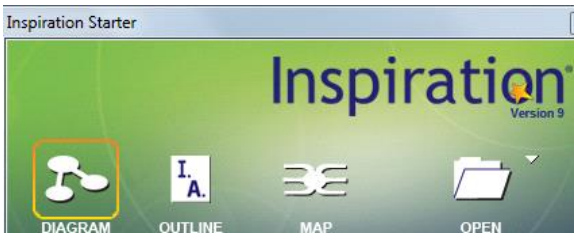
Circulatory System

Read the text below and complete the task that follows.

The body's main internal transport system is the **circulatory system**. It is the link between the cells inside the body, which have certain requirements, and the environment outside the body, which supplies those requirements. Special organs are needed to extract requirements from the environment. The digestive system absorbs nutrients and the respiratory system absorbs oxygen. Other organs are specialised to pass waste from the body to the environment. The respiratory system excretes carbon dioxide and the kidneys excrete other wastes. The blood is the transport link between the cells of all the body systems. It is also very important in maintaining the internal environment of the body at a constant level. Some of the more important functions of the blood are:

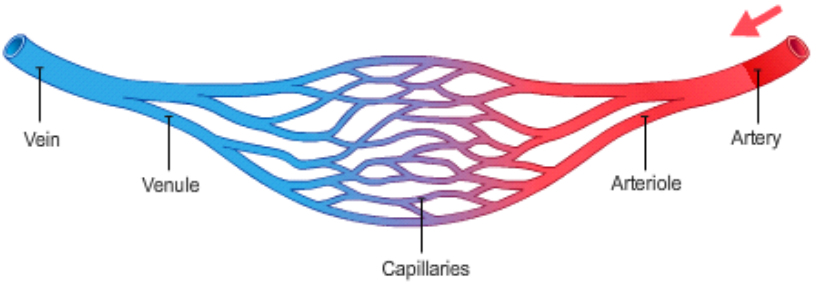
- transport of oxygen and nutrients to all cells of the body
- transport of carbon dioxide and other waste products away from the cells
- transport of chemical messengers, called hormones, to the cells
- maintaining the pH of body fluids
- distributing heat and maintaining body temperature
- maintaining water content and ion concentration of the body fluids
- protection against disease-causing micro-organisms.

Information can also be conveyed using diagrams. Construct a diagram in inspiration that coveys the functions of the circulatory system. Screen clip the diagram onto the one note page.



Study the diagrams and text below showing the differences between arteries, veins and capillaries and complete the table below.

Blood vessels



There are three types of blood vessel:

Arteries

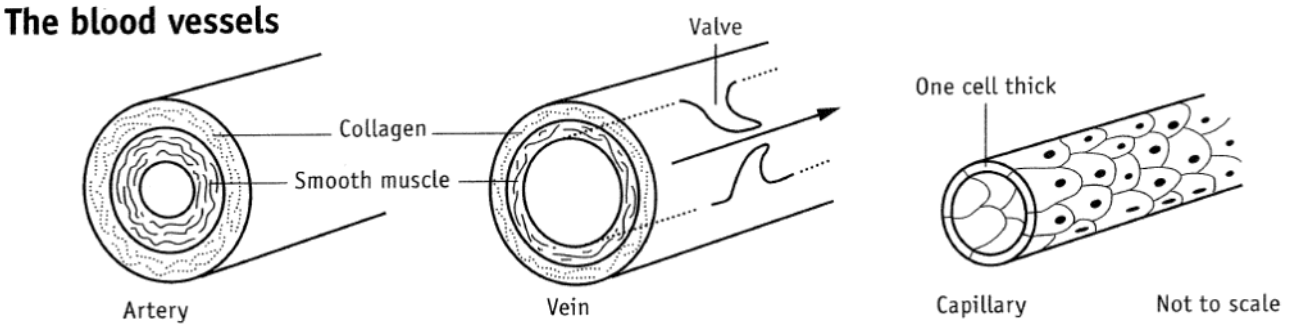
- Carry blood away from the heart (always oxygenated apart from the pulmonary artery which goes to the lungs)
- Have thick muscular walls
- Have small passageways for blood (internal **lumen**)
- Contain blood under high pressure

Veins

- Carry blood to the heart (always de-oxygenated apart from the pulmonary vein which goes from the lungs to the heart)
- Have thin walls
- Have larger internal *lumen*
- Contain blood under low pressure
- Have valves to prevent blood flowing backwards

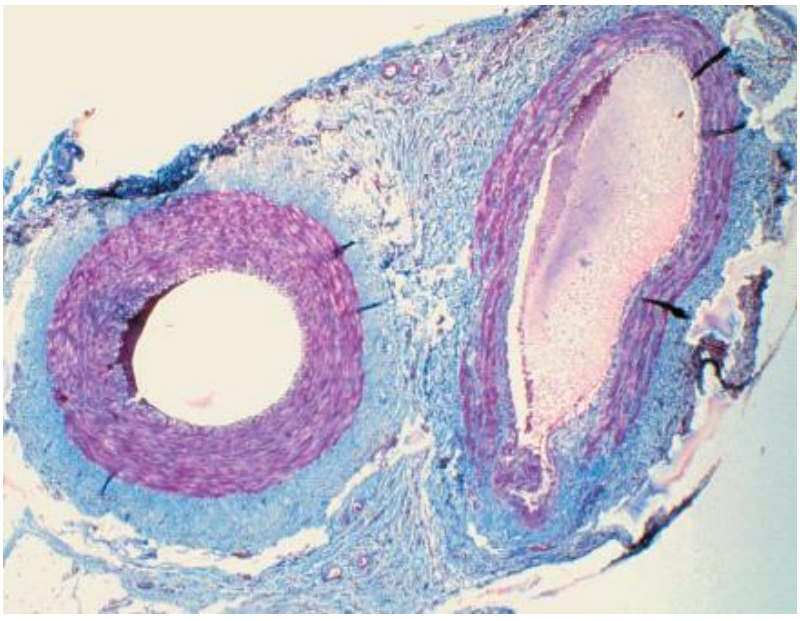
Capillaries

- Found in the muscles and lungs
- Microscopic – one cell thick
- Very low blood pressure
- Where **gas exchange** takes place. Oxygen passes through the capillary wall and into the tissues, carbon dioxide passes from the tissues into the blood



Blood Vessel	Direction of blood flow	Valves Present	Muscular walls, thick or thin	Function	Blood Pressure	Oxygenated blood or deoxygenated blood	Size of lumen
Artery							
Vein							
capillary							

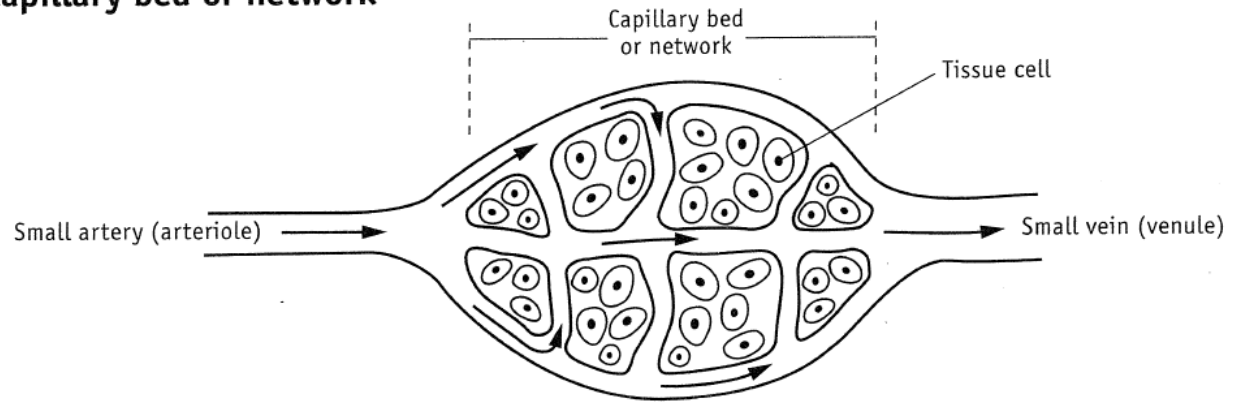
On the microscope picture below label the artery and the vein.



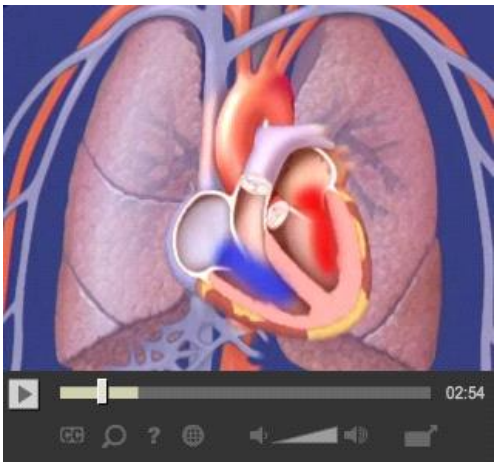
Colour the capillary bed network using the instructions below

- The arteriole carries oxygenated blood to the body tissues say in your big toe. Colour the arteriole red.
- The venule carries deoxygenated blood away from the body tissues. Colour the venule blue.
- The body cells exchange materials with the blood at the capillary bed network. Colour the tissue cells yellow. Oxygen and glucose move into the tissue cells from the capillary. Carbon dioxide and wastes move out of the cell into the capillar**y.**

A capillary bed or network

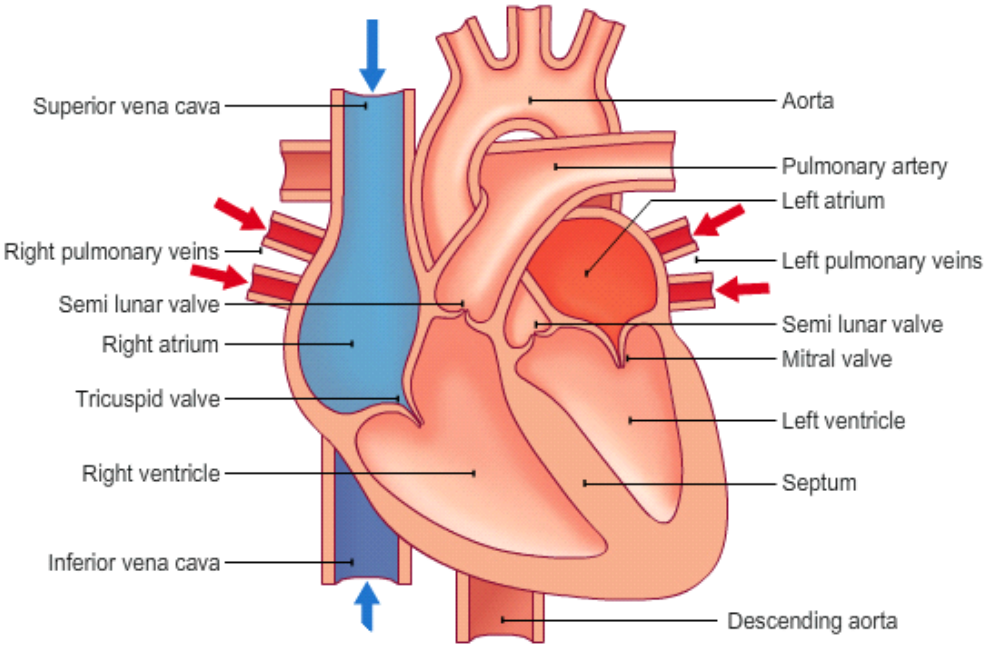


Watch the video showing how the heart pumps blood through the body.



Teachers' Domain: From the Heart
http://www.teachersdomain.org/asset/tdc02_vid_circulator/
Screen clipping taken: 26/07/2012 12:46 PM

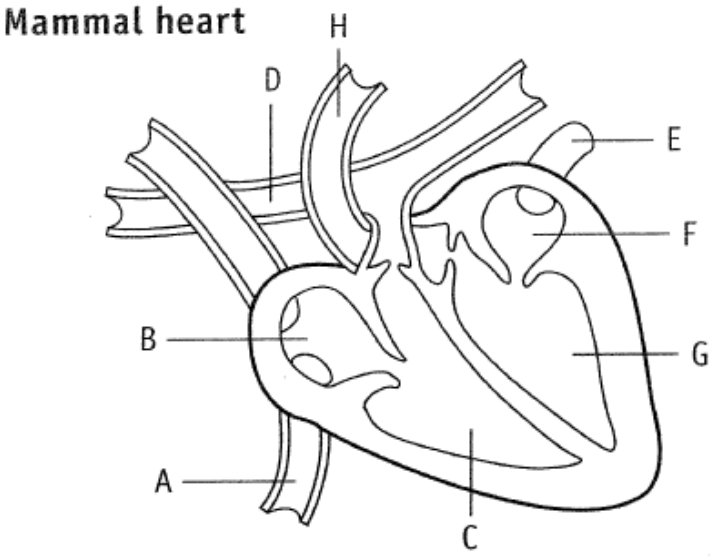
Read the text below about the heart and answer the questions that follow.



- The heart is seen from the front in the diagram. So the **right** side of the heart is shown on the **left** of the diagram. The **left** side is on the **right** side of the diagram.
- The heart is a muscular pump. When it beats it pumps blood to the lungs and around the body. These increase when exercising.
- The heart has four chambers. The two **atria** at the top of the heart and two ventricles at the bottom.
- The vena cava veins fill the right atria with deoxygenated blood from the body cells.
- The pulmonary vein fills the left atria with oxygenated blood from the lungs.
- The two **ventricles** pump the blood out of the heart.
- The right ventricle pumps deoxygenated blood to the lungs in the pulmonary artery.

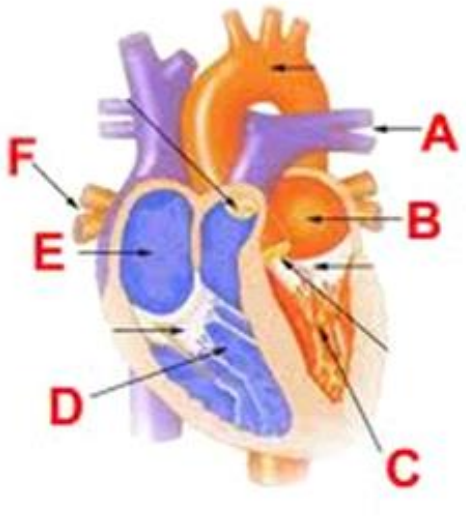
- The left ventricle pumps oxygenated blood around the body via the aorta.
- **Valves** prevent the blood from flowing backwards.
- The **septum** separates the two sides of the heart.
- The right side of the heart pumps **de-oxygenated** blood (blood not containing oxygen) to the lungs to pick up oxygen.
- The left side of the heart pumps the **oxygenated** blood from the lungs around the rest of the body.

Label the diagram of the heart.

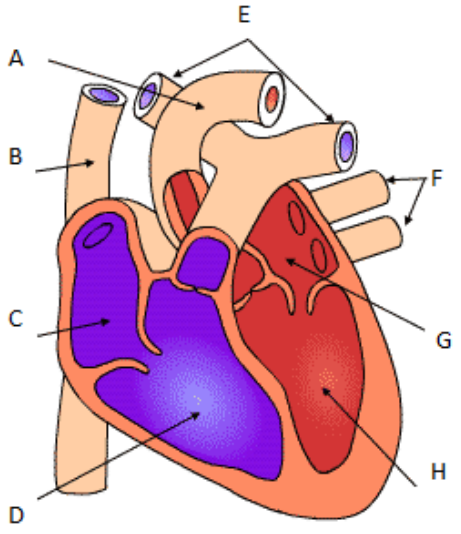


Letter	Name of structure	Function
A		
B		
C		
D		
E		
F		
G		
H		

Label the heart structures.

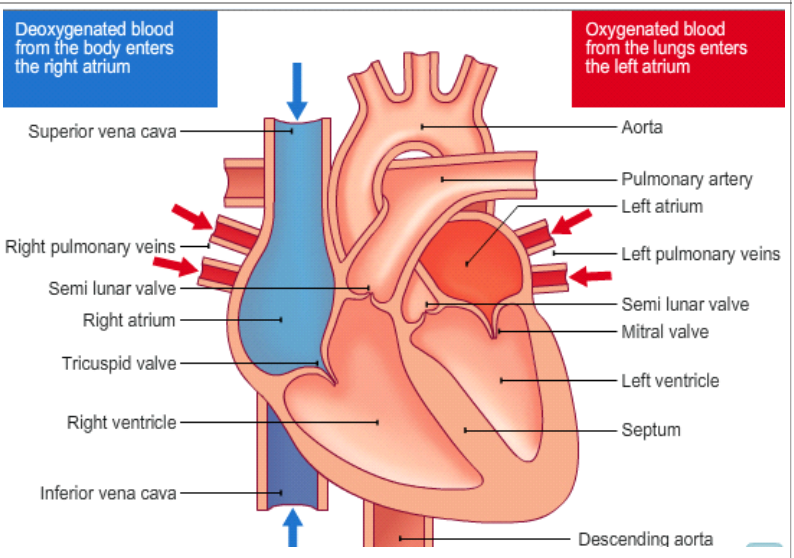
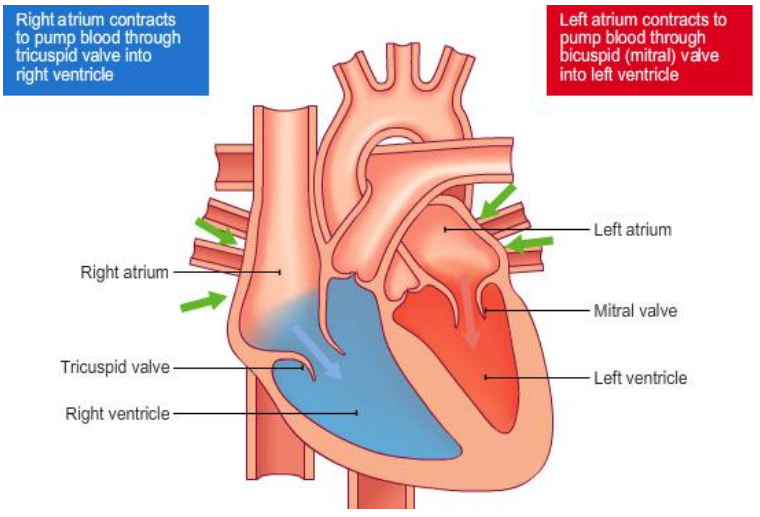
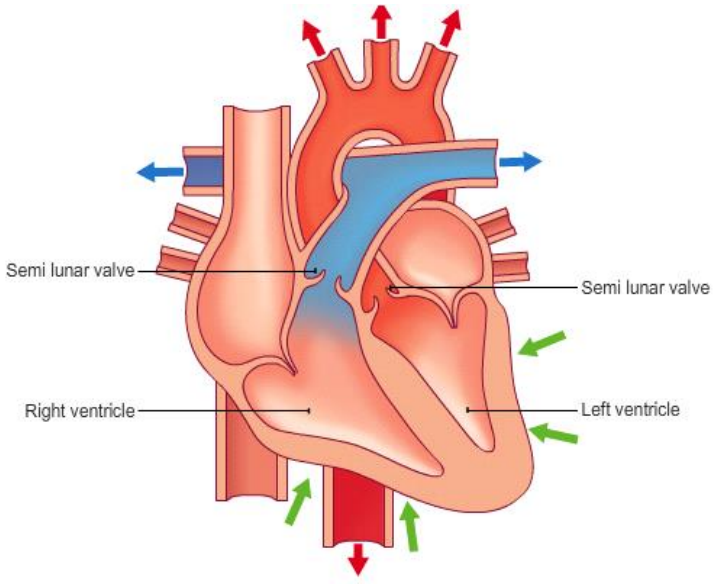


Letter	Name of structure
A	
B	
C	
D	
E	
F	



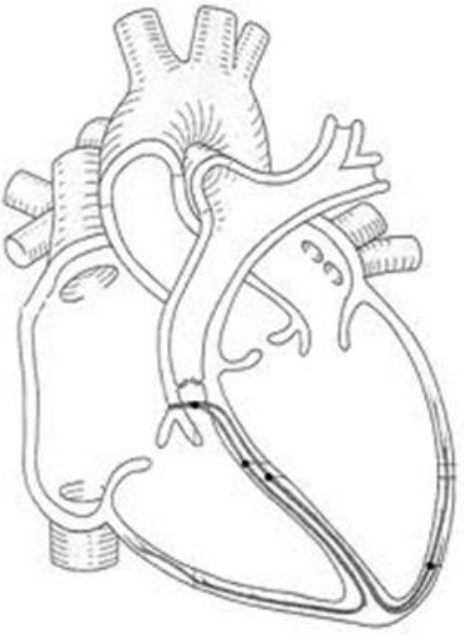
Letter	Name of structure
A	
B	
C	
D	
E	
F	
G	
H	

Study the three diagrams below showing the flow of blood through the heart then answer the question that follows.

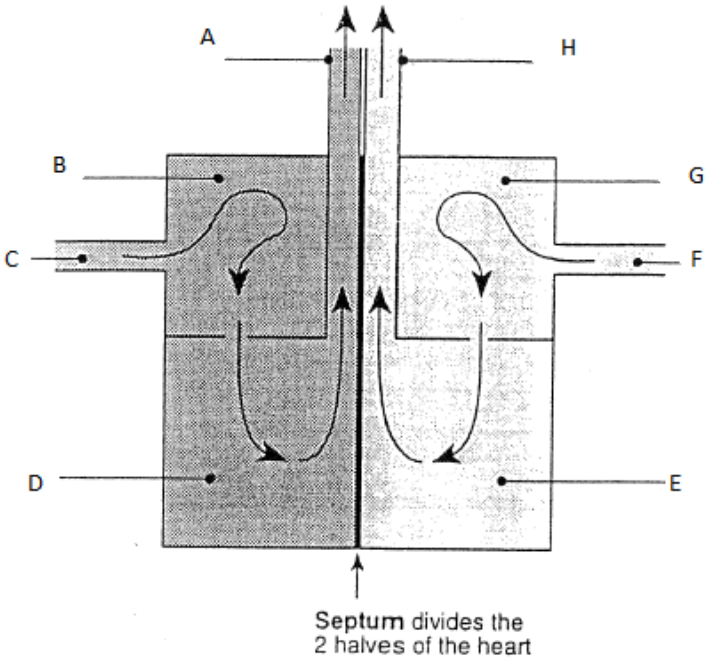
Stage	Image
1	
2	
3	

Question

On the diagram below draw in the flow of oxygenated (red pen) and deoxygenated (blue pen).



Study the diagram below showing a heart and the direction of blood flow through it and complete the questions below.



Questions

Letter	Name of structure	Letter	Name of structure
A		E	
B		F	
C		G	

D		H	

Chamber	Receives blood from	Pumps blood to
Right atrium		
Right ventricle		
Left atrium		
Left ventricle		

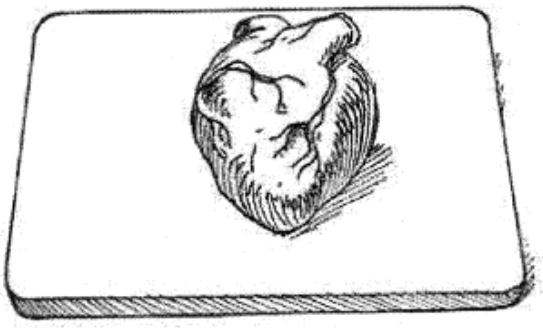
Watch the video below showing a heart dissection.

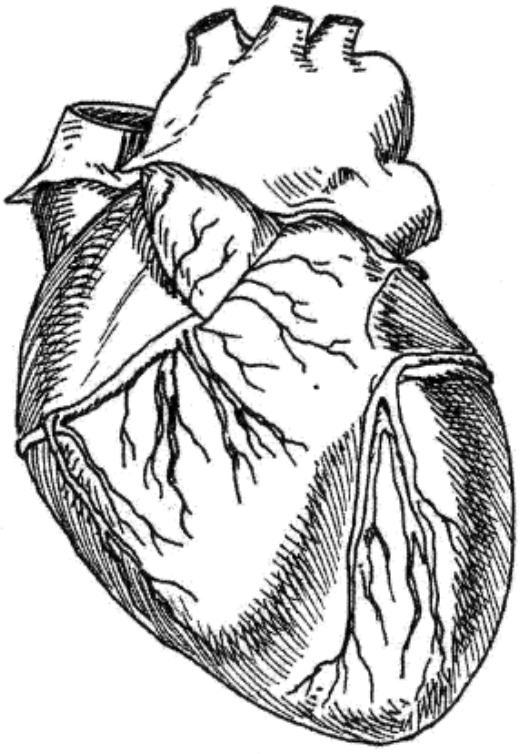
Sheep Heart Dissection - YouTube
http://www.youtube.com/watch?v=rI23fdFVRvY
Screen clipping taken: 26/07/2012 12:50 PM

Carryout the heart dissection practical.

YOU NEED
A heart
Dissecting board
Scissors or a scalpel
String 2 pieces, each 30 cm long,
Disposable gloves
Soap and water

1. Put the heart on the board.



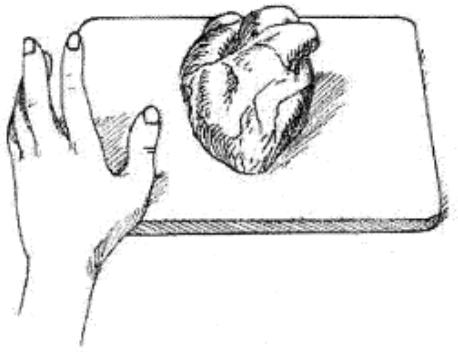


2. Look at the blood vessels on the surface of the heart. These are the coronary arteries and veins.

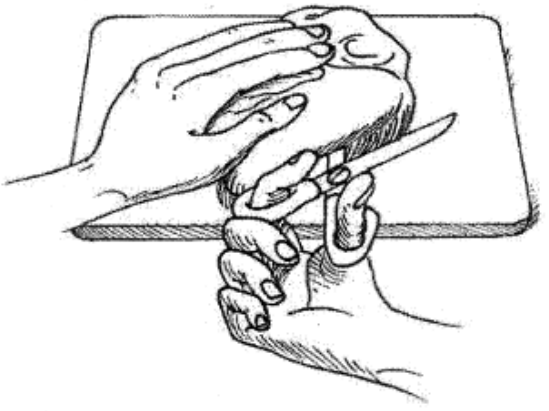
3. Feel the thinner right side and the thicker left side of the ventricle muscle.

4. Make sure that the thinner

right side is to your left.

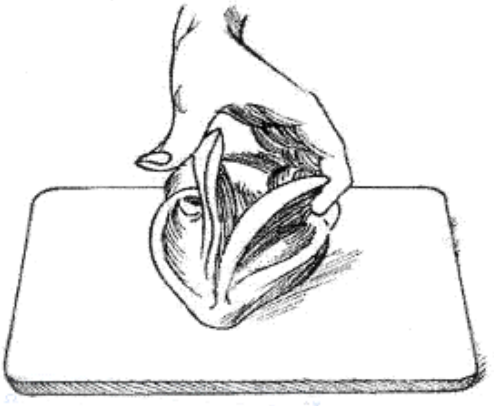


STOP!
Before you make any cuts check with the teacher to make sure you have the heart in the correct position.



5. Cut around the heart horizontally.

6. If you lift up the two upper sides of the heart you will see the muscle in the middle of the heart that separates the two parts.



a) Why is the left ventricle wall much thicker than the right?

e) Where do you think the heart strings are?

f) What is the heart made of?

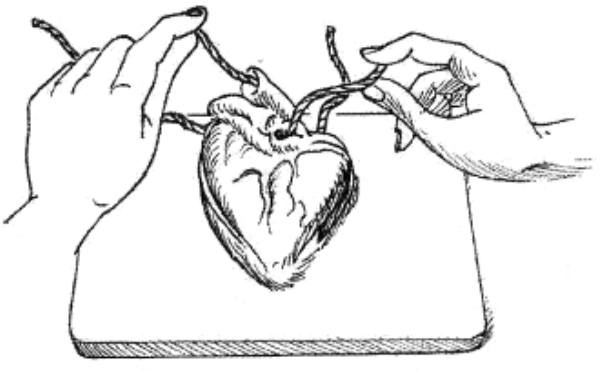
7. Notice there are two chambers on each side.

8. Find the two top chambers, or atria.
(Atria is the plural of atrium.)

9. Find the two lower chambers (ventricles).

10. Find the one-way valves (heart valves and valves at the opening of arteries) that stop blood flowing the wrong way through the heart.

11. Thread pieces of string through the blood vessels, chambers and valves to help you to see where the blood would enter and leave the heart.



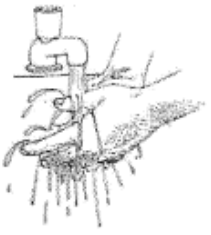
STOP!

Put your hand up.

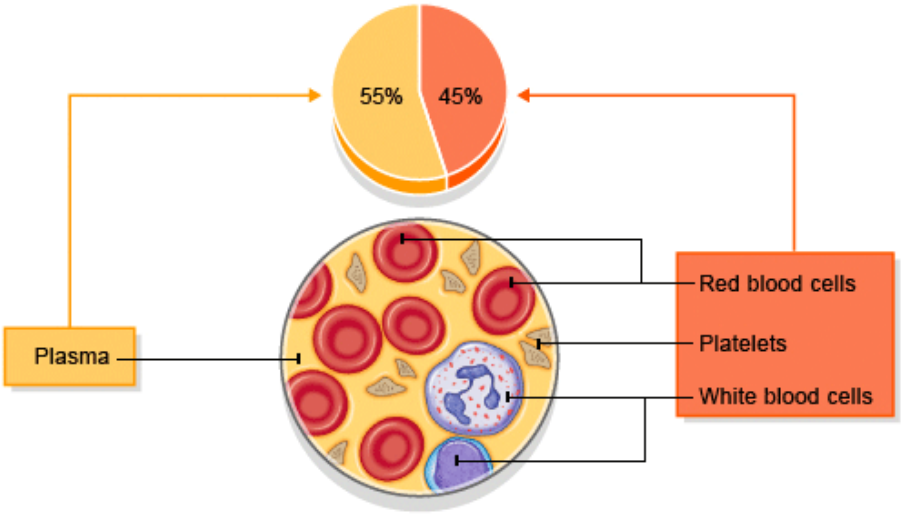
Explain to the teacher how the blood flows through the heart, when they are happy that you understand you can pack away.

Tidy up and wash your hands thoroughly.

- wash your hands thoroughly.



Read the text below about blood and answer the questions that follow.



Blood has four key components:

Plasma

- Fluid part of blood
- Carries carbon dioxide, hormones and waste

Red blood cells

- Contain haemoglobin which carries oxygen
- Made in the bone marrow. The more you train the more red blood cells are made.

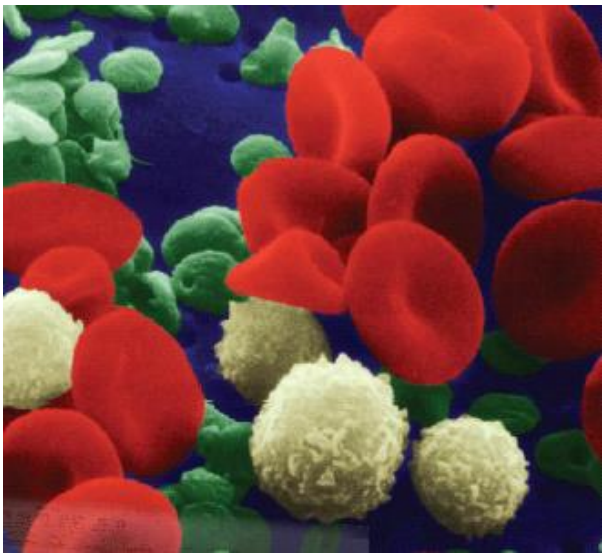
White blood cells

- An important part of the immune system, they produce antibodies and destroy harmful microorganisms
- Made in the bone marrow

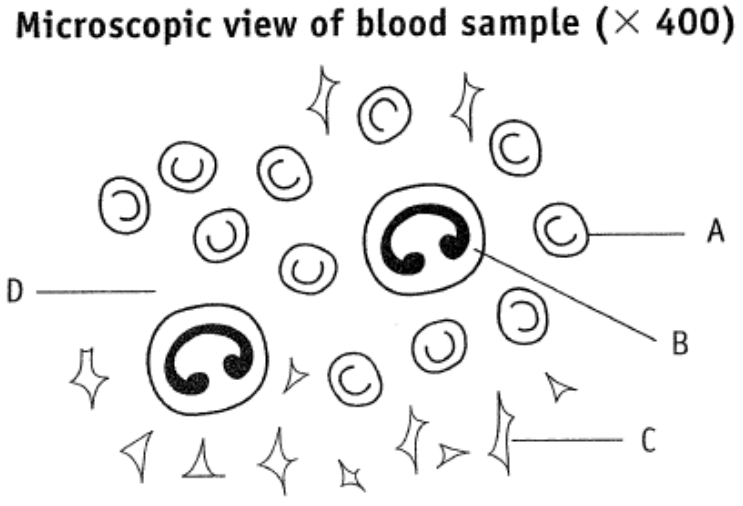
Platelets

- Clump together to form clots
- Protect the body by stopping bleeding

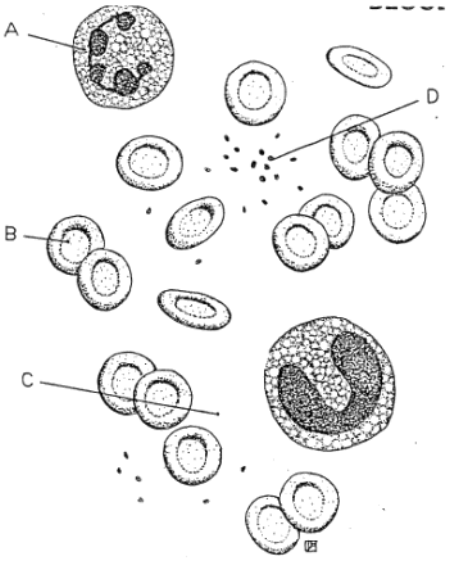
When exercising blood does the following things



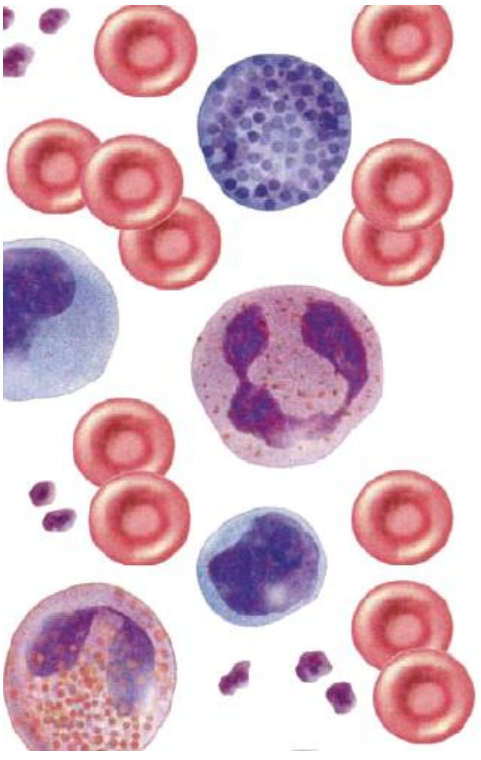
Label the diagrams of blood.



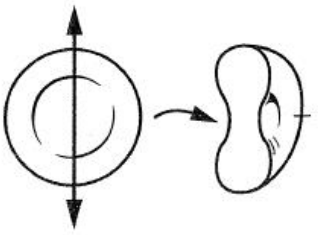
Letter	Name	Function
A		
B		
C		
D		



Letter	Name of structure	Letter	Name of structure
A		C	
B		D	



Red blood cells are highly specialized to carry oxygen. Research the special features a red blood cell that helps it carry out its function.



T.S. red blood cell

Carryout the following practical by observing blood cells with a microscope.

Procedure

PART A: Setting up the microscope

1. Place the microscope on a flat surface.
2. Check that your microscope has all its pieces attached—if there is anything missing, report this to your teacher.
3. Set up the microscope lamp in front of the microscope with the light shining onto the mirror. If your microscope has a built-in light source you will not need a lamp.
4. Adjust your mirror so that the light is reflected up into the body tube of the microscope.
5. Rotate the objective lenses until the low power lens (this is usually the shortest one with the lowest number on the side of it, eg 4X clicks into position directly above the hole in the stage.

PART B: Using the microscope

6. Place a prepared slide on the stage and ensure it is clipped in firmly.
7. While looking at the microscope from the side, use the coarse focus knob to carefully lower the objective lenses towards the slide.

Questions

1. Describe what you saw. Are there more red blood cells or white blood cells in blood?

1. Clip an image that shows the percentage composition of the different components of blood. Describe what the image tells you.