the food made in the leaves.
- These substances are especially delivered to the storage organs of roots, fruits & seeds & to growing organs.

EXCRETION IN HUMAN BEINGS

Removal of harmful metabolic wastes from the body is called Excretion.



The excretory system of human beings include -

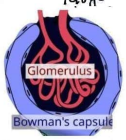
Kidney:- Nitrogenous waste such as Urea and uric acid are removed from blood through kidneys.

A pair of ureters:- connects the kidneys with the urinary bladder

Urinary bladder:- Urine is stored in urinary bladder until it is passed out (muscular, under nervous control)

Urethra:- Transport urine out of the body.

Nephron is the structural and functional unit of kidney. Each kidney has large number of nephrons.



Glomerulus - cluster of blood vessels.
Bowmans capsule - cup shaped structure in kidney that surrounds glomerulus and collects the filterate.

Glomerular filteration :-

- Nitrogenous wastes, glucose, water, amino acids, excessive salts from the blood are filtered and initial filterate enters into Bowman capsule of the nephron.

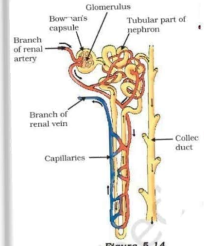


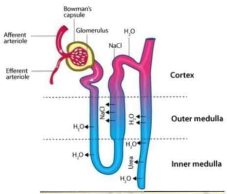
Figure 5.14
Structure of a nephron

Selective Reabsorption :-

- Useful substances like glucose, amino acids, salts and a major amount of water from the filterate are reabsorbed back by capillaries surrounding the nephron.
- Urea, extra water and salts are secreted into the tubule which open up into the collecting duct and then into the ureter.

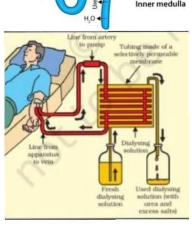
Tubular secretion - urea, extra water & salts are secreted into the tubule which open up into the collecting duct & then into the ureter.

Amount of water reabsorbed depends on
1) Amount of excess water in body.
2) Amount of dissolved waste to be excreted.



ARTIFICIAL KIDNEY
(HEMODIALYSIS)

- In case of kidney failure, an artificial kidney can be used.
- An artificial kidney removes nitrogenous waste products from the blood through dialysis.
- Artificial kidney → No Reabsorption involved.
- Dialysing fluid → same osmotic pressure as blood (without nitrogenous wastes)
- Used dialysing solution → rich in urea and excess salts



Excretion in plants :-

- Oxygen and carbon dioxide is diffused through stomata.
- Excess water is removed by transpiration.
- shedding of old leaves and bark.
- Many plant waste products are stored in cellular vacuoles
- Plants also secrete some waste substance into the soil around them.

CURRENT YEAR QUESTIONS [CYQs]

LIFE PROCESSES

QUESTION-1) (a) What is photosynthesis? identify the organelle and the organs where it occurs, explain the process using the balanced equation, and state the source of the oxygen released during this process.
(b) How would you design an experiment to demonstrate that carbon dioxide is essential for photosynthesis, and what would be the expected observation and conclusion?
CBSE (2021, 2022, 2023, 2024)

QUESTION-2) (a) What is the name of the enzyme found in the fluid of our mouth cavity, and Which gland produces it? Explain the action of saliva on food with help of an activity.
(b) Name the type of Nutrition exhibited by Ameoba. Explain how food is taken in and digested by this Organism. CBSE (2023, 2024)

QUESTION-3) (a) What is the role of each of the following in the human digestive system.
(i) Hydrochloric acid (ii) Villi (iii) Anal sphincter (iv) Lipase (v) Mucus (vi) Bile Juice (vii) Trypsin.
(b) How is the absorption of digested food carried out in the small intestine, and Why is it necessary?
(c) Why is the small intestine longer in herbivores than in carnivores?
CBSE (2020, 2023, 2024)

QUESTION-4) state reasons for the following.
(i) sometimes while running, the athletes suffer from muscle cramps.
(ii) The lungs are designed in human beings to maximize the area for exchange of gases
(iii) Rate of breathing in aquatic organisms is much faster than that in terrestrial organisms.
(iv) In human beings, when air is taken into the body through the nostrills and passed through the throat, the air passage does not collapse.
(v) The test tube containing lime water turns milky when we exhale.
CBSE (2021, 2021, 2022, 2024)

QUESTION-5) (a) Draw a flow chart showing the three different pathways involved in the breakdown of glucose and specify anaerobic and aerobic respiration in it.
(b) Draw a diagram of the human respiratory system and label - pharynx, trachea, lungs, diaphragm and alveolar sac on it.
CBSE (2015, 2020)

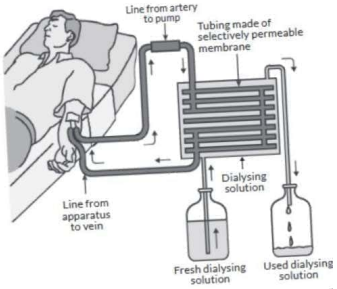
QUESTION-6) The states reasons for the following.
(i) The muscular walls of the ventricles are thicker than those of the atria.
(ii) The transport system in plants is relatively slow.
(iii) Circulation of blood in acquatic vertebrates differs from that in terrestial vertebrates.
(iv) Durning the day, water and minerals move more quickly through the xylem compared to at night.
(v) When we are injured and start bleeding, it stops after some time.
(b) (i) Differentiate between arteries, veins and capillaries in terms of composition and functions.
(ii) Explain and draw a well labelled diagram showing double circulation in human beings and trace the path of oxygenated and deoxygenated blood in arteries and veins respectively?
CBSE (2020, 2021, 2022, 2023, 2024)

QUESTION-7) (a) Draw a well labelled diagram of the human heart showing their chambers, septum and circulation of blood in it.
(b) What is lymph and how does it differ from blood?
(CBSE 2022, 2024)

QUESTION-8) (a) Draw a neat diagram of the human excretory system and label following parts and states their functions respectively.
(i) Urethra (ii) kidney (iii) Ureter
(b) Describe the structure of the basic filteration unit present in the kidney.
(c) Explain in brief two ways by which leaves of a plant help in excretion
CBSE (2019, 2020, 2021, 2022, 2023)

QUESTION-9) Read the following and answer the questions.
In case of kidney failure, an artificial kidney can be used. An artificial kidney is a device to remove waste products from the blood through dialysis.
(a)(i) Name the artery that brings oxygenated blood to the kidney.
(ii) Name the cluster the thin-walled blood capillaries present in the Bowman's capsule.
(b) In human excretory system name the organ which stores urine. Is this organ under hormonal control or nervous control?
(c)(i) List two major steps involved in the formation of urine and state in brief their functions.
(ii) In which part of the nephron does selective reabsorption take place? List the factors which the amount of water from urine reabsorbed depends on.
CBSE (2021, 2022, 2024) CBQ

QUESTION-10) Read the following and answer the Questions.
During haemodialysis, the patient's blood is cleaned by filtration through a series of semi-permeable membranes before being returned to the blood of the patient.



(i) The haemodialyser has semi-permeable lining of tubes which help
(a) to maintain osmotic pressure of blood
(b) to filter nitrogenous wastes from the dialysing solution.
(c) in passing the waste products in the dialysing solution
(d) to pump purified blood back into the body of the patient.

(ii) Which one of the following is not a function of artificial kidney?
(a) To remove nitrogenous wastes from the blood.
(b) To remove excess fluids from the blood.
(c) To reabsorb essential nutrients from the blood.
(d) To filter and purify the blood.

(iii) The 'used dialysing' solution is rich in
(a) Urea and excess salts
(b) blood cells
(c) lymph
(d) proteins

(iv) Which part of the nephron in the human kidney serves the function of reabsorption of certain substances?
(a) Glomerulus
(b) Bowman's capsule
(c) Tubules
(d) collecting duct

CBSE (2020, 2021, 2022) CBQ
