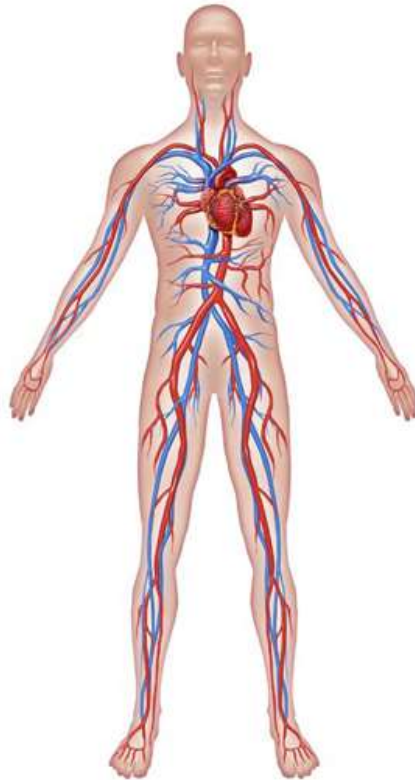




# National 5 Biology

## Unit 2 Multicellular organisms

### 2.6 Transport systems in Animals



Name \_\_\_\_\_

Class \_\_\_\_\_

Teacher \_\_\_\_\_

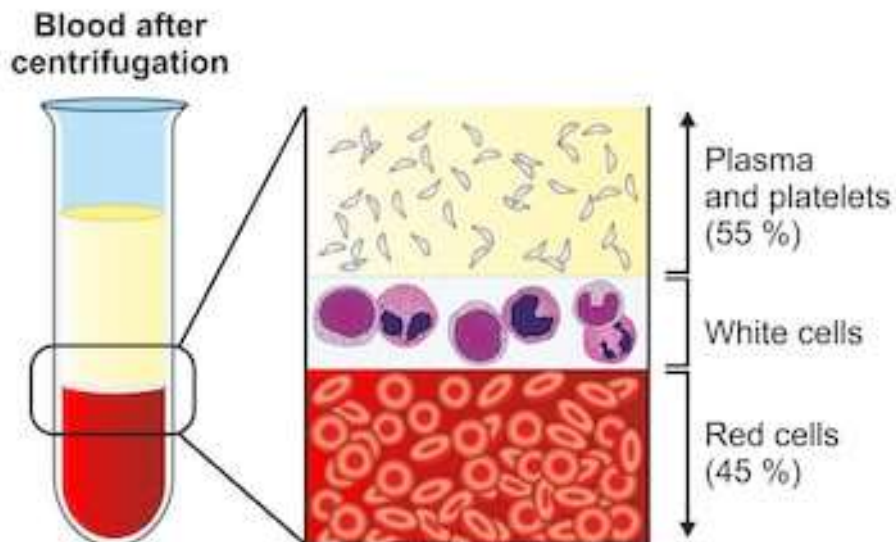
## Transport in Animals

Transport systems ensure that useful substances are delivered to the body cells and waste substances are removed. In this section we will look at the role of the circulatory system in the transport of these substances.

### **Learning intention**

To find out about the composition of blood.

In mammals the blood contains \_\_\_\_\_ (the liquid part of the blood), \_\_\_\_\_ blood cells and \_\_\_\_\_ blood cells. Nutrients, \_\_\_\_\_ and carbon dioxide are transported in the blood.

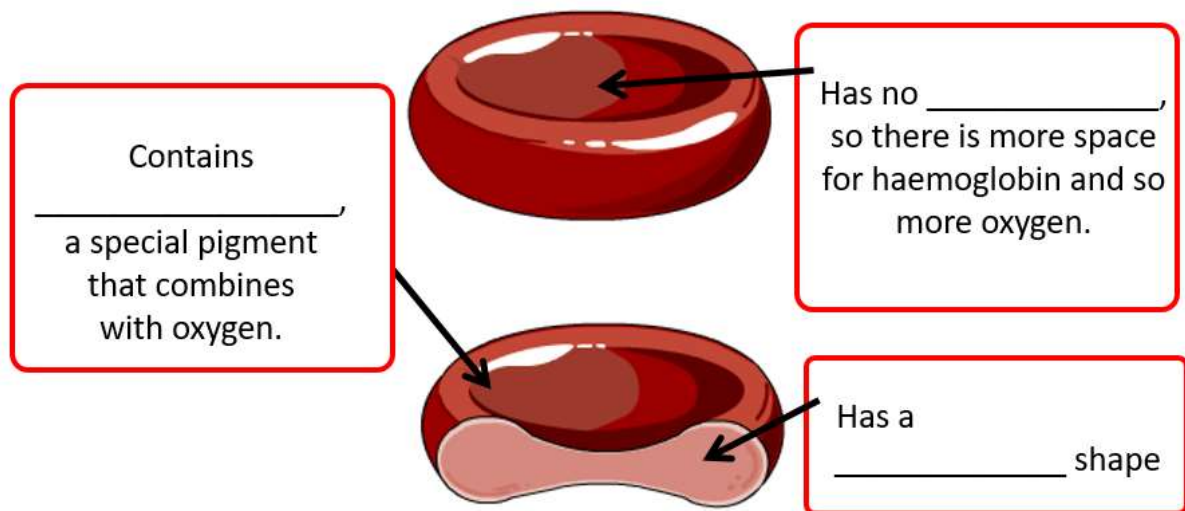


## Learning intention

To find out about the structure and function of red blood cells.

## Red blood cells

Red blood cells are specialised, with several structural features that allow for the efficient transport of \_\_\_\_\_. The specialised features are shown in the diagram below:

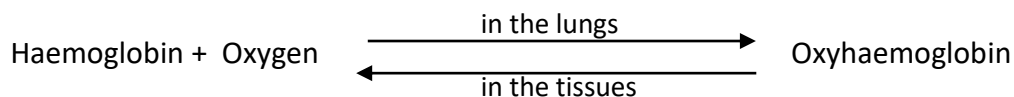


## Haemoglobin



Red blood cells contain a pigment called haemoglobin. Haemoglobin binds to \_\_\_\_\_ in the lungs to form oxyhaemoglobin. In the tissues where oxygen concentration is \_\_\_\_\_ oxyhaemoglobin releases oxygen which diffuses into cells.

These structural features of red blood cells allow for the efficient transport oxygen in the form of oxyhaemoglobin.

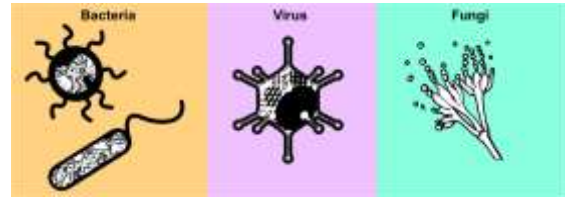


## Learning intention

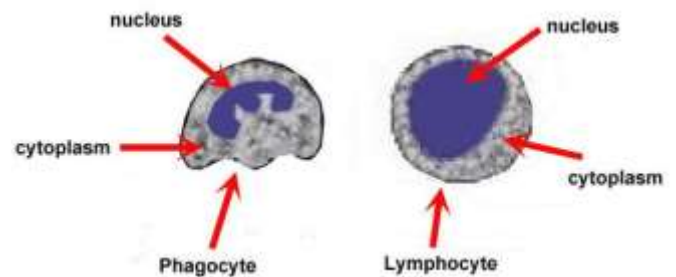
To find out about the function of white blood cells.

### White blood cells

White blood cells are part of the immune system and are involved in destroying \_\_\_\_\_. These are disease-causing micro-organisms (\_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_)

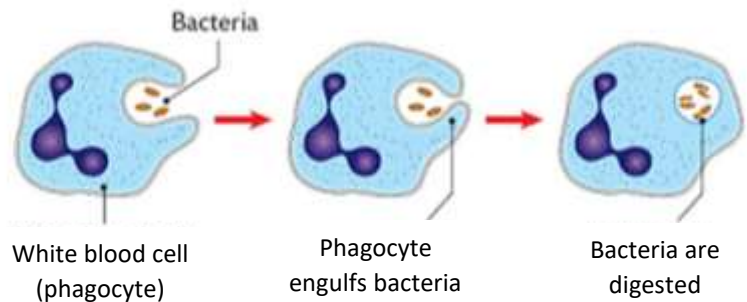


There are two main types of white blood cell involved in the destruction of pathogens: \_\_\_\_\_ and \_\_\_\_\_.



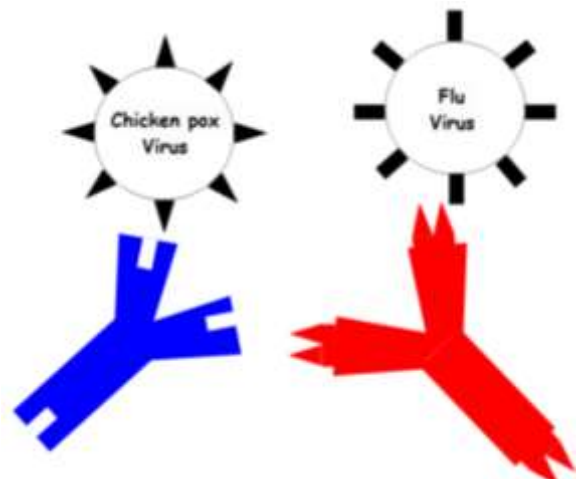
**Phagocytes** carry out a process called \_\_\_\_\_.

Phagocytosis involves the phagocyte \_\_\_\_\_ and destroying pathogens. The pathogen (e.g. bacteria) is surrounded and engulfed by the phagocyte. Once trapped inside the phagocyte the pathogen is then \_\_\_\_\_.



Lymphocytes are also involved in the destruction of pathogens. Some **lymphocytes** produce \_\_\_\_\_ which destroy pathogens.

Each antibody is specific to a particular pathogen.



## Learning intention

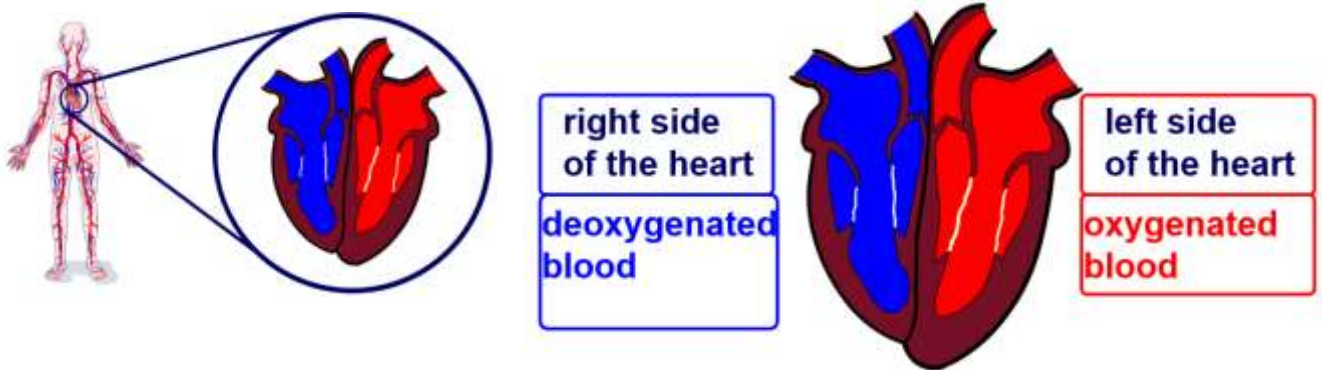
To find out about the structure of the heart and its associated blood vessels.

### Circulation and the Heart

The circulatory system consists of the heart, blood vessels and contains the blood. Oxygen, carbon dioxide, nutrients such as glucose, wastes and other substances are transported in the blood which circulates around the body.



The human heart is found in the \_\_\_\_\_ of the chest and is divided into two sections, separating the two types of blood that pass through it- oxygenated (blood that is rich in oxygen) and deoxygenated blood (blood that has a low level of oxygen).



Hint: When you see diagrams of the heart on paper remember that the heart is always labelled as if it is in a body **facing you**, so the right side of the heart is on the left of the diagram.

During one complete circuit of the body, blood passes through the heart **twice** and so the circulatory system involves a **double circulation**.

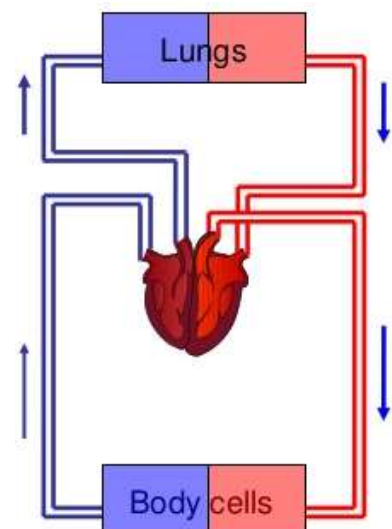
The **right hand side** of the heart pumps **deoxygenated** blood to the **lungs**.

The **left hand side** of the heart pumps **oxygenated** blood to the **body cells**.



The human heart is a simple but very efficient \_\_\_\_\_ beating over 100,000 times a day. It has \_\_\_\_\_ chambers,

four valves and various blood vessels transport blood into and out of the heart.

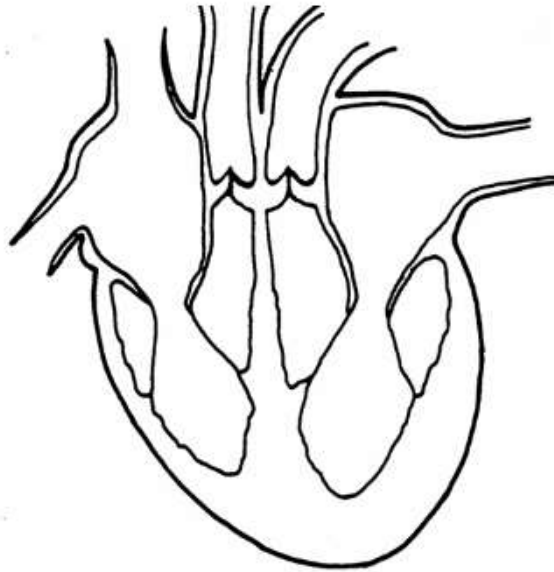


## The Structure of the Heart



Label your diagram to include: Left and right atria (singular- atrium), left and right ventricles, aorta, vena cava, pulmonary artery and pulmonary vein.

You can add colour to show the heart muscle, oxygenated and deoxygenated blood.



The wall of the left ventricle of the heart is thicker than the wall of the right ventricle because \_\_\_\_\_



Starting with the right atrium, complete the flowchart below to show the pathway of blood through the heart lungs and body.

Right atrium → \_\_\_\_\_ → \_\_\_\_\_ → Lungs →  
\_\_\_\_\_ → \_\_\_\_\_ → left ventricle → \_\_\_\_\_ →  
body → \_\_\_\_\_ → Right atrium.

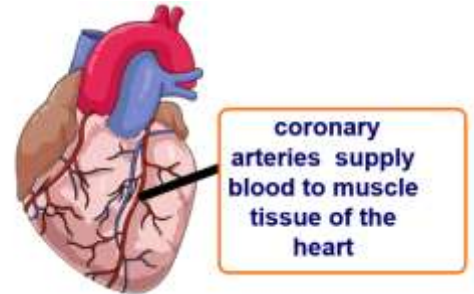
## Heart Valves



The function of the valves is to prevent the blood from flowing \_\_\_\_\_ into the heart. The four valves are located between the right atrium and the right ventricle, the right ventricle and the pulmonary artery, the left atrium and the left ventricle and the left ventricle and the aorta - added this information to your diagram by circling their positions.

## Coronary arteries

The heart is full of blood but also needs its own blood supply so that the muscle can keep pumping. The heart obtains blood from the **coronary arteries**. These are found on the outside of the heart, carrying oxygenated blood to the heart muscle cells and carrying deoxygenated blood back into the heart.



### Learning intention

To find out about the functions of the different parts of the heart and its associated blood vessels.

Structure	Function
	Carries deoxygenated blood to the heart from the head and body.
	Collects blood that enters the heart in the vena cava.
	Pumps blood out of the heart into the pulmonary artery.
	Carries deoxygenated blood to the lungs.
	Carries oxygenated blood to the heart.
	Collects blood that enters the heart in the pulmonary vein.
	Pumps blood out of the heart into the aorta.
	Carries blood away from the heart to the head and body.
	Supplies the heart muscle with oxygenated blood.
	Prevent the blood from flowing backwards.

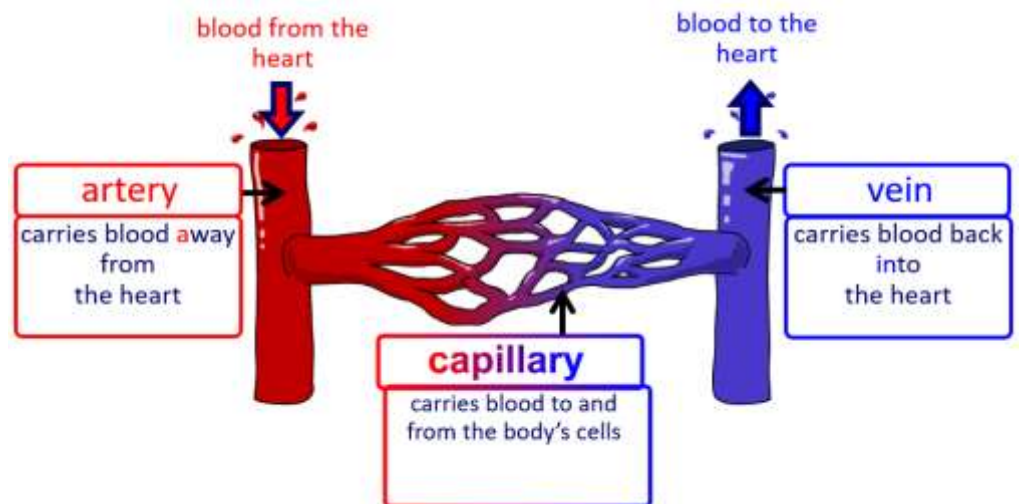
## Learning intention

To find out about the structure of the blood vessels.

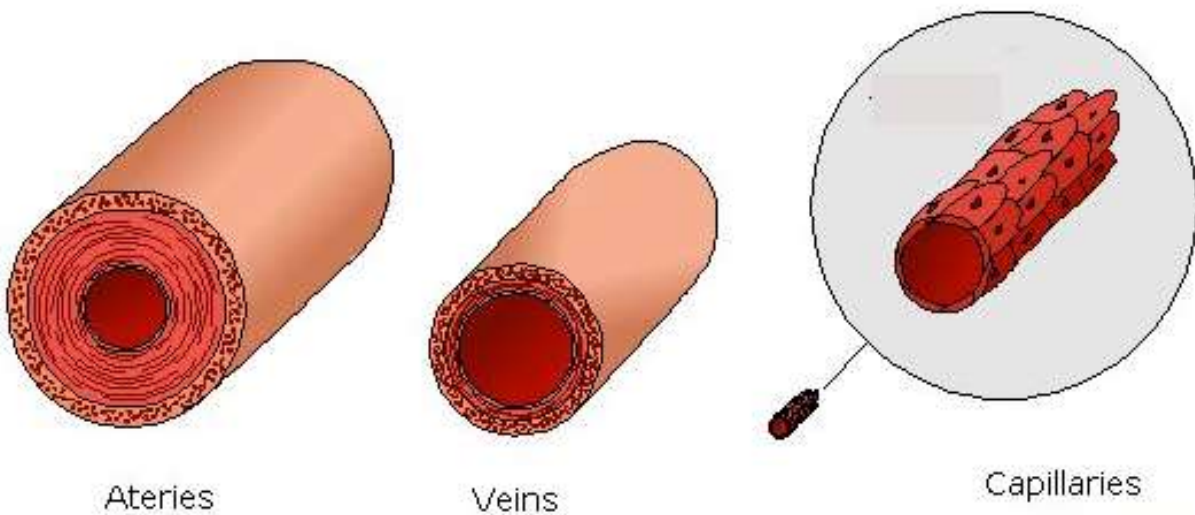
## Blood Vessels

There are three types of blood vessel;

- Arteries
- Veins
- Capillaries



## Cross section through the blood vessels





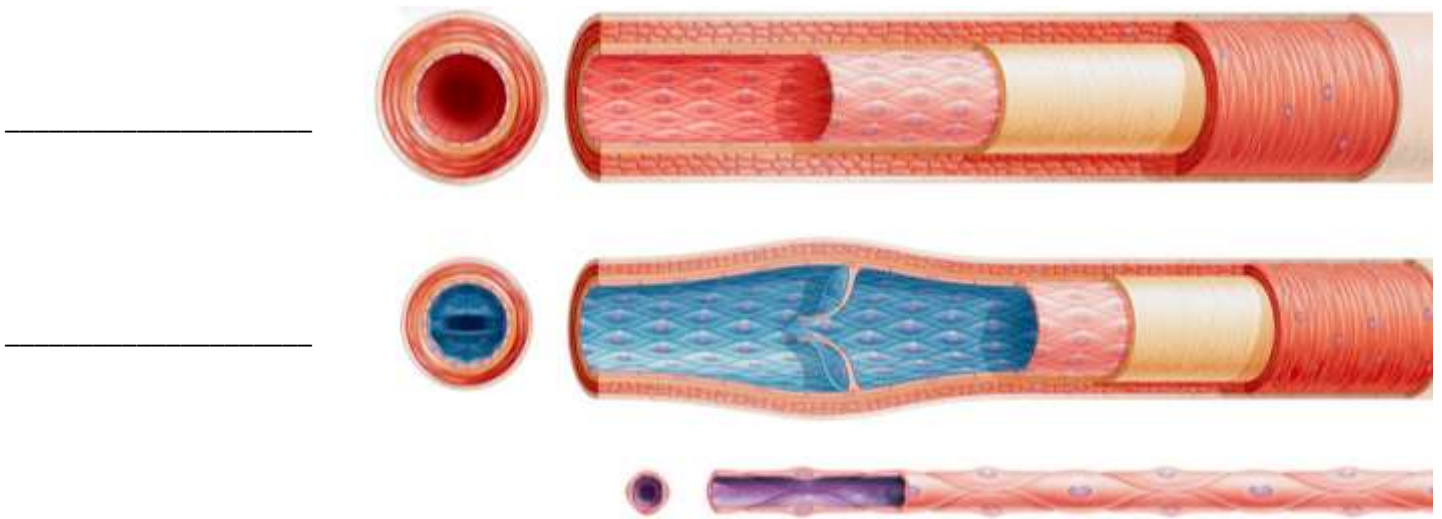
## Functions and features of blood vessels



Type of Blood Vessel	Function	Features
Arteries	Carry blood under _____ pressure _____ from the heart.	_____ muscular walls _____ central channel.
Capillaries	Form _____ at organs and tissues.	_____ walled _____ surface area, allowing efficient exchange of materials.
Veins	Carry blood under _____ pressure _____ the heart.	_____ walls _____ central channel Contain _____ to prevent backflow of blood.



Complete the diagram below by adding the name of each blood vessel.



I can:	
State that in mammals the blood contains plasma, red blood cells and white blood cells.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that nutrients, oxygen and carbon dioxide are transported in the blood.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe red blood cells as being specialised in structure by being biconcave in shape, having no nucleus and containing haemoglobin.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe how the structure of red blood cell allows it to carry out its function to transport oxygen efficiently in the form of oxyhaemoglobin.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that the summary word equation for the formation of oxyhaemoglobin as: Oxygen + haemoglobin → oxyhaemoglobin	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that white blood cells are part of the immune system and are involved in destroying pathogens.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that pathogens are disease-causing micro-organisms (bacteria, viruses and fungi).	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that there are two main types of cell involved in the destruction of pathogens.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that phagocytes carry out phagocytosis by engulfing pathogens.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the process of phagocytosis by the engulfing and digesting pathogens.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that some lymphocytes produce antibodies which destroy pathogens.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that each antibody is specific to a particular pathogen.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the structure of the heart; to include right and left atria and ventricles.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Identify (on a diagram of the heart) the location of the right and left atria and ventricles, valves, aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State the function of the right and left atria and ventricles, valves, aorta, vena cava, pulmonary artery, pulmonary vein and coronary arteries.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Describe the pathway of oxygenated and deoxygenated blood through the heart, lungs and body.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that arteries have thick, muscular walls, a narrow central channel and carry blood under high pressure away from the heart.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that veins have thinner walls, a wide channel and carry blood under low pressure back towards the heart.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that veins contain valves to prevent backflow of blood.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
State that capillaries are thin walled and have a large surface area, forming networks at tissues and organs to allow efficient exchange of materials.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
Identify (on a diagram) an artery, vein and capillary.	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>