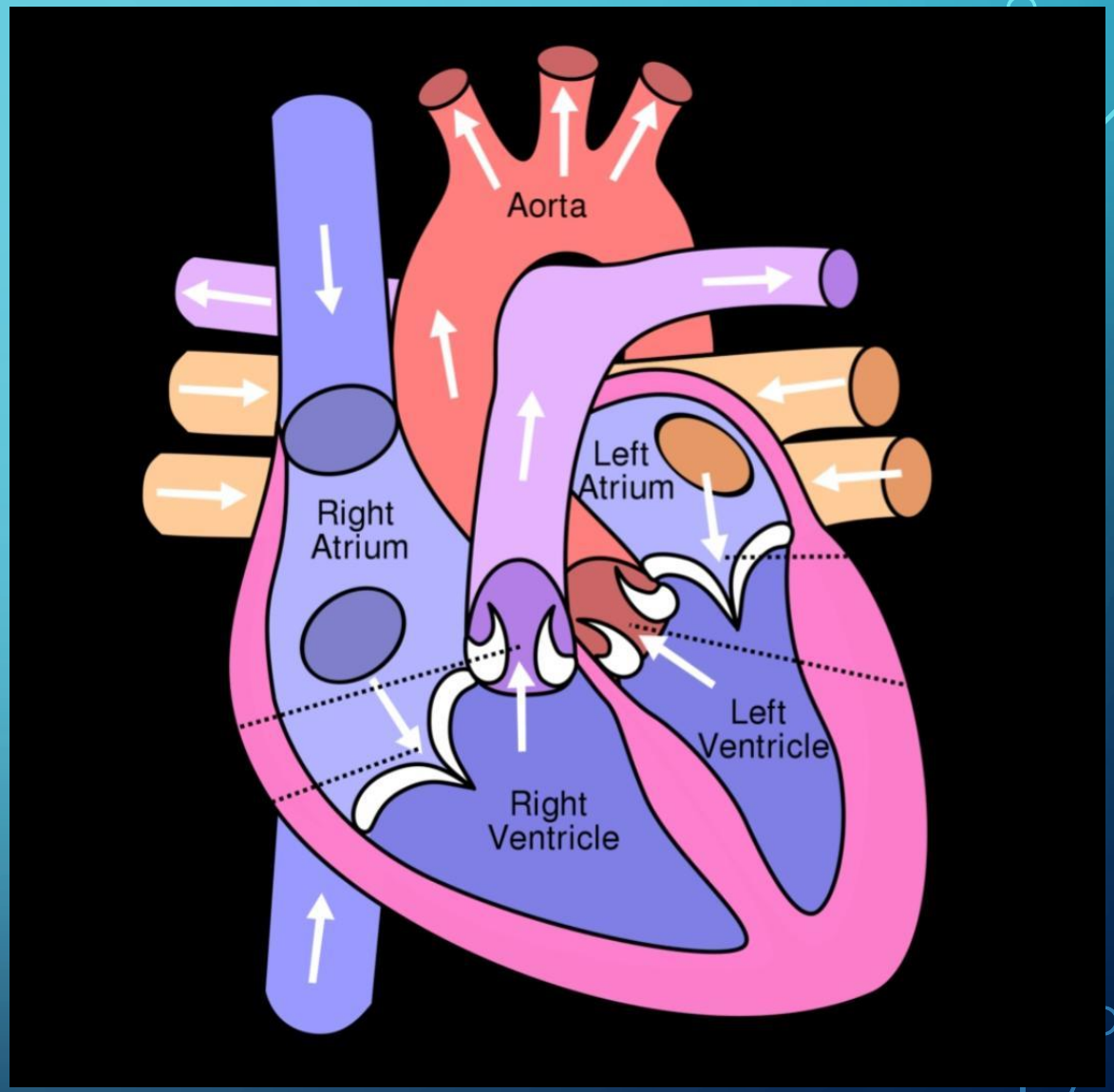
## 8) Transportation :-

### •a) Transportation in Human beings :-

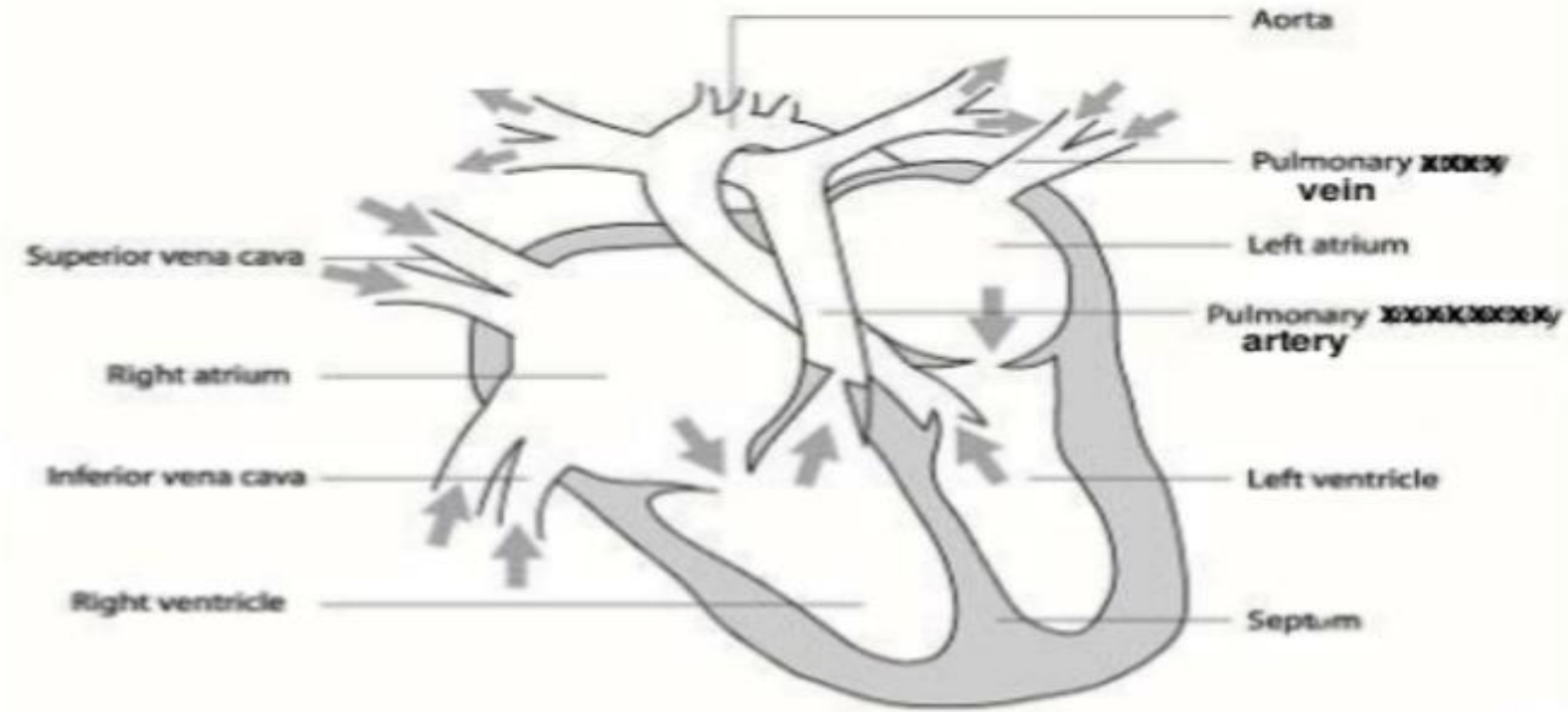
• The main transport system in human beings is the circulatory
•system. It consists of blood, arteries, veins capillaries and heart.
• i) Blood :- transports food, oxygen and waste products. It consists of
•plasma, red blood cells (RBC), white blood cells (WBC) and platelets.
•Plasma transports food, water, carbondioxide, nitrogenous waste etc.
•Red blood cells transports oxygen. White blood cells kills harmful
•microbes and protects the body. Platelets help in clotting of blood and
•prevents loss of blood during injury.
• ii) Arteries :- carry pure blood from the heart to all parts of the body.
•They are thick walled and do not have valves.
•iii) Veins :- carry impure blood from all parts of the body to the heart.
•They are thin walled and have valves.
•iv) Capillaries :- are very narrow blood vessels which connects
•arteries and veins together. The exchange of food, water, oxygen,
•carbon dioxide etc. between the blood and cells take place through
•the capillaries.

**The human heart is a muscular organ, which has four chambers. The two upper chambers called the right atrium and the left atrium, and the two lower chambers called the right ventricle and left ventricle. The right atrium and the right ventricle together may be called the right heart. The left atrium with the left ventricle together can be called as the left heart. All the chambers of the heart are separated by muscular walls called septum**

Arteries and veins are the main blood vessels. These are interconnected by a network of smaller vessels called capillaries. Veins carry deoxygenated blood to the right side of the heart whereas arteries carry oxygenated blood away from the heart to different parts of the body.

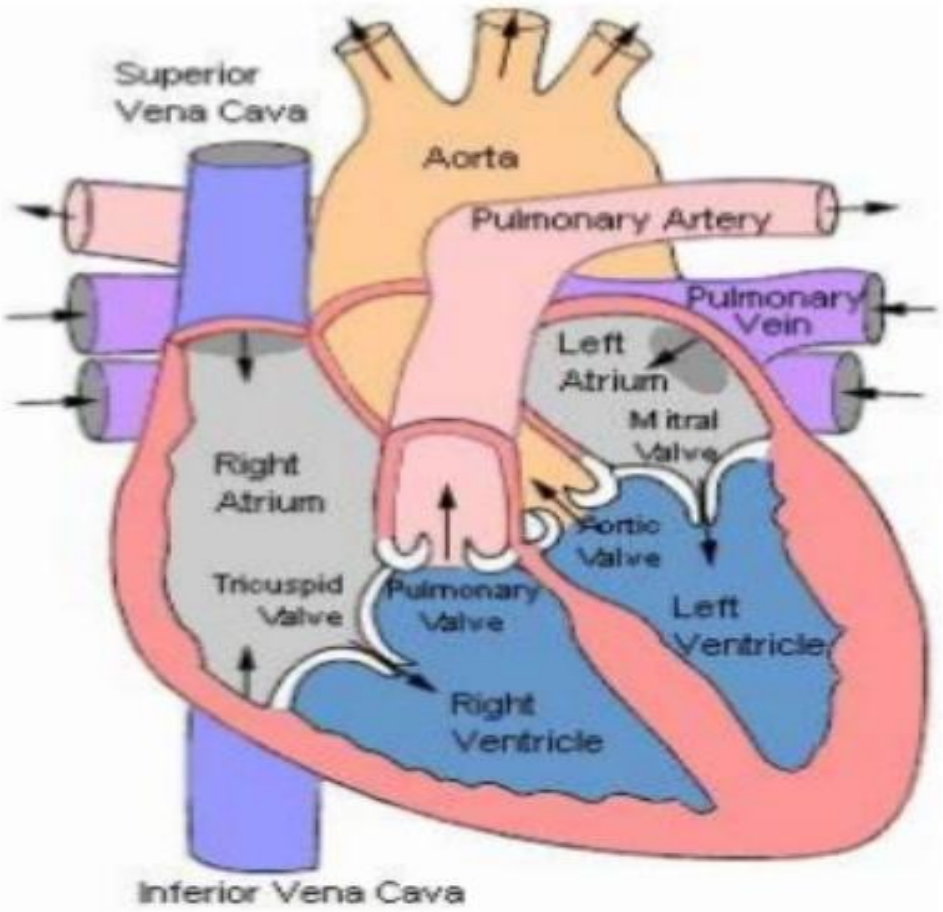


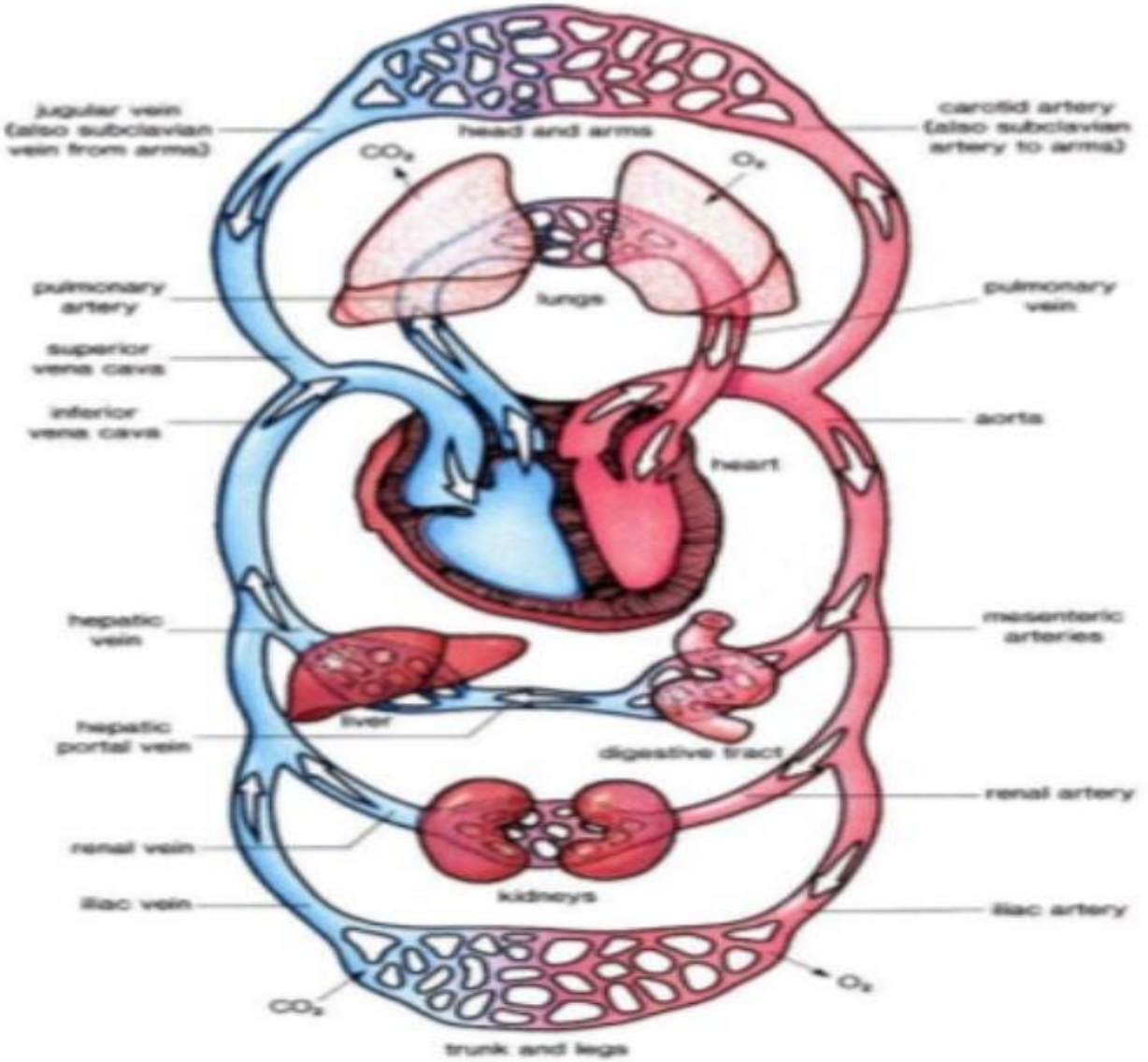
•v) **Heart** :- is a muscular organ which pumps blood to all parts of the body. It has four chambers. The upper chambers are called atria and the lower chambers are called ventricles. Since the ventricles pump blood to the different organs its walls are thicker than the atria. The right and left chambers are separated by a septum. It prevents the mixing of oxygenated and deoxygenated blood The atria and ventricles have valves between them to prevent blood flowing backward.




Internal structure of human heart

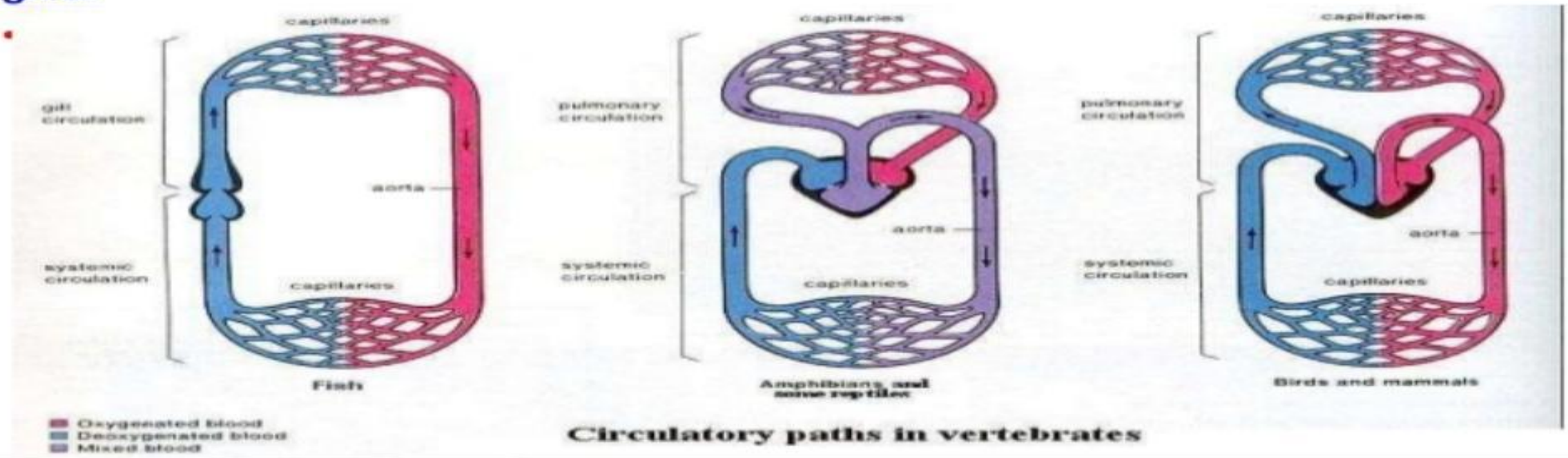
# Working of the heart (Circulation of blood) :-



## Hearts of mammals, birds, amphibians, reptiles, and fishes :-

- i) The heart in mammals :- and birds have four chambers and the right and left sides of the heart is separated by a septum. This prevents mixing of oxygenated and deoxygenated blood and provides efficient supply of oxygen. This is necessary because they need more energy to maintain their body temperature.
- ii) The heart in amphibians and reptiles :- have three chambers and allows some mixing of oxygenated and deoxygenated blood because the do not use energy to maintain their body temperature. Their body temperature is the same as the temperature of the surroundings.
- iii) The heart in fishes :- have only two chambers and blood is oxygenated in the gills.

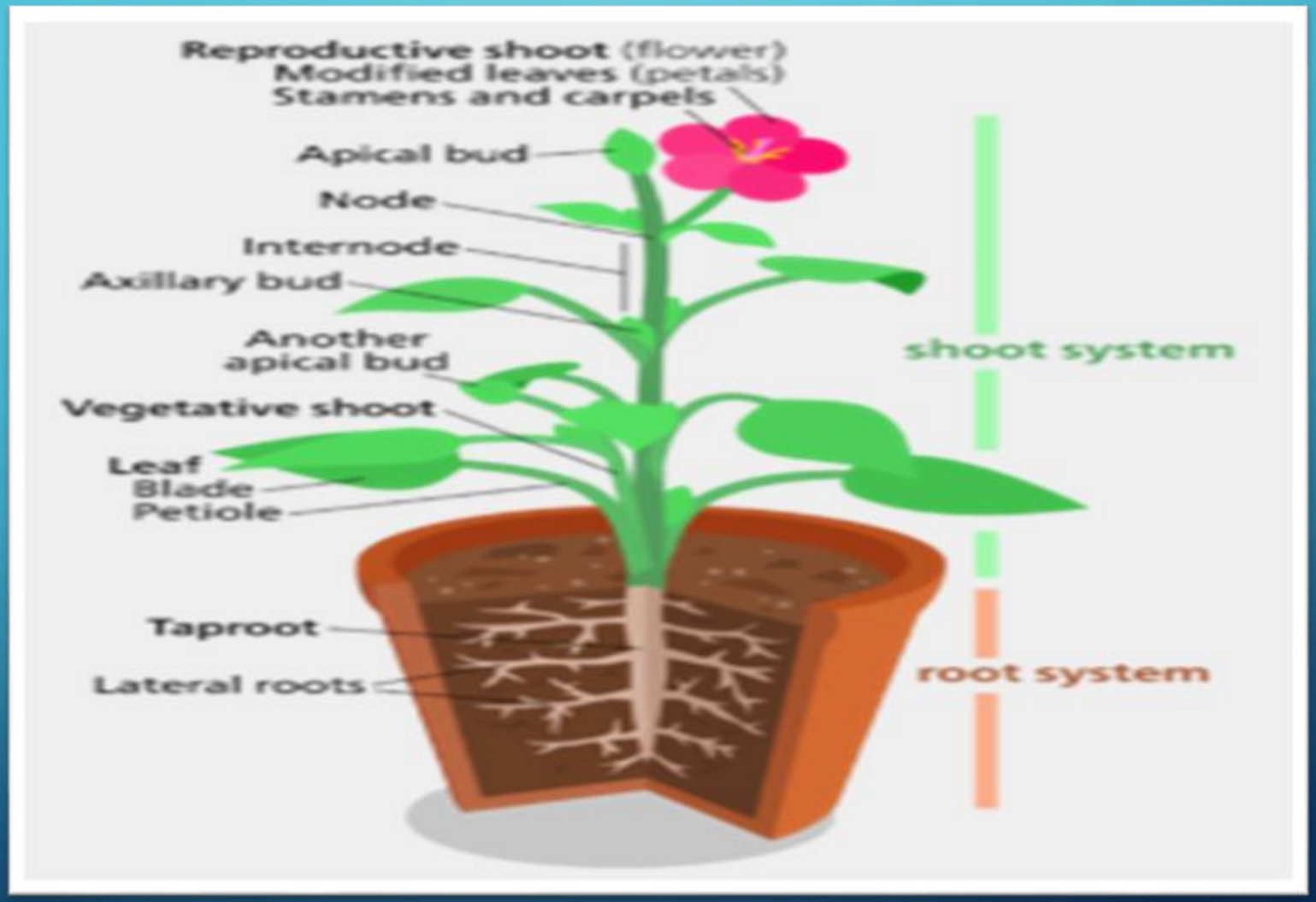



Circulatory paths in vertebrates

- **Working of the heart ( Circulation of blood ) :-**
- When the left atrium relaxes oxygenated blood from the lungs flows into it through the pulmonary vein. When it contracts, the left ventricle expands and the blood flows into it. Then the left ventricle contracts and the oxygenated blood is pumped out through the aorta to all parts of the body. After circulating through all parts of the body the deoxygenated blood enters the right atrium through the vena cava. When the right atrium contracts, the right ventricle expands and the blood flows into it. Then the right ventricle contracts and the blood is pumped to the lungs through the pulmonary artery. In the lungs carbon dioxide is removed and oxygen is absorbed and the oxygenated blood again enters the left atrium and the process repeats.
- Since blood flows through the heart twice in one cycle, it is called double circulation.

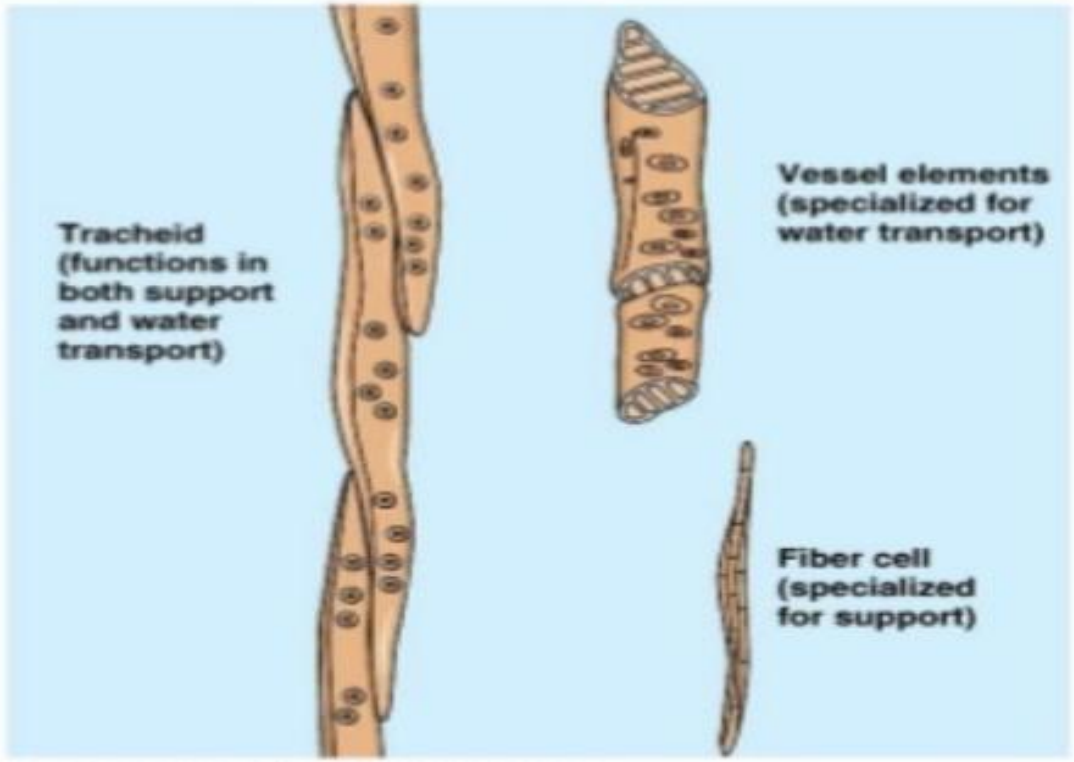
- **Lymph** :- is a colourless fluid present in intercellular spaces. It is formed from the plasma which escapes from the capillaries. Lymph drains into lymphatic capillaries which forms lymph vessels and joins into large veins.
- Lymph transports digested fats and drains excess fluids from intercellular spaces back into the blood. It contains lymphocytes which kills germs and protects the body

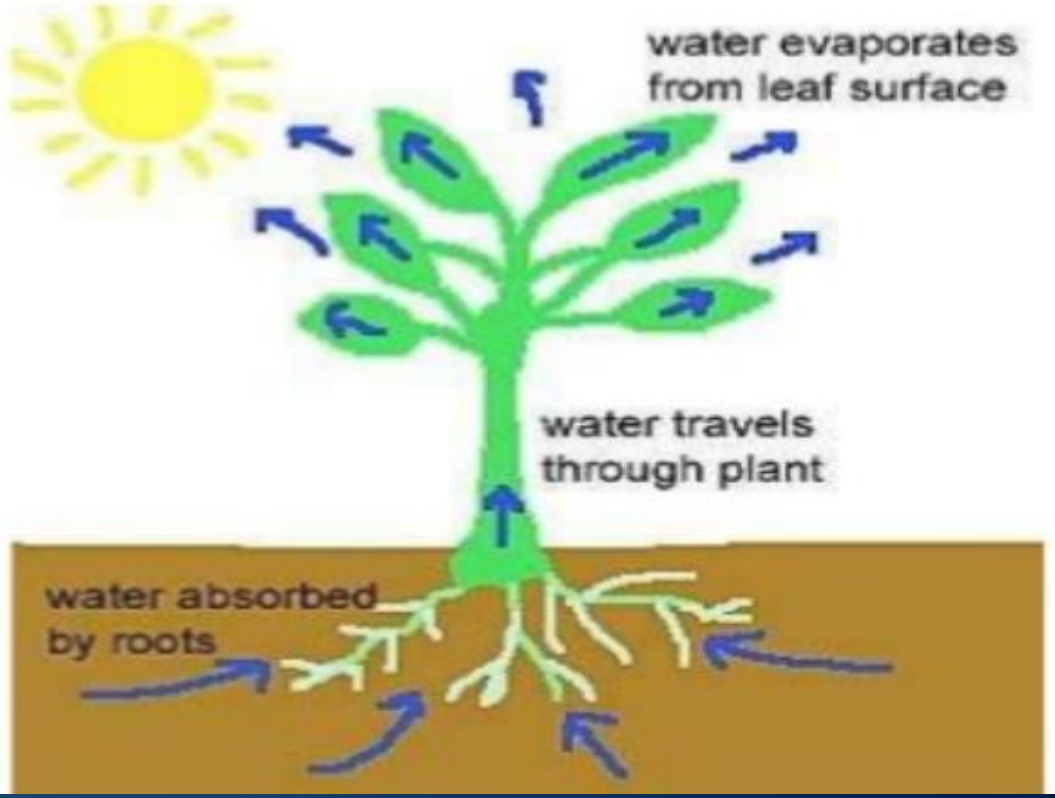
# Transportation in Plants



# b) Transportation in plants :-

- In plants, transportation of materials like food, water and minerals takes place through conducting tissues called xylem and phloem.
- i) Xylem :- transports water and minerals from the roots to all parts of the plant. It consists of xylem vessels and tracheids. Water and minerals enter the roots by diffusion. Then due to transpiration, the suction force helps in the upward movement of water an minerals.



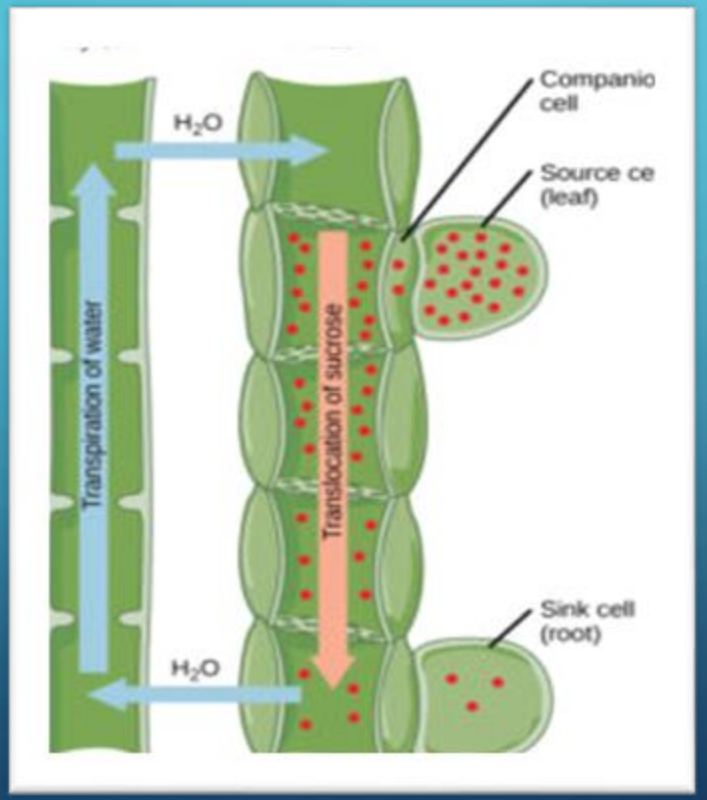
THE PLANT BODY IS GENERALLY DIVIDED INTO ROOTS, STEM, AND LEAVES. THE ROOTS ARE IN THE SOIL, WHICH IS THE MAJOR SOURCE OF NUTRIENTS IN PLANTS. WATER AND OTHER NUTRIENTS ENTER THE PLANT THROUGH THE ROOTS. THE LEAVES ARE THE FOOD PRODUCTION CENTRES. USING THE SUNLIGHT AND CARBON DIOXIDE THEY SYNTHESIZE FOOD THROUGH PHOTOSYNTHESIS IN THE CHLOROPLASTS.

NOW, FOOD FROM THE LEAVES HAS TO REACH THE OTHER PARTS AND THE WATER, ALONG WITH OTHER NUTRIENTS HAS TO REACH LEAVES AND OTHER PARTS. ALL OF THIS TAKES PLACE THROUGH THE VASCULAR TISSUES OF THE PLANTS. THIS IS BASICALLY THE TRANSPORTATION IN PLANTS.

# YOU HAVE ALREADY LEARNED IN EARLIER CLASSES ABOUT THE SPECIALIZED CELLS AND TISSUES IN PLANTS, WHICH ARE THE XYLEM AND PHLOEM. TOGETHER, THEY CONSTITUTE THE VASCULAR STRUCTURE IN PLANTS.

## Vascular Structure

The xylem tissue transports water and minerals from the roots to the leaves whereas the phloem tissue transports food from the leaves to the other parts of the plant. Xylem tissue has tracheids and vessel elements. Phloem tissue has companion cells and sieve tubes.




Xylem and Phloem tissues are present throughout the plant. They begin at the root and then move up to the stem, branches, and leaves.

WHEN TRANSPIRATION IN PLANTS OCCURS, WATER GETS EVAPORATED FROM THE LEAVES. THIS RESULTS IN MORE WATER BEING PULLED FROM THE ROOT.
THIS PHENOMENON EXPLAINS HOW WATER MOVES UP IN THE PLANTS, AGAINST GRAVITY, WITHOUT THE USE OF ANY PUMP! THE FLOW OF WATER IN THE XYLEM TISSUES IS UNIDIRECTIONAL. IT MOVES UP THE STEM FROM THE ROOTS. IT OCCUPIES THE CENTRE OF THE VASCULAR BUNDLE.

- The phloem, on the other hand, is responsible for the translocation of the nutrients like carbohydrates and amino acids from the leaves to other areas of the plants. Here, the flow is bidirectional. It moves up and down the stem. Phloem occupies the edge of the vascular bundle, as seen in the following figure. Food movement in the phloem occurs due to the pressure flow mechanism. The differences in the osmotic pressure help in the movement of food from the area of high concentration to areas of low concentration.

## Assignment questions:

1. What are the two types of vascular tissues?
2. Which are the materials transported in plants?
3. Explain Double circulation.
4. Write a note on arteries and veins.
5. What is lymph.
6. What is the function of phloem.
7. How many chambered heart is present in fishes and aphibians.?


THANK YOU