

## X State.Biology.Lesson-3.Study Material

### 3.TRANSPORTATION

**Q. How do unicellular organisms transport their materials?**

- A. Living organisms need Nutrients, gases, liquids for growth and maintenance.
- These materials have to be transported to different parts of the body in case of unicellular (or) multicellular Organisms.
- In unicellular organisms materials are transported to short distances.  
In multicellular organisms materials are transported to long distances.
- In Lower organisms materials are transported by the process of diffusion and Osmosis Eg: Amoeba.
- In Higher organisms diffusion and Osmosis processes cannot transport the substances in bulk amounts quickly.
- A separate system has evolved to solve all the above problems of transport called circulatory system.
- Circulatory system Composes of Blood, Blood vessels and heart, it helps in transportation of solids, liquids and gases.

**Q. Did you ever saw a doctor holding the wrist of a patient and trying to notice something?**

**Q Why do doctors check pulse at the wrist?**

**Q What doctors infer by checking the pulse rate?**

**Q What makes rhythmic movement in the wrist?**

- A. Generally doctors hold the wrist of a patient and check the rate of pulse/minute.
- Doctors use index and middle finger to check pulse at the wrist.
- Doctors feel rhythmic movement up and down of an radial artery in the wrist region.

**Q. Do the pulse rate vary in different conditions?**

S.No	Name of the Person	Pulse rate per minute	
		At Rest	After jogging
1	Karthik	68	74
2	Abhiram	70	80
3	Sanjay	65	79

**Q. Raju heart beats 72 times/min ,on running it Increases to 86 times/min why?**

**Q. Why pulse rate varies?**

**Q. Why pulse rate Increases during Running, climbing stairs etc?**

- A. The pulse rate varies from person to person and situation to situation.
- A. When a person is running (or) afraid, his pulse rate increases, i.e., The Blood flows rapidly in to the blood vessels, making the pulse to beat more quickly than in normal conditions.

**Q. Write about discovery of stethoscope?:**

- A. Take a paper of 10 cm length and roll it like a cylinder.  
Put one end of paper cylinder on the left side of chest of your friend.  
Put your ear on the other end, Then you can hear a sound of Lub and Dub.  
If you count these beats per minute it is equal to rhythm of match stick in the button placed on the wrist.

## X State.Biology.Lesson-3.Study Material

Experiment -2

Place a button in which a match stick is inserted and keep it on the wrist.

The rhythm of the heart is equal to the movement of match stick in the button called pulse.

By above two experiments it is concluded the rate of heart beat is equal to rate of pulse

**Q. Is there any Relationship between heart beat and pulse?**

**Q. Why some doctors check heart beat and some check pulse rate?**

**A.** Pulse can be felt by placing the thumb over the radial artery (wrist).

The rhythmic movement of pulse is due to forceful pumping of blood into arteries during ventricular Systole

The number of rhythmic movements per minute is counted. It is pulse rate. Pulse rate is equal to heart beat.

Heart beat/pulse rate per minute in an Individual.

New born (0-3 Months) → 100-150

Infants (3-6 Months) → 90-120

Infants (6-12 Months) → 80-120

Children (1-10 Years) → 70-130

Over 10 years & adults including senior citizens → 60-100

Well trained adults athletes → 40- 60

In 1816 Rene laennac discovered “stethoscope”. Before Stethoscope doctors used to keep ear on the chest & listen to heart beat by using paper tube & Bamboo, laennac called it as “Stethoscope”.

**5. John prepared stethoscope with paper and string. Write down the procedure of preparation.**

**A. Aim:** Preparation of a model of stethoscope.

**Material required:** Paper cup and string.

**Procedure:** Take a paper make it like a cup . Take a string or a thread. Attach this string to the paper cup. The paper cup will be placed on the chest and the string will be arranged to the opening of the ear. You feel some sound.

**Observation:** We can hear the heart beat.

**Conclusion:** Stethoscope is used by the doctors to measure heart beat.

**Q.** A person identified an organ ‘A’ which is pear shape & pumps the blood to differentiate parts of the body and has 4 chambers?

**A.** Upper two Chambers are Auricles and the lower two chambers are ventricles.

1) Left auricle and right ventricle are bigger among the four chambers.

2) Pulmonary artery carries the De oxygenated blood to lungs.

3) All veins opens in to Auricles with De oxygenated blood.

4) Only pulmonary vein is an exception that collects oxygenated blood from lungs and into left auricle.

**Q.** Write **Activity-on – Stethoscope.**

Paper tube- 10 inch long. One Inch-diameter. Keep one end on the chest & one end on the ear to listen heart beats.

## X State.Biology.Lesson-3.Study Material

S.No	Name of the Student	Heart beat at Rest/min	Pulserate at Rest Min
1	Harish	70	70
2	Eshwar	72	72
3	Praveen	71	71
4	Pradeep	68	68



**Q. What questions do you pose to a cardiologist to know about heart.**

- i) What is the reason to get Heart attack
- ii) Why heart beat rate Increases sometimes
- iii) What precautions to be followed to maintain good Heart beat.
- iv) What happens if more oil is used (or) Junk food taken.

**Aim:** To observe the external & Internal structure of heart.

**Materials required:** Goat heart, soda straw, sheep & long blade (or) scalpel, tray, a jug of water, dissection scissors, forceps.

**Procedure:** Clean the heart properly insert soda straws into the stumps of blood vessels.

- Heart is situated slightly towards left side in the thoracic cavity in between the two lungs.
- Heart is covered pericardium layers, shape of the heart is pearshape with anterior broad End and posterior narrow end.  
Heart is made up of cardiac muscles.
- Size of the heart is size of fist of an individual.

**Q. How heart is protected?**

**A.** Heart is protected by ribs on all sides and vertebral coloumn on back side.  
Pericardial fluid present in between the two layers of heart protects from minor shocks and injuries.

**Q. How many blood vessels are attached to heart?**

Six blood vessels are attached to heart

- (1) Aorta (2) Pulmonary Artery (3) Pulmonary Vein (4) Inferior Venacava
- (5) Superior Venacava (6) Coronary Blood vessels.

## X State.Biology.Lesson-3.Study Material

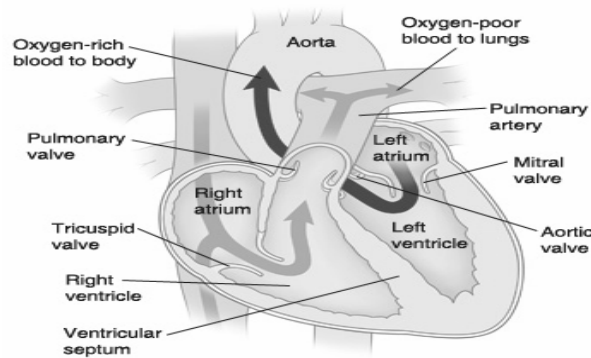
**Q. Write about internal structure of heart or explain about pumping organ with the help of a sharp blade/scalpel open the heart in such a way the chambers are exposed.**

**A.** There are four chambers.

2 auricles (Superior chambers) - (i) Right Auricle(atrium) (ii) Left Auricle(atrium)

2. Ventricle (Inferior chambers)- (i) Right ventricle (ii) Left Ventricle

**Q. How blood from auricles passes into ventricles?.**



**A.** Through right auriculo ventricular aperture- tricuspid valve.

Through left auriculo ventricular aperture- bicuspid (or) mitral valve.

valves prevent back ward flow of blood.

Chambers are separated by walls called septae.

Auricles are receiving chambers and superior chambers.

Ventricles-distributing chambers and inferior chambers.

Right and left auricles separated by inter auricular septum it prevents the mixing of deoxy blood present in the right auricle with oxygenated blood present in left auricle.

Right and left ventricles are separated by inter-ventricular septum.

**Q. Do the walls of auricles and ventricles are same?**

**A.** Walls of the ventricles are thicker and muscular than that of the auricles, as ventricles have to pump blood through different parts of the body.

**Q. Through which blood vessels blood flows towards the heart.**

**A.** Veins are the blood vessels which brings the blood towards the heart, these are thinner and less elastic.

**How many veins bring /attached to the heart 3 veins?**

i) Superior venacava → Collects deoxygenated blood from upper parts of the body and opens in to right auricle.

ii) Inferior vcnacava → Collects deoxygenated blood from lower parts of the body and opens into right auricle.

iii)Pulmonary Veins → Brings oxygenated blood (exception) from lungs and opens into left auricle.

Coronary veins found in the walls of the heart, brings deoxygenated blood from walls of the heart and opens into right auricle.

## X State.Biology.Lesson-3.Study Material

**Q. Through which blood vessels the blood is pumped out away from the heart.**

A. Arteries are the blood vessels which supply blood (or) pump blood to different body parts and are thick, rigid and elastic.

**Q. How many Arteries originate from heart?**

- i) Aorta (Largest Artery which has 3 semilunar valves/elastic valves) – Pumps oxygenated blood to all the parts of the body. It arises from the left ventricle.
- ii) Pulmonary artery (3 Half moon shaped (or) Semilunar Valves)- originates from Right ventricle & Carries deoxygenated blood (exception) to the lungs.  
Coronary Arteries-carry oxygenated blood to heart muscles.
- ii) Heart attacks are caused due to the blockage of coronary arteries by cholesterol.

**Q. Where are valves present and what is their function?**

A. Auriculo ventricular valves are present in between right auricle and right ventricle left auricle and left ventricle.

**Q. What prevents the reverse flow of blood in veins?**

A. Valves.

**Q. A person identified a blood vessel which is thin walled and he also observed blood moves in forward direction only. What is it?**

A. Veins are thin walled blood vessels.  
i) The lumen size of these blood vessels is large.

**Q. What are valves. locate the types of valves in human heart.**

- A. i) Valves are door like structures present in between auricles, ventricles and at starting point of arteries.
- ii) Valves are held in position by tough connective tissue strands –called chorda tendinae.
- iii) They prevent the reverse flow of blood.

**Types of valves:**

Name of the valve	Location	Flow of the blood
Tricuspid valve.	Right auriculo ventricular aperture	Right auricle to right ventricle
Bicuspid(Mitral) valve	Left auriculo ventricular aperture	left auricle to left ventricle.
Aortic valves	At origin of Aorta in left ventricle.	From left ventricle to Aorta.
Pulmonary valves	At origin of pulmonary artery	From right ventricle to pulmonary artery.

**Q. Explain about circulation of Blood.**

(To copy from old material)

**Q. Explain the Discovery of Veins.**

A. In 1574. Italian doctor Girolamo Fabrici studied the veins in legs. He observed valves in veins, which allows blood to move only in one direction.

Valves folded towards the walls of the veins as such blood moves freely without trouble. Girolamo Fabrici had paid no attention in which the blood moved away from left ventricle (Aorta)

William Harvey –Doctor –went to Italy and got trained under Fabrici.

## X State.Biology.Lesson-3.Study Material

Harvey studied about valves in dead peoples heart i.e. In between auricle and ventricle. When heart contracts the blood in the ventricle moves into respective arteries, but not back in to atria because of valves.

He experimented on animals by blocking tying off the veins. He noticed that vein always bulged on the side of the block away from the heart, blood can't flow back because of valve.

Heart pushes the blood into arteries and collect the blood to the heart by veins-concludes double circulation.

### 7. Collect information about blood pressure of your school teachers or your neighbors and prepare a report on their health problems.

A.

Name of the person	Blood pressure	Health condition
1) Mr. Vijay	120/80	Normal
2) Mrs. Kamala	125/85	Irritation, worried
3) Mr Raju	140/90	Fear, easily getting anger, high irritation tiredness.
4) Mrs. Chandu	110/70	Weakness, dizziness, fainting
5) Mr.Rama Rao	140/100	Dizziness, fainting.

### 1. Name the structures which are present in veins and lymph ducts and absent in arteries.

A.

1) In 1574, an Italian doctor Girolamo Fabrici, studied the veins in the leg. He noticed that veins had valves in them.

2) If the blood moved in one direction, the walls of the veins collapse and act as valve, so that the blood could pass without trouble against the gravity.

4) They were one-way valves. They permitted the blood to move upright. Blood can't move downward.

5) The valves that are present in the lymphatic vessels and veins stop the back flow of blood whereas valves are absent in arteries.

**Q. Name the person who studied about discovery of blood vessels.**

**Q. Who studied about valves in the leg?**

A. Girolamo fabrici.

**Q. In which kind of blood vessels blood flows against gravity.**

A. Veins

**Q. Who studied about the Blood vessels by blocking them?**

A. William Harvey.

**Q. Who studied about smallest blood vessels in wings of bat?**

A. Marcellomalphigii- Blood capillaries.

**Q. Write flow chart of Blood circulation?**

A. Right ventricle  $\xrightarrow{\text{Deoxygenated}}$  pulmonary Artery  $\rightarrow$  Lungs and Returns to heart by pulmonary vein .

Left auricle  $\xrightarrow{\text{Oxygenated blood}}$  Left ventricle  $\rightarrow$  Aorta  $\rightarrow$  Body parts  $\rightarrow$  Right auricle by veins.

## X State.Biology.Lesson-3.Study Material

### Q. How arteries and veins are connected.

A. Harvey thought how small arteries and veins are connected to each other

→ Artery → Arterioles → Blood capillaries → Cells → Venules → Veins.  
(oxyblood) (deoxyblood)

→ Marcello malphigi used microscope to see tiny blood vessels. In 1661, 4 years after Harvey's death, malphigi studied the wings of bat.

→ He could see blood vessels i.e. Capillaries connected by arteries and veins.

→ Capillaries – derived from Latin word “ Hair” –as they were thinner as that of hair.

### Q. How did scientists say that blood moves in Blood vessels?

### Q. Show an experiment saying that blood passes through Blood vessels.

### Q. It is possible to study the movement of blood in blood vessels without damaging them.

### Q. Demonstrate the movement of blood in veins given by William Harvey.

A. Tie a tourniquet above the elbow, blood vessels can be seen.

↓

Hold a piece of rolled cloth in the fist of the hand.

↓

Select the undivided blood vessel, at the end of the vessel apply steady pressure to stop its activity.

↓

Apply pressure from elbow towards the palm.

### Q. What happens to the Blood Vessel?

Bulge can be observed as the above activity stops the movement/flow of blood in blood vessels.

### Q. What are the different type of Blood vessels found?

### Q. How arteries are different from Veins?

A. **Arteries:**

i) It carries blood from Heart to organ.

ii) Arteries donot collapse when blood is absent.

iii) Pressure in arteries is more.

v) Arteries carry oxygenated blood except pulmonary artery.

vi) Pulmonary artery carry deoxygenated blood from right ventricle to lungs.

**Veins:**

i) It carries blood from organs to heart.

ii) valves are present.

iii) veins collapse when blood is absent.

iv) veins are less thin and less elastic.

v) Pressure in veins is less

vi) Veins carry deoxygenated blood except pulmonary vein.

vii) Pulmonary vein carry oxygenated blood from lungs to left auricle.

### Q. What are Blood capillaries:

A. Microscopic blood vessels –made of single layer cells. They help in diffusion of various substances. The blood in the capillaries will stay for longer time for exchange of material.

## **X State.Biology.Lesson-3.Study Material**

**Q. Student indentified a blood vessel, in which the W.B.C can squeeze out of it. Blood capillaries.**

**Q. In which Blood Vessels valves are found? What do you think is the function of the valves in them?**

A. Valves are found in veins that bulge on the side away from the heart when the hand is tied

The presence of valves in veins prevents reverse flow of blood.

**Q. Why do sub cutaneous blood vessels bulge all side away from heart?**

A. Veins carry blood towards the heart, when a vein is blocked, the blood doesn't flow towards the heart and bulge occur away from the heart.

**Q. The deep seated blood vessels bulge on the side towards the heart when tied. What do you understand from it?**

A. Arteries are the blood vessels which carry blood away from the heart, if an aretery is tied/blocked the blood cannot move from the heart as a result a bulge appears on the side of the heart.

**Q. There are valves in the heart between atria and ventricles. Is the purpose of valves in the veins and arteries same?**

A. Yes the valves between atria and ventricles and in veins, arteries perform the same function. They prevent the reverse flow of blood.

**Q. Sit on a table with one big dangling and other leg resting on it, after sometime, leg which is on to give a series of small movements with each heart beat.**

A. Pins and needles in leg can be observed due to reduced flow of blood in to leg.

**Q. Swing the (hard) arm several times and hold arm vertically downwards, gently press the finger along a vein-stocking it in the reverse direction to the blood flow i.e, towards the hand.**

A. Swelling can be ovbserved as we are pushing the blood against the flow of blood. As valves don't allow the reverse flow of blood.

**Q. Artery walls are very strong and elastic. Why?**

A. Artery walls are strong and elastic because blood is pumped out from the heart with high pressure into arteries.

**Q. Why we compare arteries rather like tree which divided into smaller and smaller branches?**

A. We compare arteries rather like tree which divides into smaller and smaller branches because arteries supply blood from heart to various parts of the body.

**Q. Lumen size is bigger in vein when compare with the artery. Give reason.**

A. Veins are collecting blood vessels. Presure in them is low when compared to the arteries so, the lumen size of veins is bigger than arteries because they have to carry large amount of deoxygenated blood against the gravitational force.

**Q. Explain cardiac cycle: Exlain 'Lub and Dub' Sound created by heart ?**

A. Human Heart starts beagin around 21<sup>st</sup> day during embryonic development. Contraction phase-Systole.

Relaxation phase – Diastole

One contrction and relaxation of heart is "Heart beat"



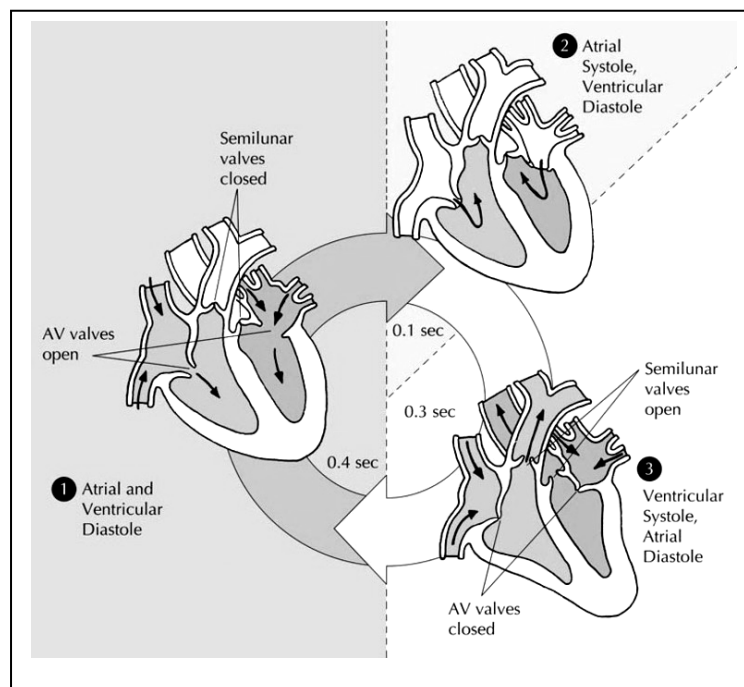
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### Events occur during the heart beat

- i) Auricular systole (Both Auricles contract simultaneously)
- ii) Ventricular systole (Both ventricles contract simultaneously)
- iii) Ventricular diastole (Auricles & Ventricles both relax)

#### Auricular systole:

- i) When both auricles are filled with i.e, deoxygenated blood in to right auricle from superior and inferior venacava and oxygenated blood in left auricle from pulmonary vein,The auricle contract (systole) and push the blood in the ventricles by opening tricuspid and bicuspid valve.
- ii) Ventricular systole: The blood in the ventricles will try to move back, the valves are closed, it cannot move back, due to this a sound is produced “lub” sound is produced due to closure of auriculo ventricular valves.



- iii) Ventricular diastole: Now the blood inside the ventricles move in to their respective blood vessels. Pulmonary aorta and systemic aorta due to ventricular contraction. The blood enters the resepective blood vessels and can not flow back into ventricles, semilunar valves prevent the reverse flow of blood. As a result dub sound is produced. Dub sound is produced due to closure of semi lunar valves in blood vessels.

Nameof the Animal	Weight of the body	Weight of the beat	No of beats/min
Blue whale	1,50,000 kg	750 kg	7
Elephant	3,000 kg	12-21 kg	46
Man	60-70 kg	300 g	76
Coalltit (Bird)	8 gm	0.15 g	1200

## X State.Biology.Lesson-3.Study Material

- Q. In the above table, which organ has less number of heart beat/min.  
A. Coallit (Bird)
- Q. In which organism the blood moves into the heart for less no of times.  
A. Blue Whale.
- Q. Why the no of heart beats increases as the weight of the organism decreases?  
A. As the size of the organism is large. More time for the blood to reach the heart and to pump it and the size of the heart is also large. Hence the no of heart beats decreases for a organism having, more body weight.
- Q. What is the relationship between weight of an organism & weight of the heart?  
A. As the size of the organisms is large, the weight of the heart is large which directly proportional.
- Q. Blood flows through hearth only once write about single circulatory systems:  
Q. Explain the circulatory system in fishes.  
Q. Explain the process in which gills purify the blood and sent to various body parts.  
Q. Why in fishes blood flow for one time through the heart?  
A. Fishes have two chambered heart one auricle and one ventricle.  
A. The deoxygenated blood is collected from all the body parts by sinus venosus.  
A.  $Body\ parts \xrightarrow[blood]{Deoxy} Sinus\ Venosus \rightarrow Auricle \rightarrow Ventricle \rightarrow Gills \xrightarrow{Oxyblood} body\ parts$
3. Read the given para and name the parts of the heart.  
We have observed that the heart is divided into four chambers by muscular structure. Any structure that divides two chambers is known as septum. Now let us try to name the septa present in the heart.
- a) The septum that divides the two atria can be named as \_\_\_\_\_  
b) The septum that divides the two ventricles can be named as \_\_\_\_\_  
c) The septum that divides the atrium and ventricle can be named as \_\_\_\_\_
- The holes that connect two chambers are called apertures. Let us try to name the apertures which connect the atria and ventricles.
- d) The aperture that is connecting the right atrium and right ventricle can be named as \_\_\_\_\_  
e) The aperture that is connecting the left atrium and left ventricle can be named \_\_\_\_\_
- Any structure that closes an aperture, and allows one way movement of materials is called as valve. Now let us name the valves that are present in the chambers of the heart.
- f) The valve that is present between left atrium and left ventricle can be named as \_\_\_\_\_  
g) The valve that is present between right atrium and right ventricle can be named as \_\_\_\_\_
- A. a) Inter atrial septum. b) Interventricular septurm.  
c) Inter atrial ventricular setum d) Right atrioventricular aperture.  
e) Left atrioventricular aperture. F) Bicuspid (Mitral) valve.  
g) Tricuspid valve.  
Body parts .

## X State.Biology.Lesson-3.Study Material

**Q. Write about Double Circulatory System:**

**Q. How the blood flows twice through Human Heart?**

**Q. Explain how purified blood from the heart reaches the organs?**

A. In Birds and Mammals, the heart is divided into 4 chambers. As the blood flows twice towards the heart hence this system is called double circulatory system.

i) Systemic circulation: As the blood flows between heart and body parts. It starts from left ventricle (Aorta) and terminate in to right auricle (Caval veins)

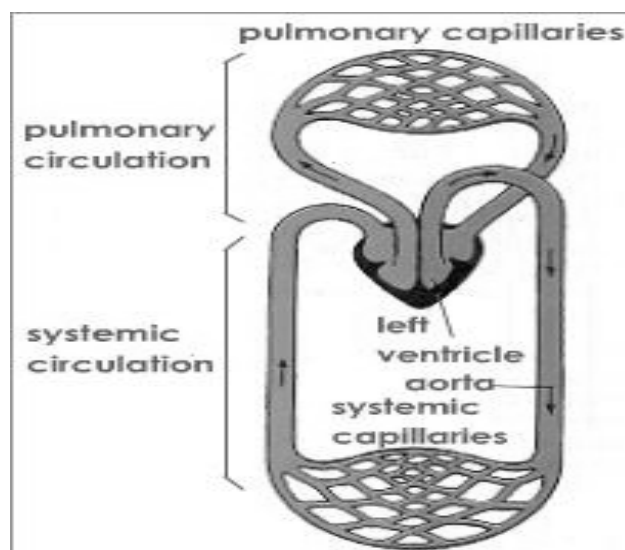
ii) Systemic circulation supply oxygen to tissues during internal respiration.

**Q. In which circulation the oxygenated blood is converted in to deoxygenated blood?**

A. Systemic circulation.

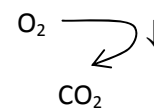
**Q. In which circulation the deoxygenated blood is converted to oxygenated blood ?**

A. Pulmonary circulation.



**1) Systemic circulation:**

$Auricle \xrightarrow[\text{Mitral}]{\text{Bicuspid}} \text{Left Ventricle} \xrightarrow[\text{blood}]{\text{Oxy}} \text{Aorta (Largest Artery)} \rightarrow \text{Body parts}$

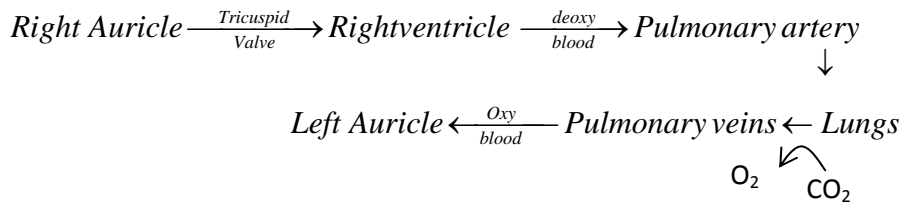


$\text{Right Auricle} \xleftarrow[\text{blood}]{\text{deoxy}} \text{Superior Venacava, Inferior Venacava} \leftarrow \text{Deoxygenated blood}$

**2) Pulmonary circulation :** The flow of blood is between heart and lungs. Purification (Or) oxygenation of blood takes place.

It starts from right ventricle by pulmonary artery terminate in to left auricle by pulmonary vein

## X State.Biology.Lesson-3.Study Material



**Q. Write about lymphatic system:**

**Q. How lymph acts a link between blood and tissues?**

**Q. How deoxygenated blood from tissue fluid enters in to veins?**

**Q. Why do swelling occurs in legs after over night journey?**

**A.** As blood flows through tissues some amount of fluids and certain solid material are constantly flowing out of them at different junctions. Such material are to be collected and sent back in to blood circulation.

Heart  $\rightarrow$  Artery  $\xrightarrow{Oxyblood}$   $\rightarrow$  Arteriole capillary  $\rightarrow$  Tissue  $\xrightarrow{Deoxyblood}$  Vennules  $\rightarrow$  veins.

When tissue fluid is being forced out of capillaries R.B.C, most of W.B.C and large proteins cannot pass out due to large size.

Tissue fluid components are water with dissolved oxygen, glucose, fattyacids, glycerol, aminoacids , vitamins, minerals and hormones.

Body cells, extract  $O_2$  from tissue fluid and release  $CO_2$  and other waste material into Tissue fluid.Tissue fluid (containing  $CO_2$ , waste) enters into venules  $\rightarrow$  veins.

A separate system called lymphatic system has evolved to transport the remaining tissue fluid into venules.

So lymph is the vital link between blood and tissues. Blood is a substance which contains solid and liquid particles lymph is the substance that contains blood without solid particles. In latin lymph means 'Water'

**Q. Write about evolution of the transport system from unicellular to vertebrates?**

**Q. Explain how transport of materials occurs in different organisms?**

**Q. Explain various modes of transport systems in different organisms?**

**Q. How organisms have developed various modes of transport systems?**

<i>Organism</i>	<i>Transport system</i>
Unicellular organisms (Amoeba)	Brownian movement (Natural movement)

Sponges  $\rightarrow$  Water currents by beating of flagella in their body.

Cnidarians (Jelly fish, Hydra)  $\rightarrow$  Gastro vascular cavity.

Platyhelminthes (Fasciola hepatica)  $\rightarrow$  Branched digestive system, excretory system.

Nematyhelminthes  $\rightarrow$  Pseudocoelome.

Annelids (first eucolomate)  $\rightarrow$  Pulsatile vessel – Transport material.

Arthropoda  $\rightarrow$  pulsatile vessel  $\rightarrow$  pump blood  $\rightarrow$   $O_2$  supplied directly to tracheal System tissues by respiratory system.

open circulatory system –system which supplies nutrients to tissues directly

Eg: Arthropoda, Molluscus and lower chordates.

Close circulatory system – Blood flows inside the blood vessel and supply food material

Eg. Annelids, echinoderms fishes, reptiles, birds, mammals

## X State.Biology.Lesson-3.Study Material

- Q. What is blood pressure? How it is checked in our body?  
Q. What is hypertension? Mention its effects.  
Q. How systolic and diastolic pressures are related to B.P?  
Q. What symptoms are observed in high and low B.P?  
Q. A student went to a doctor to check his blood pressure and asked few questions.  
a) When is the B.P. measured in a person?  
b) by which instrument can we measure it?  
Q. How many readings are taken measured? Name them.

**2. Reading (i) systolic pressure (ii) Diastolic pressure.**

**By (Blood pressure).**

- A. To move the blood into the arteries a great pressure is required. As the heart imparts pressure to move the blood it is called blood pressure, normal blood pressure is  $\frac{120}{80}$

BP is measured in the upper arm artery by an instrument device called sphygmomanometer.

There are two pressure readings. One measure the strongest pressure –during this time blood is forced out of ventricles (ventricular contraction)- Systolic pressure.

The second reading is taken during the resting period, as the ventricles are refilled with blood-diastolic pressure.

For a healthy young adult =  $\frac{\text{Systolic Pressure}}{\text{Diastolic Pressure}} = \frac{120}{80} \text{ mm / Hg.}$

Changes in top	Condition of health
125/85 (High)	Irritation, worried
140/90 (High)	Fear, High irritation, tiredness.
110/70 (Low)	Weakness, dizziness, fainting.
140/100 (High)	Dizziness, Fainting

**Reasons:**

5) One of the reasons for hypertension is the blocking of arteries by cholesterol. Constant stress and strain for a long time, improper functioning of kidneys, smoking and alcohol consumption are the reasons for high B.P.

**Preventive measures:**

- 6) Hypertension can be prevented by diet control, moderate exercise, avoiding stress and strain, avoiding alcohol consumption and smoking.  
**10. After reading this lesson what precautions you would suggest to your elders about edema?**

- A. Edema is formally known as dropsy or hydroxyl. This is abnormal accumulation of fluid in the interstitium, which is located beneath the skin or one or more cavities of the body. It is clinically shown as swelling.

Generally this occurs by inactivity and is clearer in edlers, the lower part of the legs will be swollen.

Simple methods recommended by health care professionals are as follows:

- 1) **Compression stocking:** It reduces the fluid build up and improves circulation.
- 2) **Movement:** Sitting and standing for too long promote the fluid flow into the legs and

## X State.Biology.Lesson-3.Study Material

feet. Getting up and stretching the legs once in a while avoid fluids build up, specially traveling long in bus and train.

Leg exercise increases circulation while preventing fluid retention in the legs and feet moving and using the leg muscles helps pump excess fluids back to the heart.

People with swollen feet or legs, can keep the legs elevated above the level of heart for 30 minutes a day or 3 or 4 times a day.

- 3) Massage the effected areas with firm pressure towards the heart which helps to move the excess fluid away from swelling.
- 4) **Low salt diet:** Practising low salt diet can prevent or reduce swelling. Reducing the amount of salt including table salt in the diet may prevent swelling problems from reoccurring.
- 5) **Avoid temperature changes:** Temperature changes to very hot or cold can make Edema worse. This can happen when going from hot doors into an air conditioner building or vice versa.  
Avoid hot baths, hot showers when swelling occurs.
- 6) Diuretics, medications help increase urine output, excrete water and sodium.
- 7) **Reducing swelling symptoms:** Diuretics can be used carefully much use of medication can remove excess fluid too rapidly and lead to lower blood pressure or kidney impairment.
- 8) **Homeopathic treatment:** It has not proved effective by scientific research. People should discuss them with doctor before going by journey.

**Q. What is Coagulation of Blood.**

**Q. How blood clotting occurs?**

- A.
- 1)When there is an injury in the body parts, the blood comes out and clots in 3-6minutes.
  - 2) The reddish solid material is formed after 3-6 minutes and it is called the blood clot.
  - 3) Enzyme thrombokinase and vitamin K is responsible for blood clot.
  - 4) The figures form a network over the damaged part, it entraps blood corpuscles and forms a jelly like mass called blood clot.
  - 5) The yellow coloured fluid portion after foundation of blood clot is called serum.

**Q. Why do in some persons clotting of blood doesn't occur?**

A. Because of vitamin K deficiency, (or) genetic disorder.

**Q. What is Haemophilia:**

A. A genetic disorder in which blood may have been from marriages between very close relatives.

**Q. What isThalassemia:**

- A.
- 1) Inherited blood disorder character by mild to severe anaemia caused by Hb deficiency in R.B.C.
  - 2) Symptoms are: (i) Anaemia, enlarged liver and spleen, slow growth, thin and brittle bones and Heart failure etc.

**Q. How materials transport with in the plant? Show with the help of activity?**

**Q. Explain how roots absorb water from the soil?**

**Q. Name the process by which the water enters in to Roots.**

**Q. How xylem elements carry water to tissues of plant.**

**Q. Explain how root pressure causes the movement of water into the plant.**

## X State.Biology.Lesson-3.Study Material

- A. 1) Water is absorbed by roots and food prepared by leaves are supplied to the remaining parts of the plant by vascular bundles having xylem and phloem.  
 2) In root-xylem-is exterior.  
 In stem-bundles-centre.

### Observing root hairs:

Mustard seed: grown on wet filter paper-fine threads coming from the seeds are 'Roots'. They have microscopic structures called root hairs.

Squash the portion of root hair in between slide and coverslip to know how water enters into the root.

Observe through microscope.

Osmosis play an Important role in the entry of water in to the cell movement of water molecules from low to high concentration through semipermeable membrane.

Every living cell acts an osmotic system, the plasma membrane below the cell wall act as semi permeable membrane.

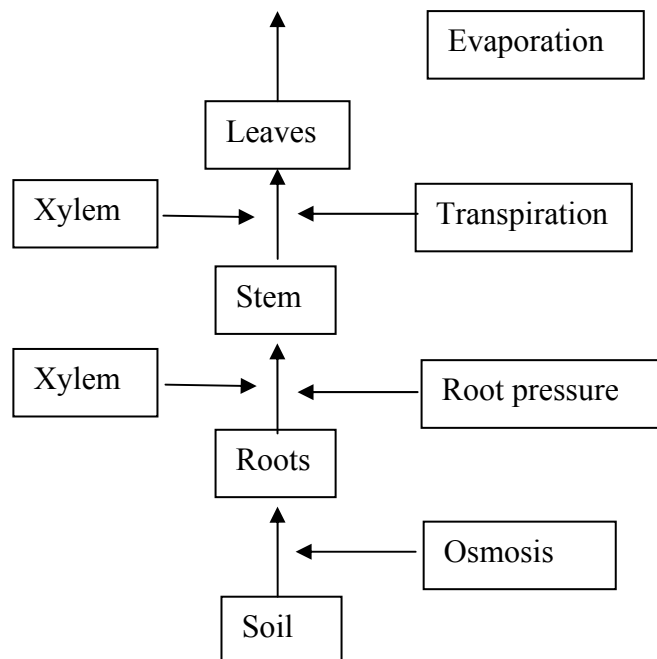
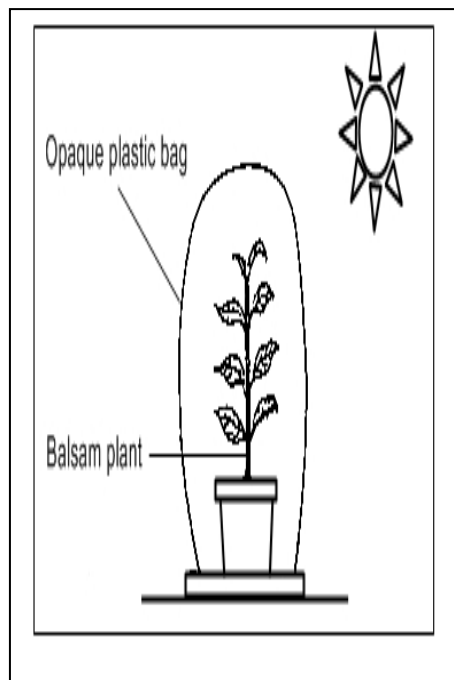
The soil water is an extremely dilute solution of salts. Water molecular concentration is low and dilute as a result water enters into vacuole of the root hair by osmosis.

Water entry in to the cell dilute the cell than its neighbouring cell and finally water enters into xylem vessels.

- I Root pressure is developed in xylem vessels.

This is the mechanism by which water travels through the plant.

8. Prepare a block diagram showing from water absorption by roots to transpiration by leaf.



## **X State.Biology.Lesson-3.Study Material**

### **8. How can you compare with the transportation in blood vessels of Man with Tree?**

- A.**
- 1) Transportation of blood vessels can be compared with the transportation of water and food by xylem and phloem in the plants.
  - 2) Heart pumps oxygenated blood into the large artery systemic aorta. This artery divides into arteries and arterioles and distributes oxygenated blood to all the body parts and ends with capillaries.
  - 3) Veins start with capillaries. These form into venules, these join to form into veins. All these veins join to form superior and inferior venacava. These large veins collect deoxygenated blood from body parts and brings to the heart.
  - 4) Heart pumps deoxygenated blood to lungs by pulmonary artery. For oxygenation and this oxygenated blood is sent to heart by pulmonary veins to heart. The circulation repeats.
  - 5) This transportation is compared to transportation in plants. Root hairs absorb water and mineral salts from soil by osmosis. This water enters into xylem and transport to the stem and leaves by root pressure.
  - 6) From leaves excess water is sent outside through stomata by transpiration as water vapour. This water vapour cools down and forms as rain. This is absorbed by roots and the cycle continues.

### **9. How do you feel about transportation of water in huge trees?**

- 1) Water is absorbed by root hairs and there is a push from below due to root pressure on the column of water in the xylem vessels.
- 2) Root pressure can push water upwards by not more than a few meters. This is enough to supply water from roots to leaves in small herbaceous plants.
- 3) However there are huge trees, as tall as 120 m high. In such trees, water has to be pushed several meters upwards against earth's gravitational pull.
- 4) Water is absorbed by osmosis from the soil by the root hairs and is passed into the xylem vessels which form a continuous system of tubes through root and stem into the leaves.
- 5) 2% of water is utilized by the plant and the excess 98% of water evaporates and passes into the atmosphere through stomata in the leaves.
- 6) The evaporation creates the main pull from above root pressure which gives a variable and minor push from below. The result is continuous column of moving water, the transpiration stream is maintained in the huge trees.

### **Q. How is water reached up to 200 m in case of eucalyptus tree?**

### **Q. Explain the mechanism of transpirational pull.**

### **Q. How xylem helps in conduction of water from root to shoot.**

### **How does the water reach 180 mts high to the top of a tree a like a eucalyptus?**

- A. Transpiration:-** It is the loss of water from aerial parts of the plant body. When leaves transpire there is a pulling effect on the continuous columns of water in the xylem vessels. Water is continuously till the mesophyll cells from there it evaporates. The water column doesn't break due to its continuous molecular attraction.



## X State.Biology.Lesson-3.Study Material

**Q. How the water enters in the mesophyll Cells from Roots?**

**Q. Trace out the path way of water from Roots to stomata.**

A. Water enters into cell by osmosis.

Water → Root hairs → Epidermis → Cortex cells → Continuous column of xylem → Mesophyll → stomata.

The evaporation creates the main pull of water above root pressure which gives a variable and minor push from bellow.

This results in a continuous coloumn of moving water.

**Q. Is there any relation between transpiration and rainfall?**

A. Yes, in forest Areas, Oak tree nearly transpires 900 litres of water per day.

**4. What will happen if cell sap of root hair cells contains high concentration of ions?**

A. 1) The cell membrane of root hair is a semipermeable membrane. It allows the movement of molecules from low concentration to high concentration.

2) The root hair cells contain high concentration of ions and the salt contraction in the water from soil is less concentration.

3) As the result, water flows from the soil into the cell sap of root hairs.

**6. How can you prove that the water is transported through the xylem?**

A. An experiment is carried out to show that xylem is responsible for the transportation of water in plant.

A plant which soil on roots has been removed is used in the experiment. The roots of the plant are bathed in a stained solution, after three hours, thin cross sections on stem, roots and leaves are cut and the sections are examined under microscope. Red stain substances are found in where xylem is located.

**2. Write differences between Xylem-Phloem.**

A.

Xylem	Phloem
1) It is a complex tissue transport water and minerals.	1) It is a complex tissue transport food and nutrients.
2) Movement occurs from roots to aerial parts.	2) Movement occurs from leaves to storage organs and growing parts of a plant.
3) In xylem transport is unidirectional	3) In phloem transport is Bi-directional
4) Xylem is made up of tracheids, vessels, xylem parenchyma and sclerenchyma.	4) Phloem is made up of sieve tubes, companion cells, phloem parenchyma, phloem fibers and intermediary cells.
5) dead tissue at maturity	5) Living tissue with cytoplasm but no nucleus/tono plast.
6) Provides mechanical support in addition to transportation.	6) Forms vascular bundles with xylem allowing longitudinal flow of food material.
7) The type of movement of water in xylem from root to schoot is called 'Ascent of sap'	7) The movement of substances in phloem to various parts of plant is called 'Translocation'.
8) Xylem occupy the center of the vascular bundle.	8) Phloem occur on outer side of the vascular bundle.

## X State.Biology.Lesson-3.Study Material

**Q** Write an activity to show root pressure.

**A** Select a regularly watered potted plant and cut the stem portion 1 cm above the ground surface.

Connect a glass tube by means of rubber tubing to prevent loss of water.

Pour water in the glass tube and mark it as 'Level  $M_1$ ' and keep the apparatus aside for 2-3 hours.

The water level rises in the glass tube. Mark it as  $M_2$ .

**Q.** Calculate how much amount of water has been increased in the glass tube  $M_2-M_1$ .

**Q** By which process the minerals are carried in to the roots?

**Q** Which vessels transport the minerals into plant?

**Q** How minerals are transported through xylem?

**A** Salts are in the form of electrically charged ions.

NaCl in the form of  $Na^+$  &  $Cl^-$ ,  $MgSO_4$  in the form of  $Mg^{2+}$  &  $SO_4^{2-}$  they require energy (Active transport) to get transported in to root (Xylem)

From xylem it is even transported into phloem, where the minerals are in need of.

Transport of manufactured food:

**Q.** Show an experiment to prove that food is transported through phloem elements.

**Q** How can you say that aphids feed on plant juices?

**Q** Why proboscis of aphid has moved until the phloem elements.

**Q** Why aphids feed on plants? What do they get from plants?

**Q** What is honey dew? What does it contain?

**A** Sugar (food) transported through phloem sieve tubes.

The veins of a leaf consist of xylem and phloem.

Biologist studied about the food transportation in plants with the help of aphids (Green fly)

Aphids are the small insects which feed on young sapling for obtaining plant juices.

Aphids use 'Proboscis' (Mouth part) with its sharp like needle to suck the plant juices.

Biologist killed the feeding aphid and have sectioned (cut) the stem, they found aphids proboscis pierced till the phloem elements.

**Q.** What do plant juices contain?

Biologist killed a feeding aphid leaving the hollow proboscis and applied slight pressure on it as a result some fluid came out and tested the fluid, it contained sugars and amino acids.

Aphid take up much plant juice, but it does not assimilate the complete plant juice, as a result extra plant juice is excreted out which is called 'Honey dew' sticky substance formed out.

**Q.** How do you prove that phloem transport the food material?

**Q.** What happens if phloem is removed from the plants stem?

**Q.** How do you prove that proboscis of an aphid moved till phloem region.

**Q.** Voles, grey squirrels also damage the bark of a tree-comment on.

**A.** Removing a ring of bark from the tree (Removing all the tissues from centre to outward. Including the phloem. After some days there is an increase in the thickness of the stem above the ring.

## X State.Biology.Lesson-3.Study Material

This is due to removed of phloem, and as a result the food doesn't get transported to region below the bark.

forester introduce predators like owls, hawks, badges and faces in to the areas where the population of voles and rabbits are more. As these predators decreases the ratio of voles and Rabbits.Grey squirrel also damage the casurina crop which are present at seashore and beaches.

### I. Choose the correct Answers:

- The term cardiac refers to which organ in the body? [     ]  
A) heart                      B) vein                      C) lymph                      D) capillary
- Blood in which side of the human heart is low in oxygen? [     ]  
A)left ventricle              B) right ventricle              C) left atrium              D) right atrium
- Which structures of the heart control the flow of the blood? [     ]  
A) arteries                      B) veins                      C) valves                      D) capillaries
- Which of the following opinions is correct? [     ]  
A) Ravi said xylem and phloem cells arranged in phloem.  
B) John said xylem and phloem are not separate tube like structures.  
C)John said xylem and cells connect together to form tube like structure.  
D) Hari said because of its shape they said to be tube like structure.
- An aphid pierces its proboscis into the \_\_\_\_\_to get plant juices.[     ]  
A) xylem                      B) phloem                      C) cambium                      D) vascular bundle
- Pericardium is associated with [     ]  
A) lungs                      B) kidney                      C) heart                      D) brain
- Pulmonary aorta starts from [     ]  
A) Righty auricle              B) Left ventricle              C) Left auricle              D) Right ventricle
- Shape of the heart [     ]  
A) rectangular              B) oval                      C) pear                      D) square
- Aorta originates from [     ]  
A) right ventricle              B) right auricle              C) Left Ventricle              D) left auricle
- Normal blood pressure of human beings [     ]  
A) 80/120                      B) 100/120                      C)120/80                      D) 120/50

## X State.Biology.Lesson-3.Study Material

11. Largest artery [     ]  
A) Coronary artery    B) Pulmonary artery    C) Aorta                    D) None
12. Largest vein [     ]  
A) Pulmonary vein    B) Venacava                C) Coronary vein        D) None
13. Pulmonary vein contains [     ]  
A) Oxygenated blood    B) deoxygenated blood    C) mixed blood        D) none
14. Pulmonary vein opens into [     ]  
A) right auricle        B) left auricle            C) right ventricle        D) left ventricle
15. Valves of heart allow blood to flow in [     ]  
A) one direction        B) both directions        C) many directions      D) none
16. Deoxygenated blood from the heart is taken to [     ]  
A) kidneys              B) lungs                    C) neck                    D) stomach
17. Water transport system in plants is [     ]  
A) xylem                B) phloem                C) leaf                    D) flower
18. Roots absorb water and salts into xylem by [     ]  
A) diffusion            B) osmosis                C) both                    D) none
19. Transpiration in plants takes place through [     ]  
A) stem                 B) root                    C) stomata                D) all the above
20. The concentration of cell sap in root hair is [     ]  
A) more                 B) less                    C) medium                D) none

### II. Fill in the blanks:

1. The \_\_\_\_\_ in above cells and the \_\_\_\_\_ in below cells causes to continuous column of moving water.
2. If we remove all tissues from the cambium outwards \_\_\_\_\_ will not occur.
3. The fluid found in phloem contains \_\_\_\_\_ and \_\_\_\_\_
4. Biologists studied about food transportation in plants with the help of \_\_\_\_\_
5. Upward movement of water to the leaves in herbs is helped by \_\_\_\_\_
6. Transpiration occurs through \_\_\_\_\_
7. There is a vast \_\_\_\_\_ to continuous supply of essential supply of nutrients

### X State.Biology.Lesson-3.Study Material

- and water in plants.
8. \_\_\_\_\_ have xylem and phloem.
  9. Every living cell act as an \_\_\_\_\_ system.
  10. The cytoplasm lining of cellwall in roots act as the \_\_\_\_\_
  11. The rate of heart beat in new born child is \_\_\_\_\_
  12. Heart is protected on all sides by \_\_\_\_\_
  13. Heart is covered by two layers of membranes called \_\_\_\_\_
  14. The heart is divided into four parts by \_\_\_\_\_
  15. The largest artery is the \_\_\_\_\_
  16. \_\_\_\_\_ supplies blood to the walls of heart.
  17. \_\_\_\_\_ carries blood from heart to the lungs.
  18. The two atria and the two ventricles are separated by \_\_\_\_\_
  19. The openings between atria and ventricles are guarded by \_\_\_\_\_
  20. \_\_\_\_\_-allow blood to move in one direction.
  21. Blood circulation was studied by \_\_\_\_\_.
  22. The heart pushes blood into the \_\_\_\_\_ and the blood returns by the way of the \_\_\_\_\_
  23. Marcello Malpighi studied the wings of \_\_\_\_\_
  24. \_\_\_\_\_ discovered capillaries.
  25. Arteries and veins are connected by \_\_\_\_\_
  24. \_\_\_\_\_ discovered capillaries.
  25. Arteries and veins are connected by \_\_\_\_\_
  26. The human heart starts beating around \_\_\_\_\_ day during the embryonic development.
  27. One contraction and one relaxation of atria and ventricles is called \_\_\_\_\_
  28. The time needed for atrial contraction is \_\_\_\_\_
  29. The time needed for ventricular contraction is \_\_\_\_\_
  30. An active phase of cardiac cycle is called \_\_\_\_\_
  31. The movement in the protoplasm of amoeba is called \_\_\_\_\_ movement.
  32. Hydra and jelly fish have developed blind sac like cavity called \_\_\_\_\_
  33. In Latin lymph means \_\_\_\_\_
  34. In elders the swollen legs is due to \_\_\_\_\_

## X State.Biology.Lesson-3.Study Material

35. The \_\_\_\_\_ can squeeze out of the capillary wall.
36. If the blood flows through the heart twice for completing one circulation is called \_\_\_\_\_
37. Doctors measure the blood pressure with a device called \_\_\_\_\_
38. The genetic disorder in which blood may not coagulate is called \_\_\_\_\_
39. In man, caval veins open into \_\_\_\_\_
40. In some people due to \_\_\_\_\_ deficiency blood clots more time.

### III. Match the following:

#### I.

##### Group-A

- |                     |   |   |
|---------------------|---|---|
| 1. Amoeba           | [ | ] |
| 2. Hydra            | [ | ] |
| 3. Platyhelminthes  | [ | ] |
| 4. Nematyhelminthes | [ | ] |
| 5. Arthropoda       | [ | ] |
| 6) Anelida          | [ | ] |
|                     | [ | ] |

##### Group-B

- A) Digestive and excretory systems
- B) Open type of circulation
- C) Brownian movement
- D) Pulsatile organ
- E) Gastro vascular cavity
- F) Pseudo coelom
- G) Closed type of circulation

#### II.

##### Group-A

- |                     |   |   |
|---------------------|---|---|
| 1. Tricuspid valve  | [ | ] |
| 2. Bicuspid valve   | [ | ] |
| 3. Venacava         | [ | ] |
| 4. Aorta            | [ | ] |
| 5. Platelets        | [ | ] |
| 6. Oxygenated blood | [ | ] |
| 7. Blood            | [ | ] |

##### Group-B

- A) Deoxygenated blood
- B) Right atrioventricular aperture
- C) Oxygenated blood
- D) Thrombokinase
- E) Left atrioventricular aperture
- F) Plasma
- G) Pulmonary vein

#### III.

##### Group-A

- |                         |   |   |
|-------------------------|---|---|
| 1. Food transporation   | [ | ] |
| 2. Water transportation | [ | ] |
| 3. Absorption           | [ | ] |
| 4. Transpiration        | [ | ] |
| 5. Vascular bundle      | [ | ] |
|                         | [ | ] |
|                         | [ | ] |

##### Group-B

- A) Evaporation of water
- B) Pholem
- C) Xylem and phloem
- D) Plnty nutrients
- E) Root hairs
- F) Xylem
- G) Epidermis