L2

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CLASS X - SCIENCE

LIFE PROCESSES

PRASHANT KIRAD

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PK HITS🔥

- Nutrition (Diagram)
- Human Heart (Diagram)
- Respiration (Aerobic, Anaerobic)
- Excretion (Specially Nephron)

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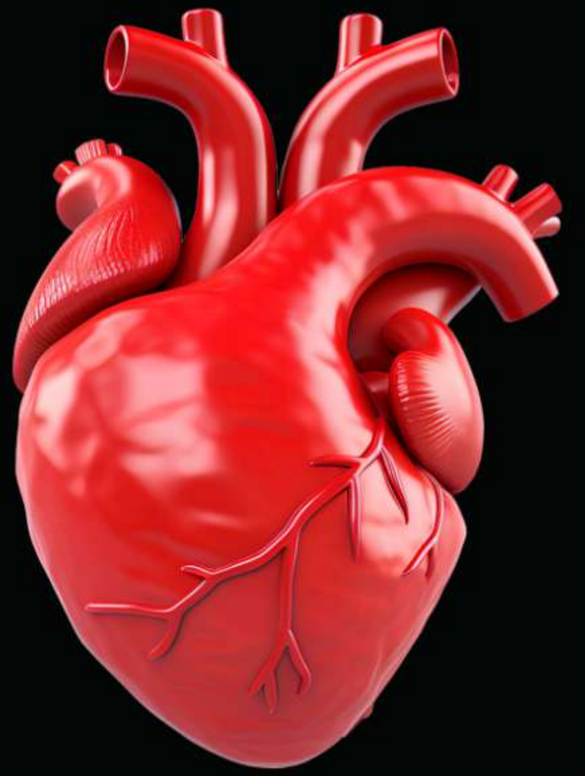
TOPICS TO BE COVERED

- Transportation
  - Blood and Its functions
  - Blood vessels and Plasma
- Human heart and its working
- Lymphatic system
- Transportation in plants
- Human Excretory system
- Excretion in Plants



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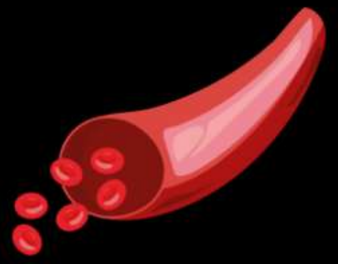
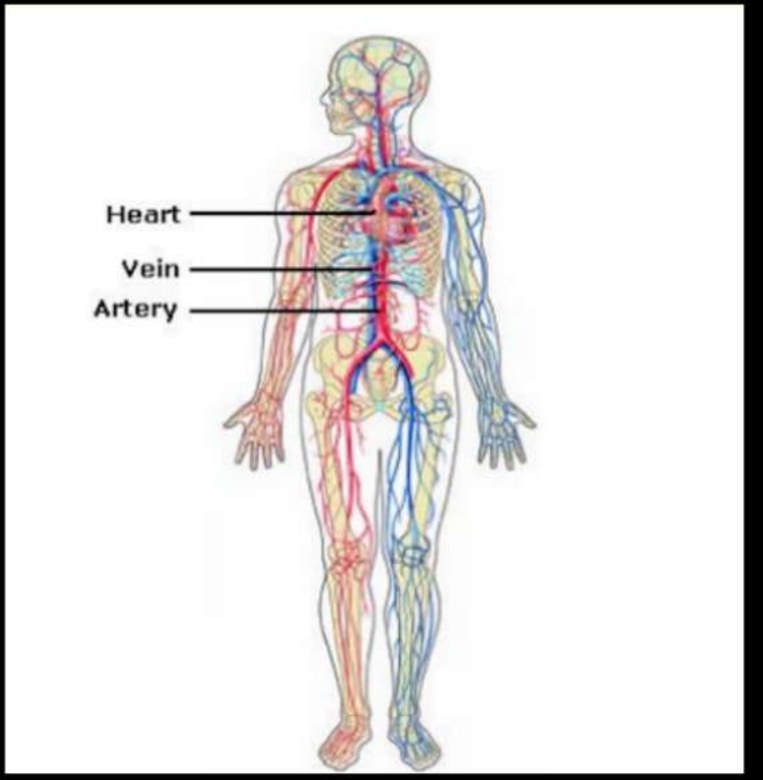
TRANSPORTATION

Transportation in living organisms refers to the process of moving food, water, oxygen, and other essential materials to different parts of the body, as well as removing waste products.

Circulatory System

- **Blood** (Fluid connective tissue)
- **Blood Vessels** (Tubes)
- **Heart** (Pumping Organ)





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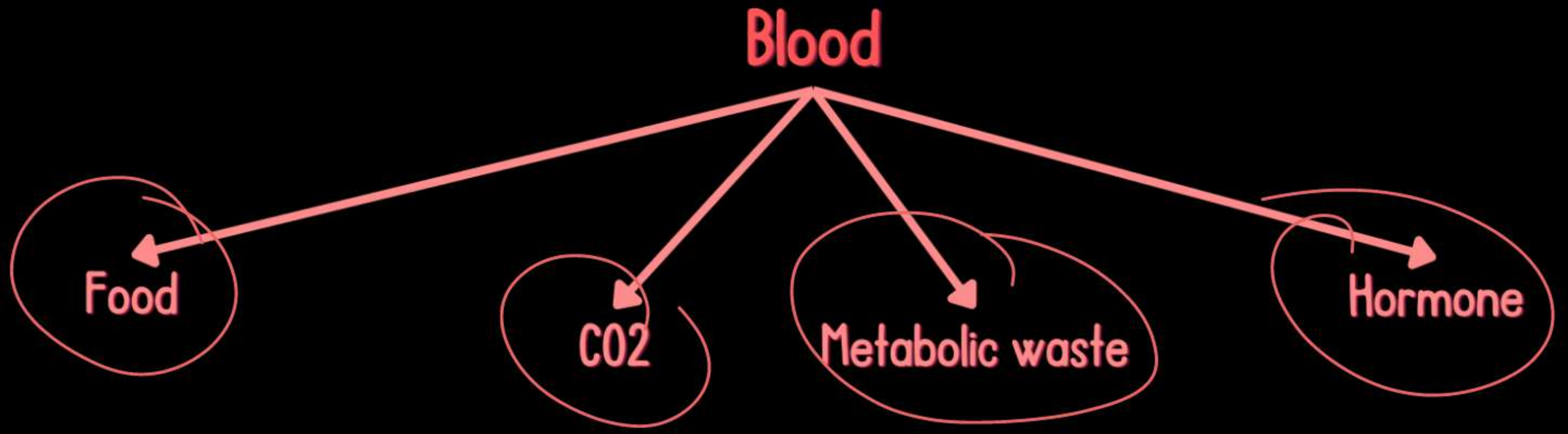
BLOOD

- Blood is a red coloured fluid connective tissue, which circulates in our body.
- Its red colour is due to presence of a pigment called haemoglobin in its red cells.
- *The deficiency of haemoglobin in our body is referred as anaemia.*



COMPONENTS OF BLOOD

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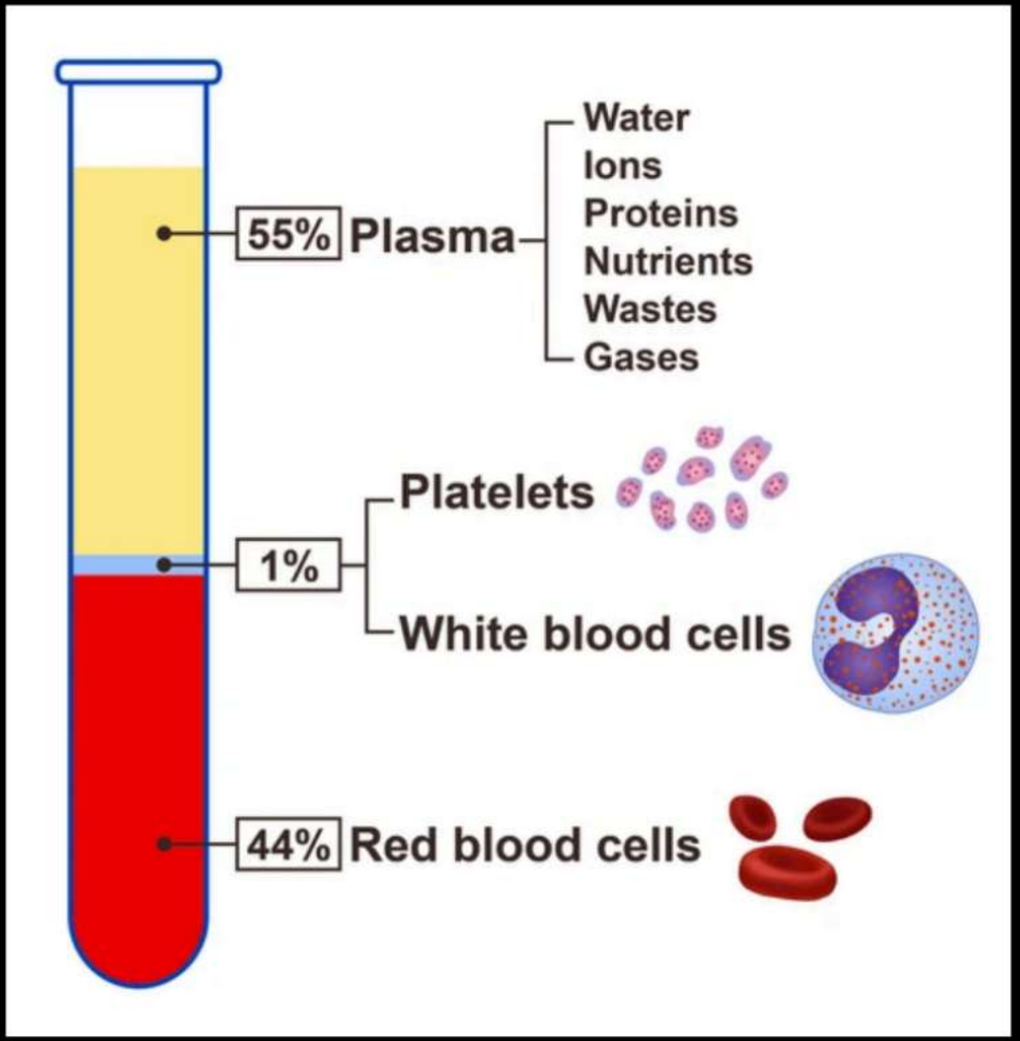
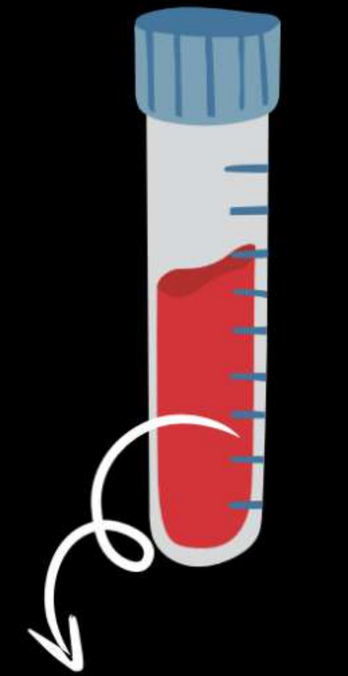
RBC
WBC
Platelets





What's your Blood group?

COMPONENTS OF BLOOD

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1. Red Blood Cells (RBCs)

- RBCs contain haemoglobin, a red pigment that binds with oxygen to transport it throughout the body.
- They help in carrying oxygen from the lungs to the body tissues and carbon dioxide from the tissues back to the lungs.

2. White Blood Cells (WBCs)

- WBCs are part of the immune system and fight against infections.
- They help protect the body by destroying harmful microbes.

3. Platelets

- Platelets are responsible for blood clotting.
- They form clots at injury sites to prevent blood loss

FUNCTIONS OF BLOOD

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- **Transportation:** Blood carries oxygen, nutrients, hormones, and waste materials across the body, ensuring that every part receives what it needs and harmful substances are removed.

- **Oxygenation:** Red blood cells deliver oxygen from the lungs to tissues and organs, enabling energy production through cellular respiration.

- **Immune Defense:** White blood cells protect the body by fighting infections and destroying harmful microbes.

- **Temperature Control:** Blood helps maintain body temperature by moving heat from the core to the skin, allowing it to cool.

- **Clotting:** Platelets help stop bleeding by forming clots at the site of injuries, preventing blood loss.

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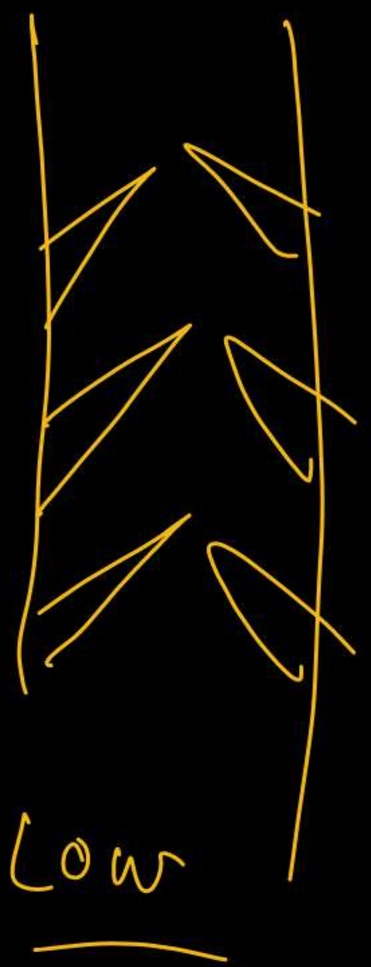
BLOOD VESSELS

Away

Feature	Arteries	Veins	Capillaries
Direction of Blood	Carry blood away from the heart	Carry blood towards the heart	Connect arteries and veins
Oxygen Content	Oxygenated (except pulmonary arteries)	Deoxygenated (except pulmonary veins)	Both (exchange oxygen and carbon dioxide)
Pressure	High	Low	Low
Wall Thickness	Thick and elastic	Thin	Very thin (one cell thick)
Valves	Absent	Present	Absent
Function	Distribute blood pumped by the heart	Return blood to the heart	Exchange oxygen, nutrients, and waste with cells
Carries	Oxygen and nutrients	Carbon dioxide and waste	Oxygen and nutrients to cells, carbon dioxide and waste from cells


Low

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- Largest Artery: Aorta
- Only artery that carries deoxygenated blood: Pulmonary Artery
- Largest Vein: Vena Cava
- Only vein in that carries oxygenated blood: Pulmonary Vein

"KAAM KI BAAT"

HUMAN HEART

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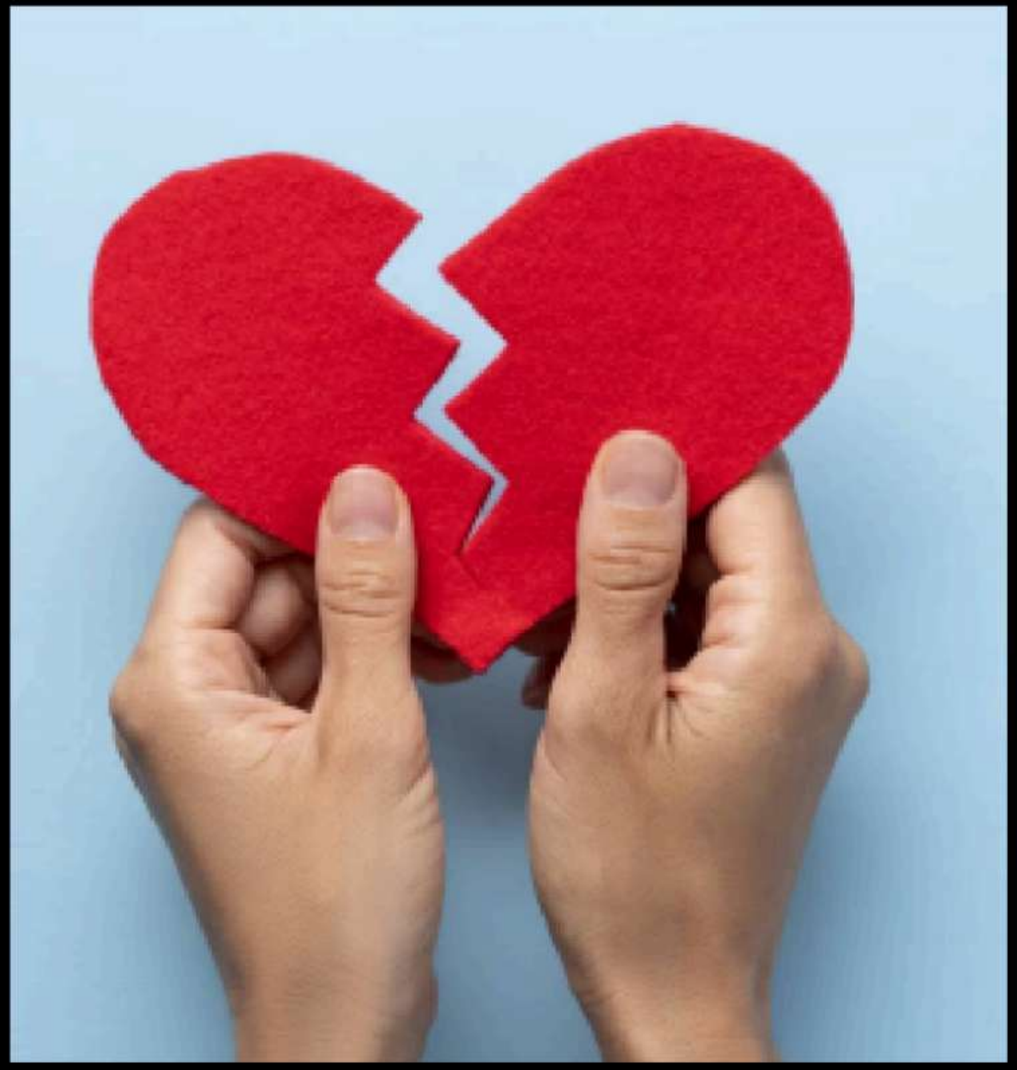

Dil tootne ke liye mashhoor hua hai,
Par asli kaam toh zindagi chalana hai.😂

(PK Babu)

HUMAN HEART

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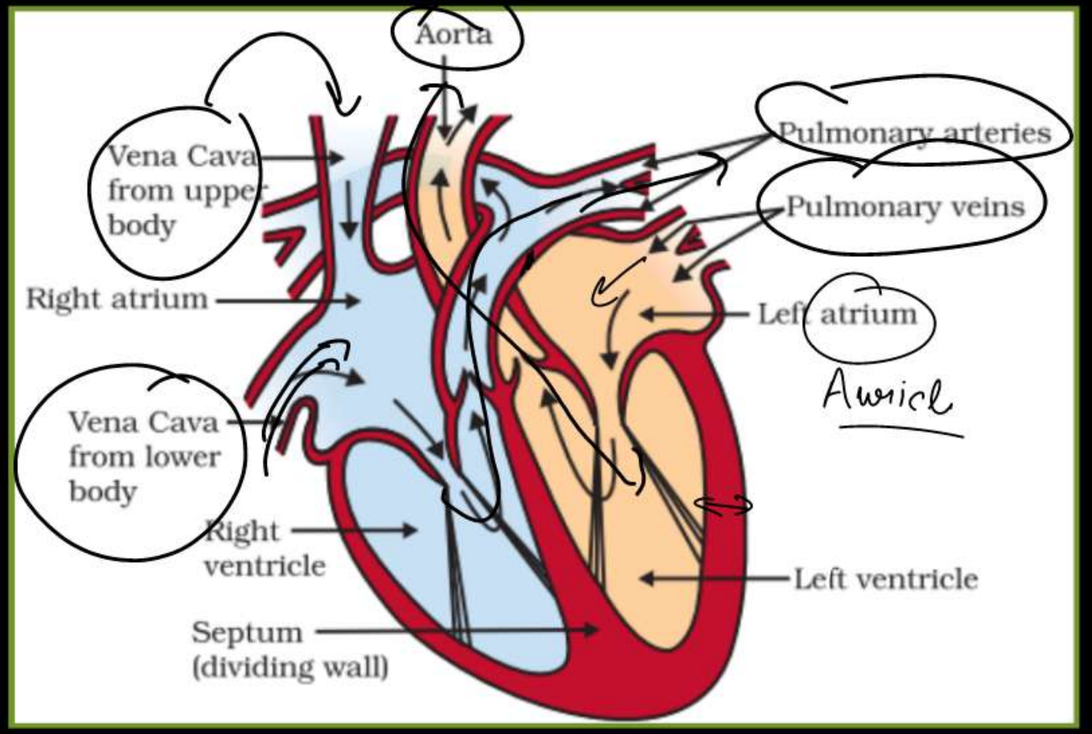
The heart is a muscular organ that is situated in the front of the chest. It pumps blood all through the body in a process called circulation.
It has four chambers separated by septum which prevent mixing of pure and impure blood.

Chambers of heart:

Atrium (upper chambers): there are two atrium separated (dividing walls)

Ventricle (lower chambers): the two inferior chambers of heart are right and left ventricle.



FLOW OF BLOOD IN HUMANS

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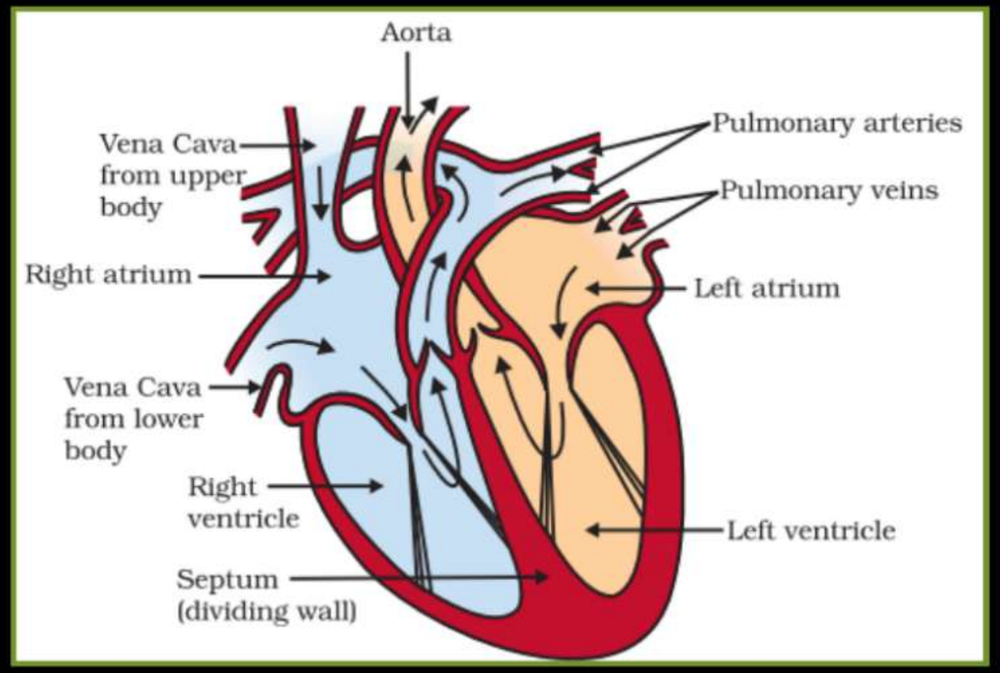
Humans have double circulation, which means that blood goes through heart twice to supply blood once around the body.

Pulmonary circulation

The movement of blood from heart to lungs and back to heart constitutes pulmonary circulation.



Step 1 - Right ventricle pushes the blood to lungs for oxygenation via pulmonary arteries.

Step 2 - The oxygenated blood comes back to left atrium of heart through pulmonary veins.

Step 3 - The left atrium then pushes blood to left ventricle

FLOW OF BLOOD IN HUMANS

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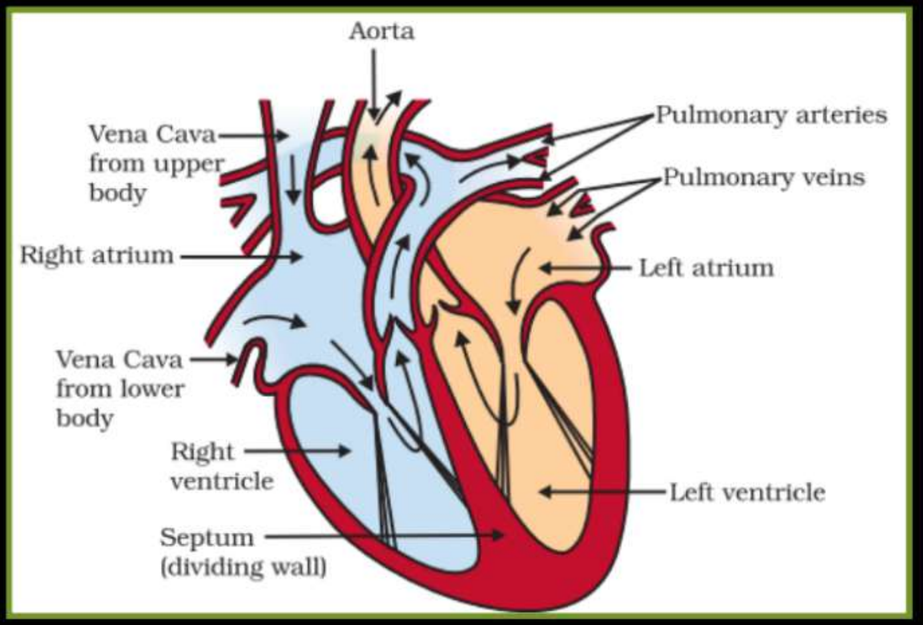
Systemic circulation

The movement of blood from heart to various places of body except lungs and back to heart



Step 1 - As the blood fills in the left ventricle, the blood is pushed out.

Step 2 - The blood is pumped to whole body via aorta.

Step 3 - Deoxygenated blood enters the right atrium from both upper and lower body via the superior and inferior vena cava.

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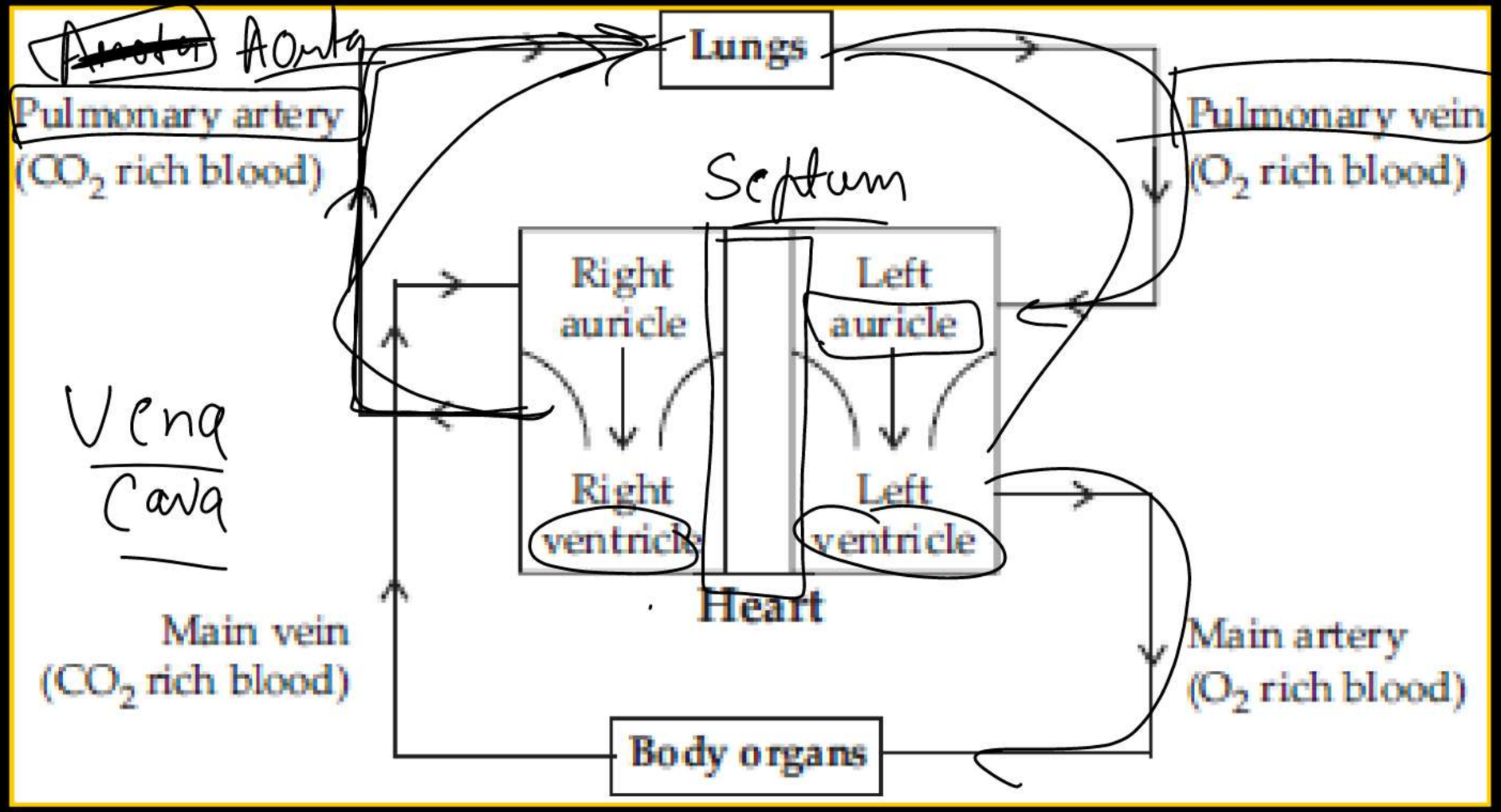
q01. 4 Chamber

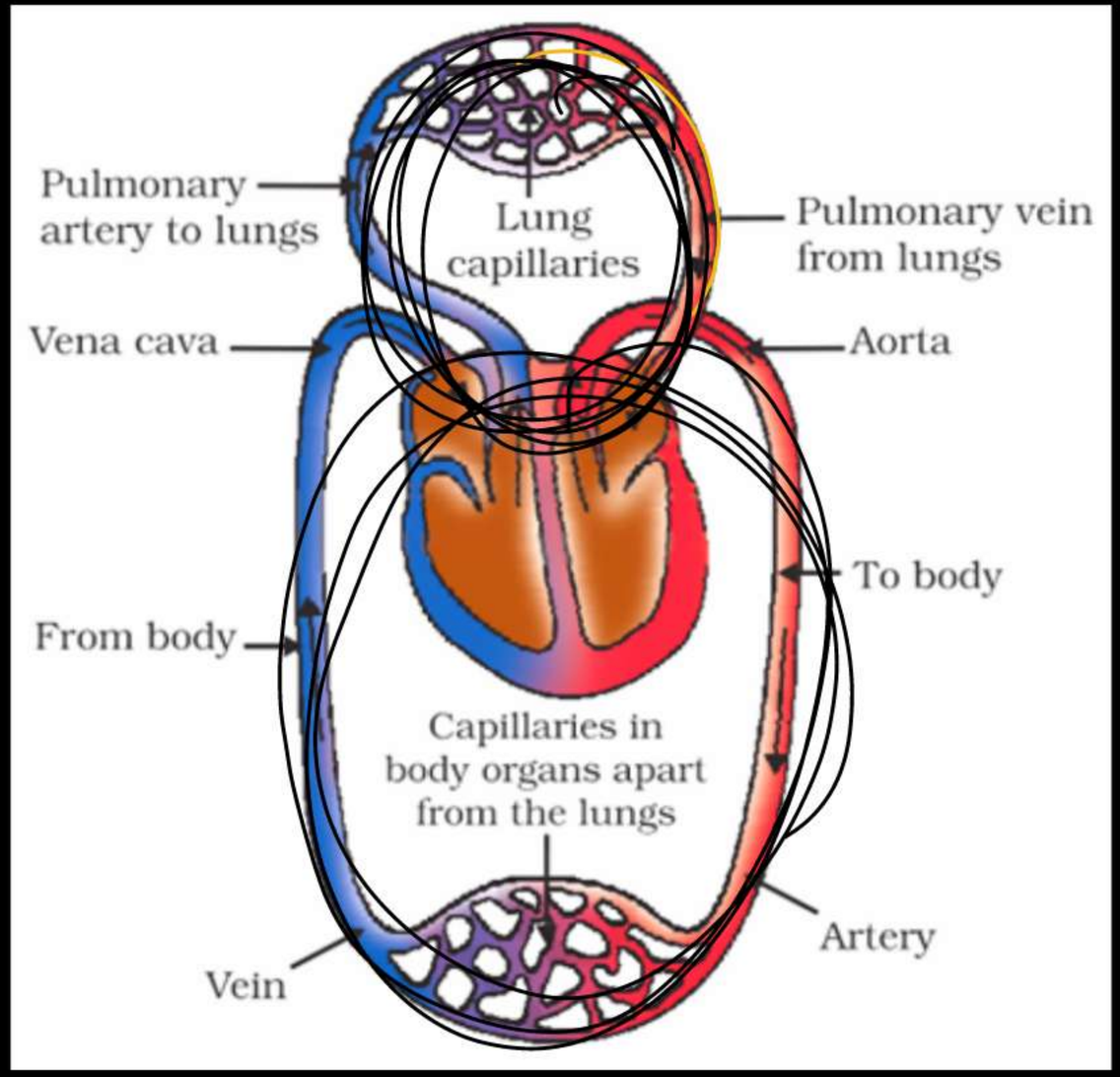
- To prevent mixing of oxygenated and deoxygenated blood.
- More oxygen will be supplied to body organs in better way.
- Highly efficient supply of oxygen to the body.
- More respiration leading to more energy production

Heart me Chambers ki kya need h?

WORKING OF HUMAN HEART



DOUBLE CIRCULATION



Double circulation prevents mixing of oxygenated and deoxygenated blood.

LYMPHATIC SYSTEM

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Lymph, also known as tissue fluid, is a clear, colorless fluid involved in transportation within the body.

- **Formation:** It is formed when some plasma, proteins, and blood cells leak through capillary walls into the spaces between cells (intercellular spaces).
- **Composition:** Lymph is similar to blood plasma but contains less protein and no red blood cells, giving it a colorless appearance.

Function: ⊕ Immunity

- **Transportation:** Carries digested fats from the intestines to the blood.
- **Drainage:** Removes excess fluid from tissues and returns it to the blood through lymphatic capillaries and vessels.

Pathway: Lymph flows through lymphatic capillaries and vessels, which eventually drain into larger veins, rejoining the circulatory system.

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Difference between blood and lymph

Feature	Blood	Lymph
Color	Red, due to the presence of hemoglobin.	Colorless.
Hemoglobin	Present.	Absent.
Function	Transports materials between organs.	Transports materials from tissues into blood.

Difference between blood and lymph capillaries

Feature	Blood Capillaries	Lymph Capillaries
Color	Red, as they carry blood.	Colorless, as they carry lymph.
Content	Carry blood.	Carry lymph.
Width	Narrower in diameter.	Wider in diameter.

TRANSPORTATION IN PLANTS

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- **Transportation in plants is the movement of water, minerals, and food throughout the plant**

- The water and minerals are absorbed from the soil by the roots of the plant and transported to various parts of plants like stem, leaves and f lowers.

- Food is transported from leaves to developing parts of plants.

There are two main conducting pathways in a plant.

(i) Xylem → Water

(ii) Phloem → Food

XYLEM AND PHLOEM

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Xylem	Phloem
1. Conducts water and minerals from roots to leaves.	1. Conducts food from leaves to all parts of the plant.
2. Composed of mainly dead elements.	2. Composed of mainly living elements.
3. Transport is unidirectional (only upwards).	3. Transport is bidirectional (both upwards and downwards).
4. Four types of cells: Tracheids, Vessels, Xylem Parenchyma, and Xylem Fibres.	4. Four types of cells: Phloem Fibres, Sieve Tubes, Companion Cells, and Phloem Parenchyma.

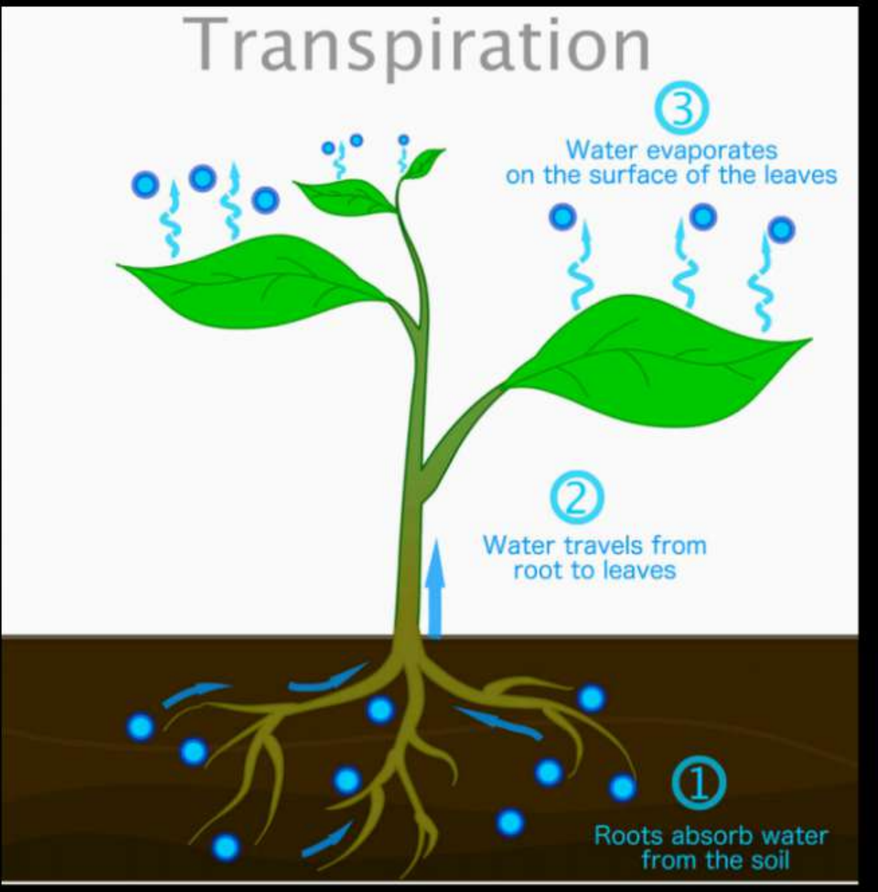
TRANSPIRTION PULL

Transpiration is the process of water loss as vapor from the aerial parts of the plant. This creates a suction force called transpiration pull, which helps in drawing water upward through the xylem from the roots to the leaves.
It is aided by cohesion and adhesion forces between water molecules. This pull helps in the ascent of sap in tall plants.

Function :

(a) Absorption and upward movement of water and minerals by creating PULL.

(b) Helps in temperature regulation in plant.



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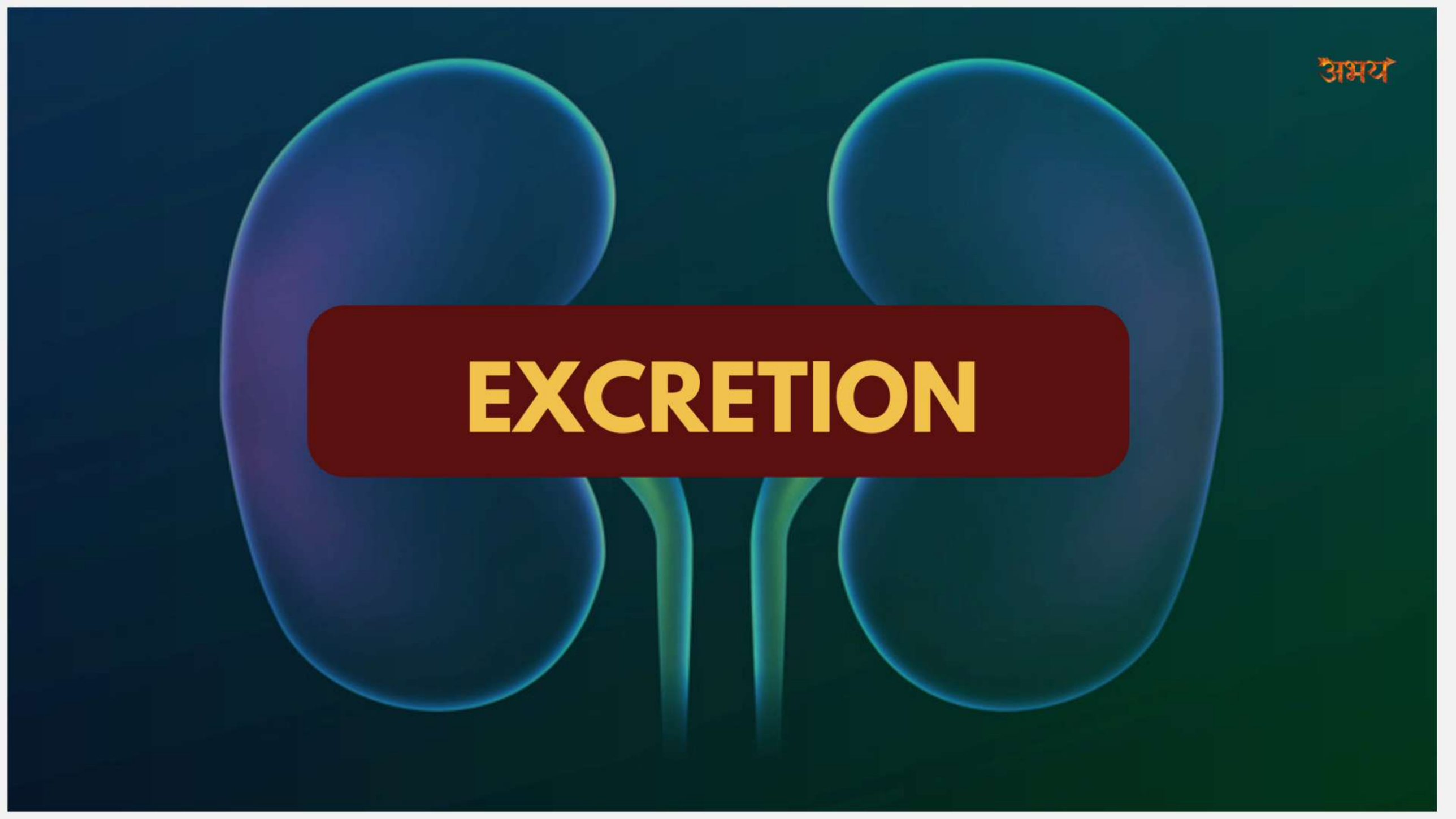

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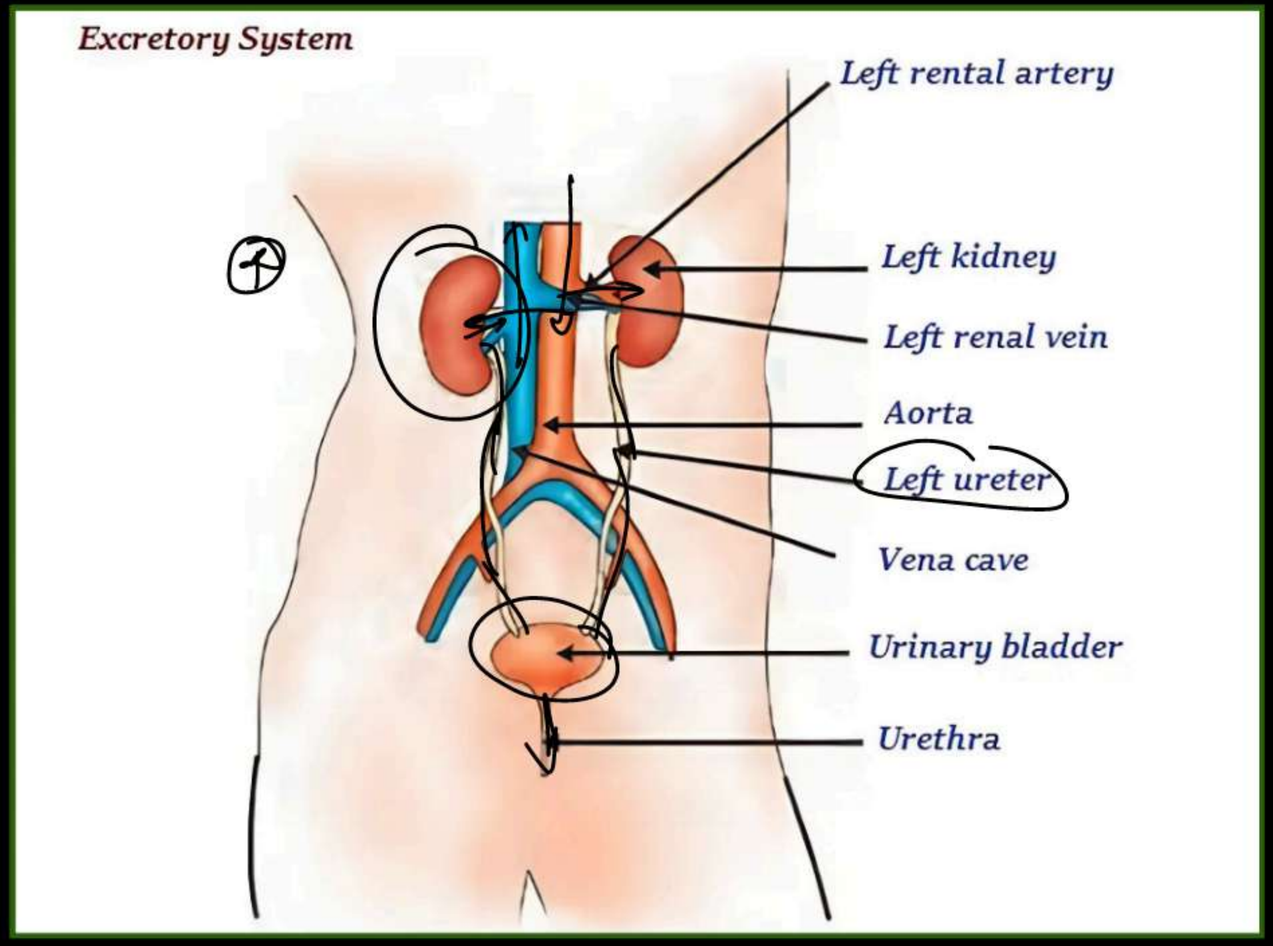
EXCRETION

It is biological process by which an organism removes harmful metabolic wastes from the body.

Metabolic waste

- Carbon dioxide
- Excess water
- Excess mineral salts
- Nitrogenous waste



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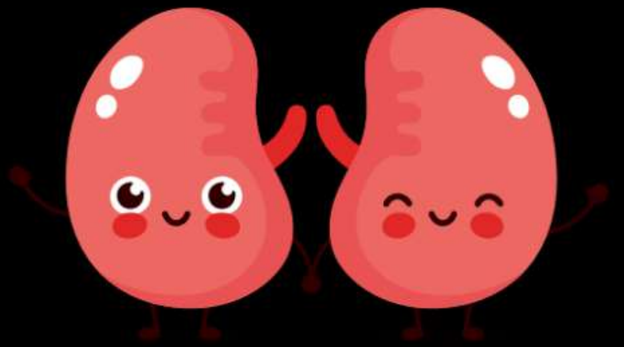
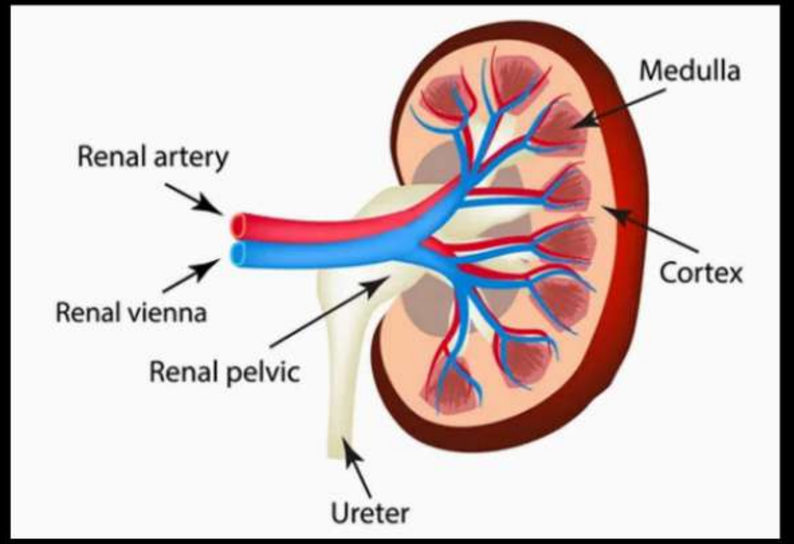
KIDNEY



The kidneys are two bean-shaped organs on each side of the body that filter blood, remove nitrogenous waste, and regulate fluid balance and pH of blood.

- Blood and waste enter through renal artery.
- Filtered blood leaves through renal vein.
- Excess water and toxic waste leaves through ureter as urine.



NEPHRONS

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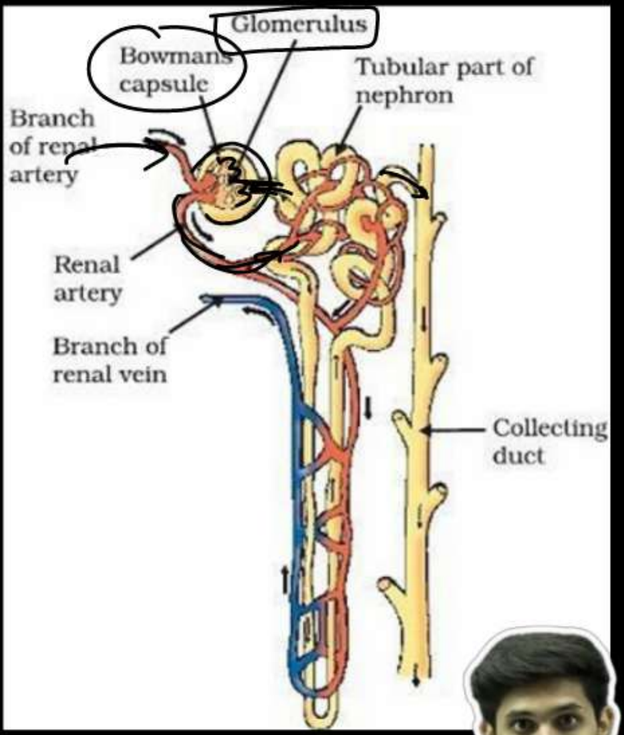
Structural & functional unit of kidney/excretion system.

- Responsible for filtration of blood.
- Its one end is connected to cup shaped structure called *Bowman's capsule* contain bundle of blood capillaries called glomerulus that is followed by tubular part of nephrons and loops at some places.
- There are millions of nephron in each kidney.



FORMATION OF URINE

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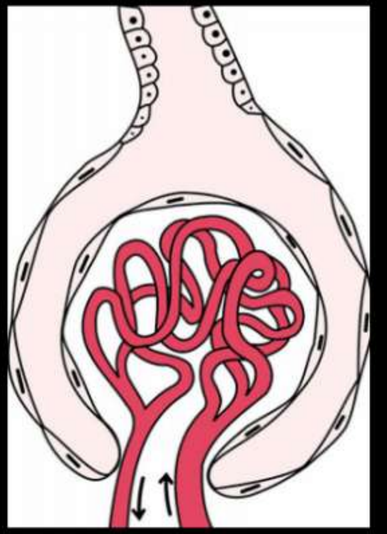
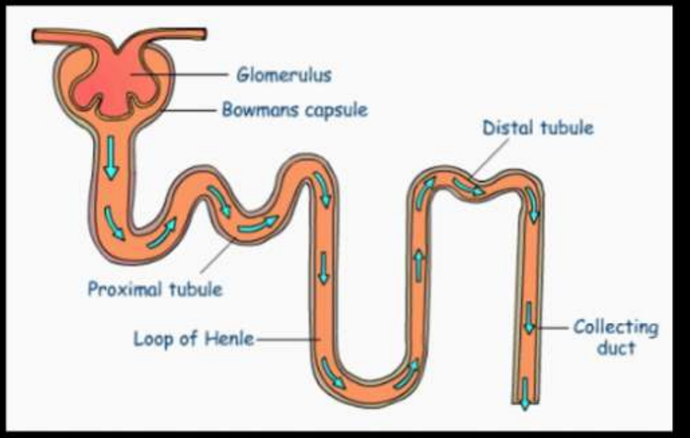
Glomerular filtration

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



Selective reabsorption

Useful substances like glucose, amino acids, salts and a major amount of water from the filtrate are reabsorbed back by capillaries surrounding the nephron.



FORMATION OF URINE

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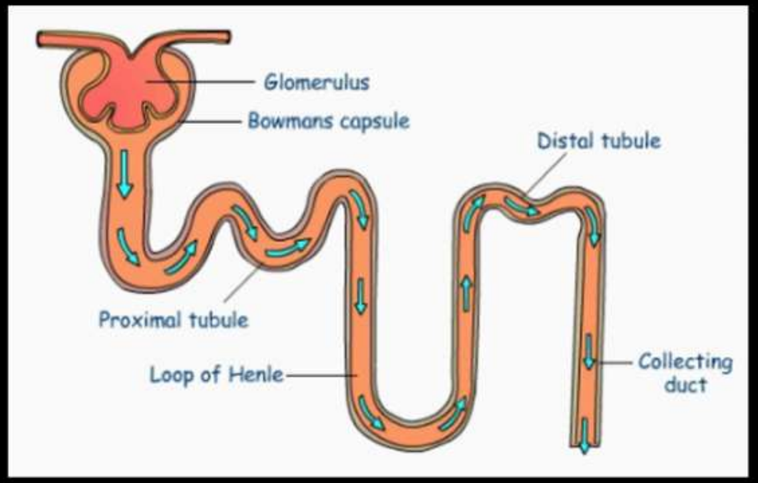
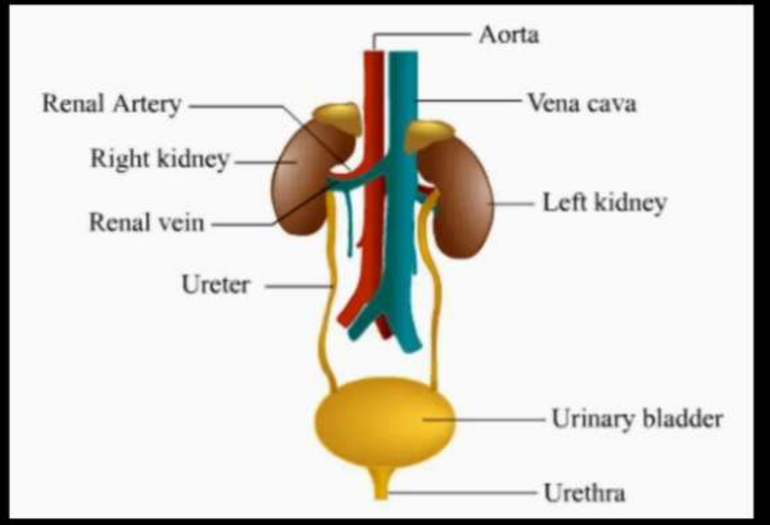
Tubular secretion

Urea, extra water and salts are secreted into the tubule which open up into the collecting duct & then into the ureter.



- Urine is stored in the urinary bladder.
- The bladder is muscular and it is under nervous control.



FUNCTIONING OF EXCRETION

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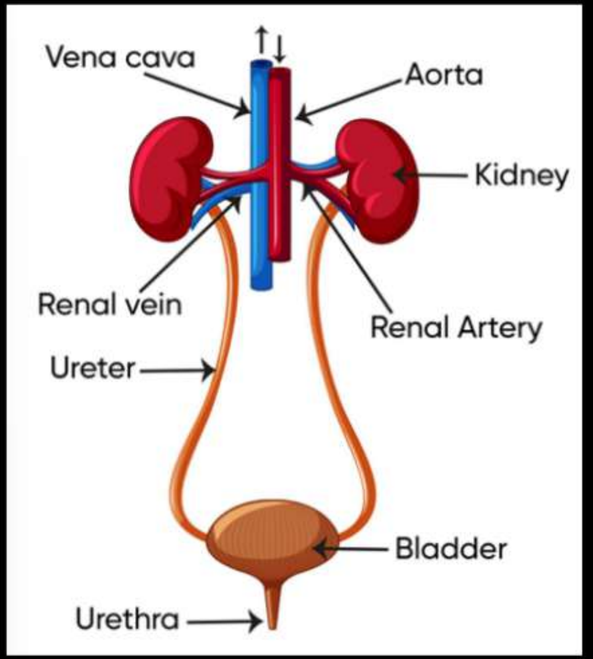
- Glomerulus filters the blood passing through it.
- It also ensures to remove only harmful substances from the body that include waste materials.
- The useful substances like glucose, amino acids, salts, and major amount of water is selectively reabsorbed by tubular part of nephron.
- Some substances like K+ are actively secreted into the urine through tube.
- The collecting dust collects the urine and passed it to *ureter*.



Box wala sawal

HEMODIALYSIS

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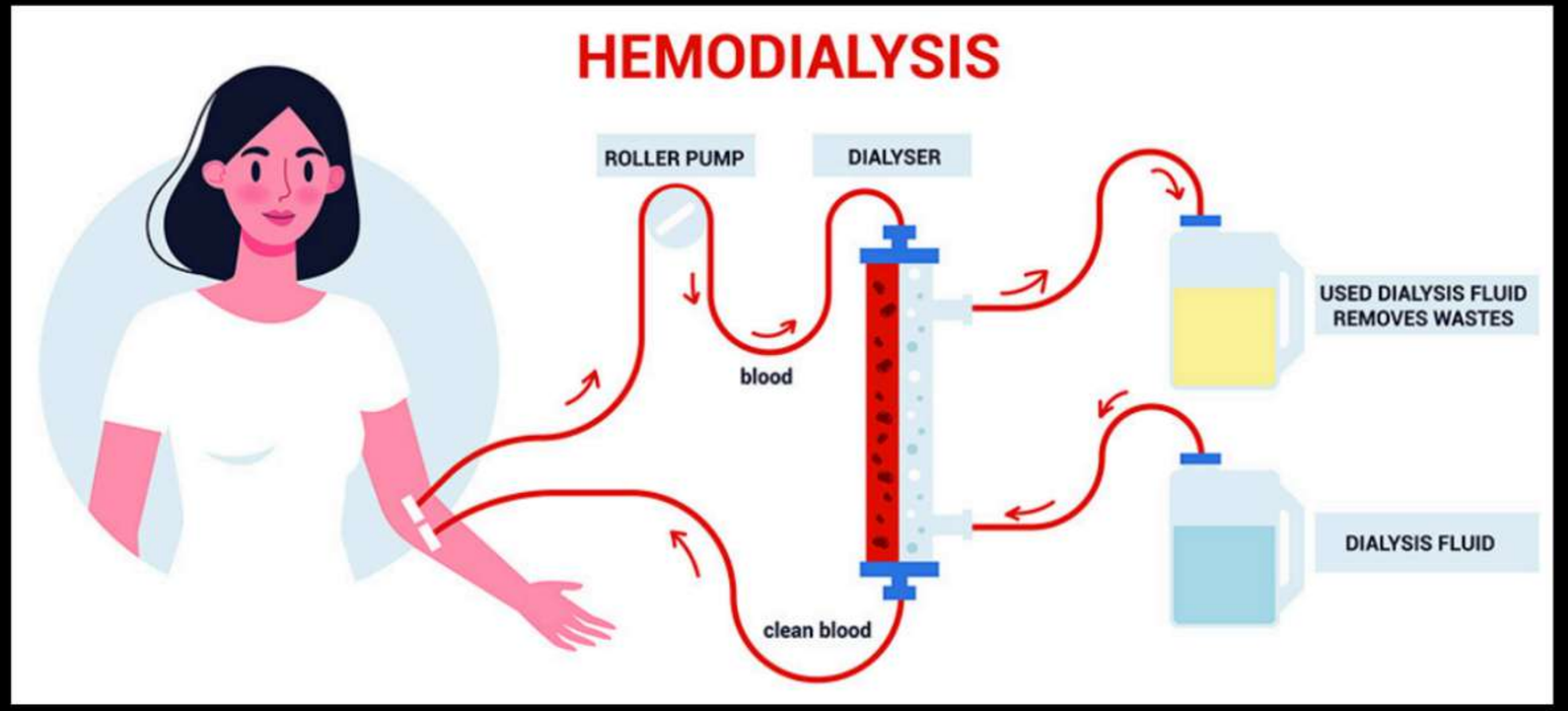
Hemodialysis is a medical treatment used to filter and cleans the blood of people with kidney failure.



EXCRETION IN PLANTS

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Plants use different strategies for excretion of different products :

- Oxygen and carbon dioxide is diffused through stomata.
- Excess water is removed by transpiration.
- Plants can even loose some of their old parts like old leaves and bark of tree.
- Other waste products like raisins and gums especially in old xylem cells which can also be lost by plant
- Plants also secrete some waste substances into the soil around them.

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1.Which one of the following statements is correct about the human circulatory system?

(a) Blood transports only oxygen and not carbon dioxide.
(b) Human heart has five chambers.
(c) Valves ensure that the blood does not flow backwards.
(d) Both oxygen – rich and oxygen – deficient blood gets mixed in the heart.

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2. Which of the following option shows the transport of oxygen to the cell correctly?

(a) Lungs →pulmonary vein →left atrium →left ventricle →aorta → body cells
(b) Lungs →pulmonary vein →right atrium →right ventricle → aorta → body cells
(c) Lungs →pulmonary artery →left atrium → left ventricle → vena cava → body cells
(d) Lungs →pulmonary artery →right atrium → right ventricle→ vena cava → body cells

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3. How is food transported from the phloem to the tissues according to plants' needs?

(a) Food is transported along with the water in the plant's body
(b) Food is transported in only one direction, like water in the plant body through the xylem
(c) Food is transported from a region with a low concentration to a higher concentration
(d) Food is transported from the region where it is produced to other parts of the plants

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4. Name a circulatory fluid in the human body other than blood.

(a) Platelets
(b) RBC
(c) Lymph
(d) Plasma

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5. Identify the correct path of urine in the human body.

(a) Kidney → urinary bladder → urethra → ureter
(b) Urinary bladder → ureter → kidney → urethra
(c) Kidney → ureter → urethra → urinary bladder
(d) Kidney → ureter → urinary bladder → urethra

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6. Write three types of blood vessels. Give one important feature of each.

Answer: The three types of blood vessels in human body are:
(i) arteries, (ii) veins and (iii) capillaries.
(i) Arteries are the blood vessels which carry blood from heart to various parts of the body. The walls of arteries are thick, elastic and muscular that,Carry oxygenated blood away from heart.
(ii) Veins are thin walled blood vessels which carry deoxygenated blood from the body back to the heart.
(iii) Capillaries are thin walled . Helps in facilitation of exchange of gases,nutrients and waste.

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7. What do the following transport?

(i) Xylem, (ii) Phloem, (iii) Pulmonary vein, (iv) Vena cava, (v) Pulmonary artery, (vi) Aorta

Answer: (i) Xylem is a specialised plant conducting tissue that transports water and minerals from roots to all aerial parts of plants .

(ii) Phloem transports food that is prepared in the leaves, through photosynthesis, to various parts of plant. Phloem also transports amino acids, hormones synthesised in the shoot tips and root tips and other metabolites.

(iii) Pulmonary vein present in human circulatory system brings oxygenated blood from lungs to the left atrium of heart.

(iv) Vena cava transport deoxygenated blood collected by all veins of body except pulmonary vein and pass it to the right atrium of heart.

(v) Pulmonary artery transports deoxygenated blood from right atrium of heart to lungs for oxygenation.

(vi) Aorta transports oxygenated blood from left atrium to systemic arteries which further take the blood to various body parts and organs.

Chapter ka gyaan 

Digest the good vibes, excrete the negativity.

—alimentary canal