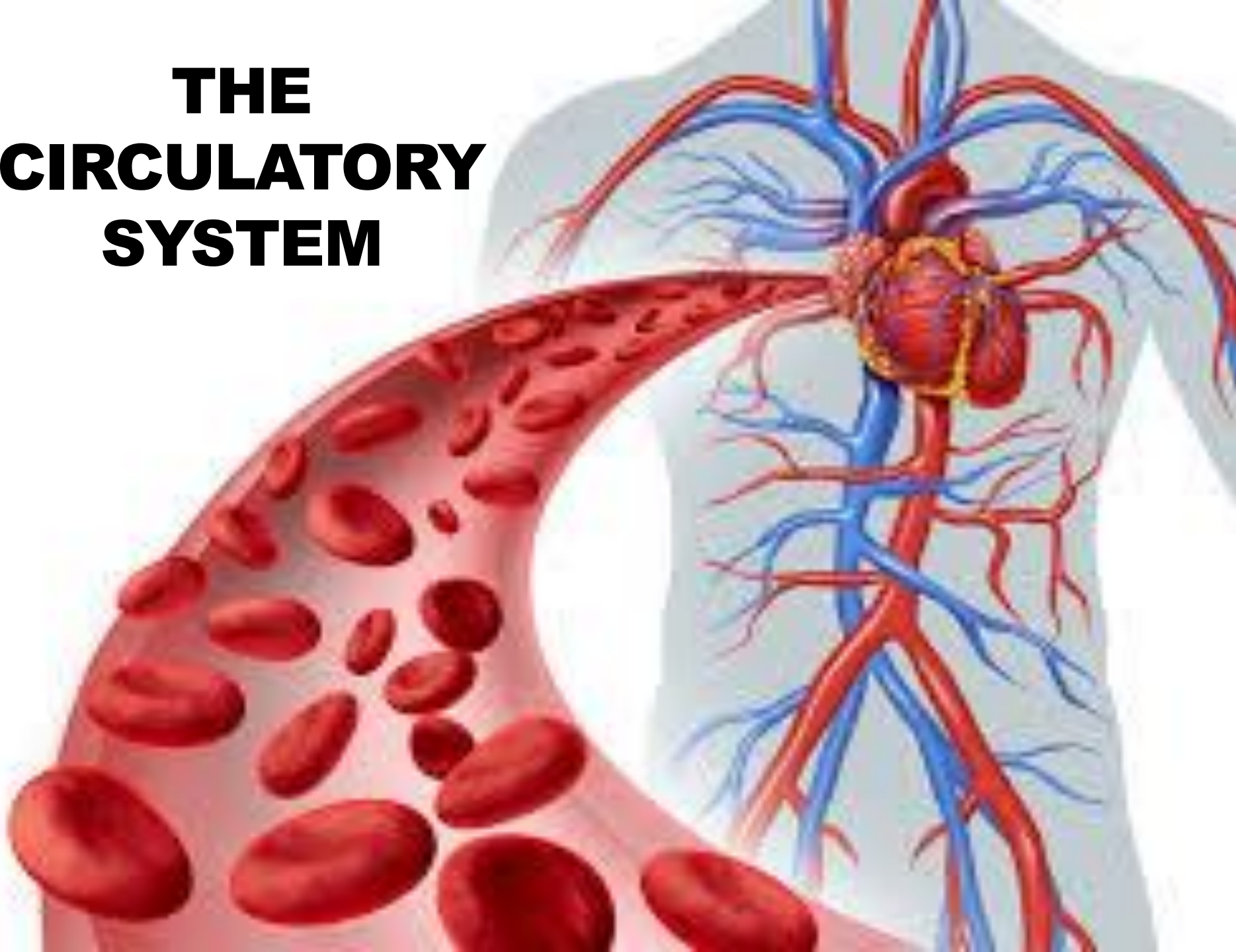


THE CIRCULATORY SYSTEM



LEARNING INTENTIONS

What will I know?

1. The purpose of the circulatory system.
2. The organs involved in the circulatory system.
3. The effect of exercise on heart rate.

Success Criteria

I can:

1. State two functions of the circulatory system.
2. State the three organs involved in the circulatory system.
3. Describe and Explain the effect exercise has on heart rate.

STARTER ACTIVITY - WHAT DO YOU ALREADY KNOW?

Write down as many words that you know which relate to the circulatory system.

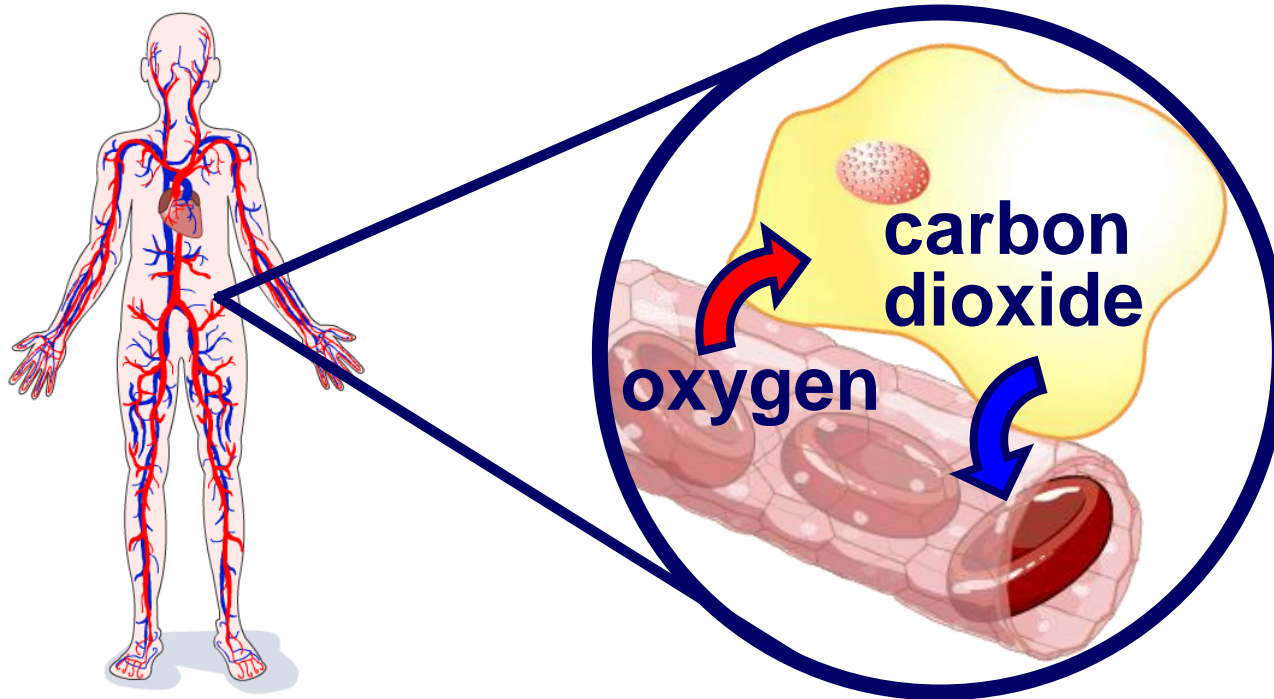
TIM AND MOBY – THE CIRCULATORY SYSTEM

(SEE STAFF DRIVE)

**PUPILS USE INFORMATION FROM
VIDEO TO DISCUSS THE PURPOSE
OF THE CIRCULATORY SYSTEM.**

WHAT IS CARRIED BY THE CIRCULATORY SYSTEM?

What is transported to and from the body's cells by the blood flowing in the circulatory system?



Oxygen and Glucose are needed for respiration and are transported **to** the body's cells.

Carbon dioxide is the waste gas produced by respiration that must be carried **away from** the body's cells.

HOW DO SUBSTANCES MOVE AROUND THE BODY?

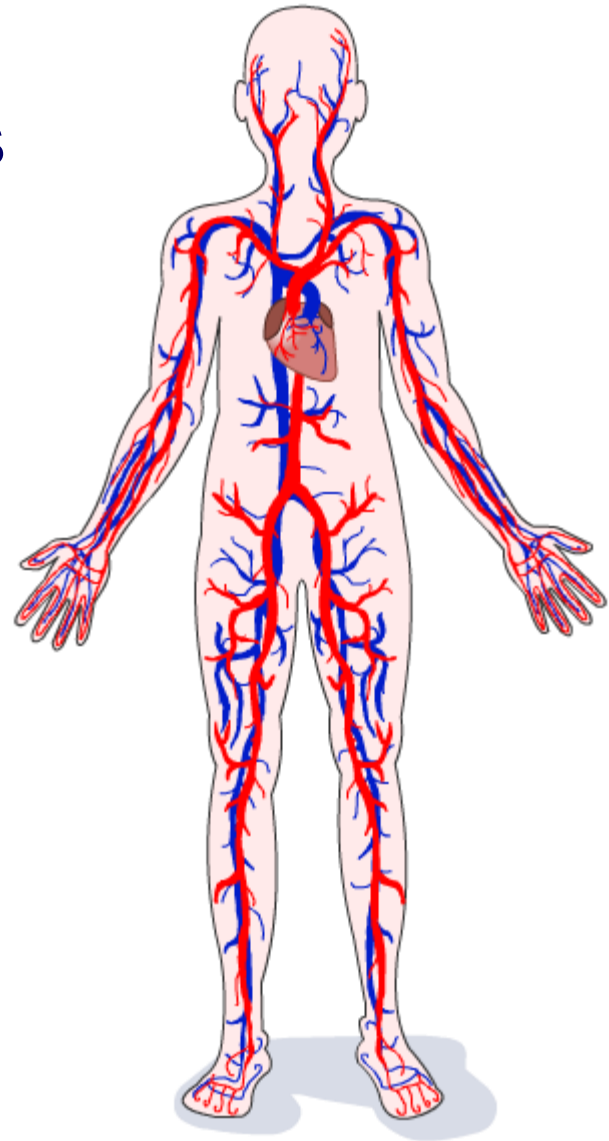
The body has its own **transport system** that carries substances around the body.

Which organs are involved in this system?

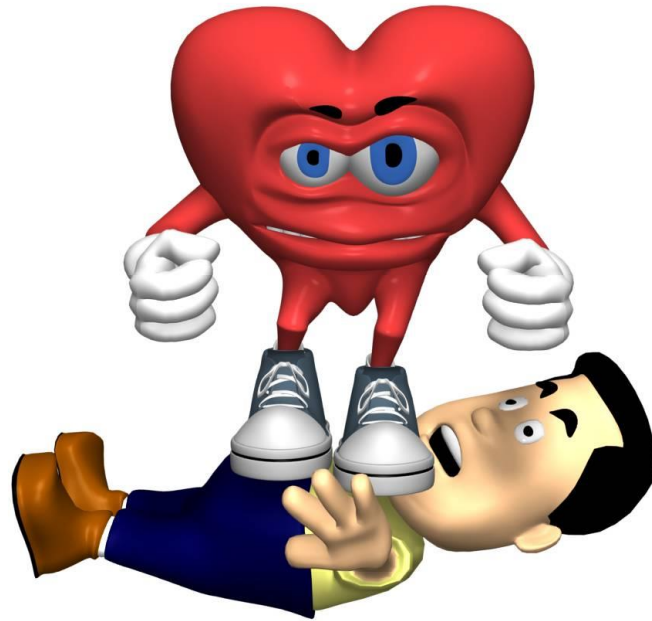
heart

blood vessels

blood



EFFECTS OF EXERCISE ON THE HEART



[Change4Life Campaign Advert](#)

How to find your pulse

You can find your pulse in places where an artery passes close to your skin, such as your wrist or neck.

1. To find your pulse in your wrist:

- hold out one of your hands, with your palm facing upwards and your elbow slightly bent.
- put the first finger (index) and middle finger of your other hand on the inside of your wrist, at the base of your thumb.
- press your skin lightly until you can feel your pulse – if you can't feel anything, you may need to press a little harder or move your fingers around.

2. To find your pulse in your neck, press the same two fingers on the side of your neck in the soft hollow area just beside your windpipe.

(NHS website)



When feeling for the carotid pulse under the angle of the jaw, use very light pressure

ADAM



The radial pulse is felt on the wrist, just under the thumb

ADAM

**ON WHITEBOARDS, USE FOLLOWING KEY
WORDS TO HELP YOU DESCRIBE THE EFFECT
OF EXERCISE ON HEART RATE**

DURING EXERCISE

PULSE RATE

AFTER EXERCISE

NORMAL

**USE FOLLOWING KEY WORDS TO
HELP YOU EXPLAIN THE EFFECT
OF EXERCISE ON HEART RATE**

ENERGY

HEART

PUMP

GLUCOSE

OXYGEN

MUSCLES

RESPIRATION

CONCLUSION

Describe:

Exercise caused an increase in the pulse rate. After exercise, the pulse rate gradually decreased to normal (recovery rate).

Explain:

Exercise causes the pulse rate to increase as when we exercise more energy is required. Consequently, the heart has to pump more blood containing glucose and oxygen to the muscles.

LEARNING INTENTIONS

What will I know?

The function of blood and what it contains.

Success Criteria

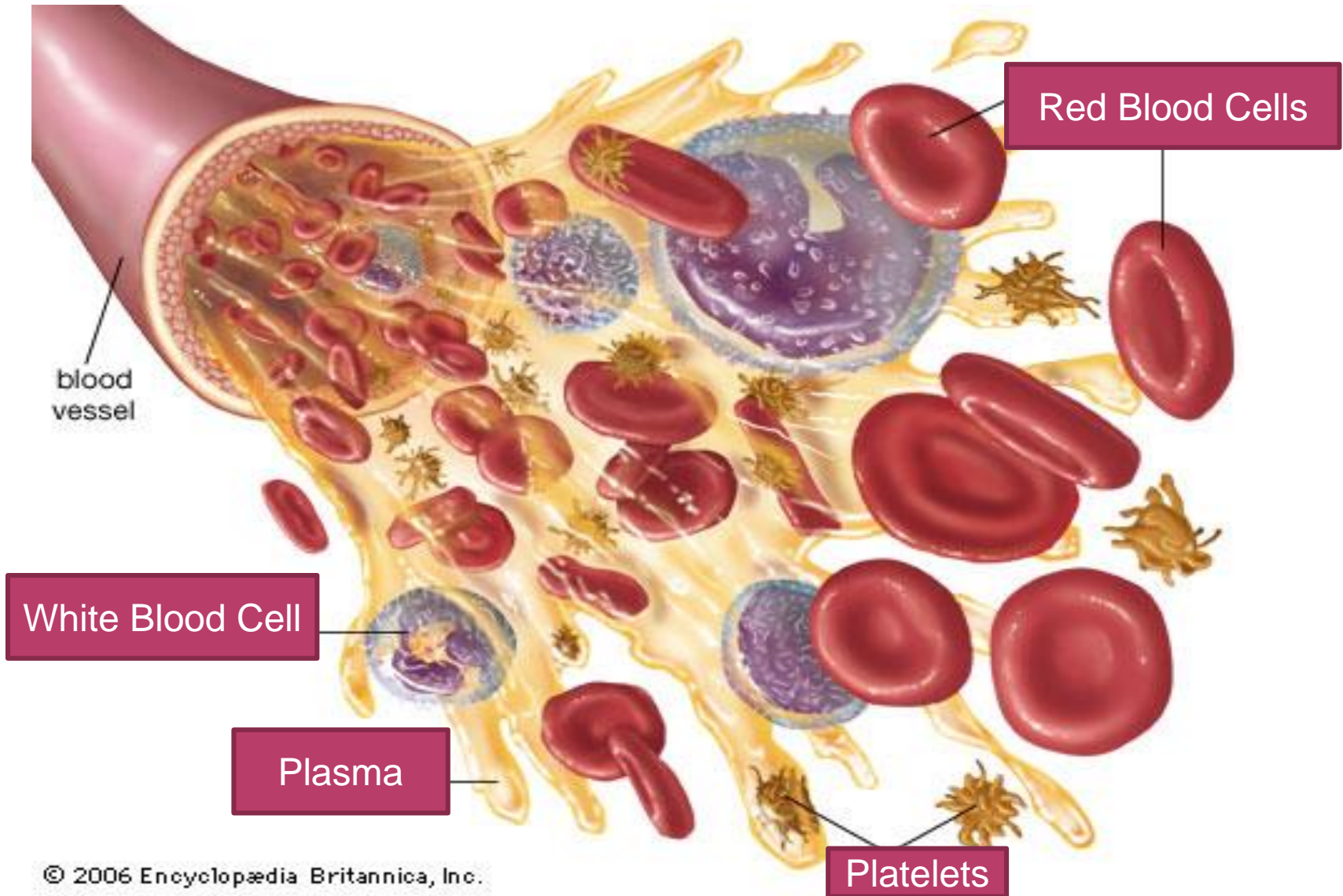
I can:

- 1. State the function of blood.**
- 2. List the four main components present in blood.**
- 3. Describe the function of each blood component.**

**Tim and Moby –
Blood Video.**

(See staff Drive)

COMPONENTS OF BLOOD



WHAT IS THE FUNCTION OF BLOOD?



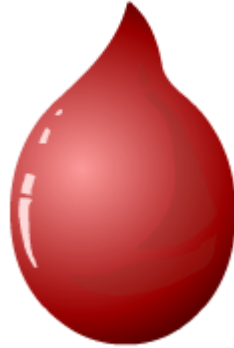
The blood transports:

- 1. Oxygen to respiring cells (via red blood cells).**
- 2. Carbon dioxide to the lungs to be exhaled.**
- 3. Nutrients to respiring cells.**
- 4. Urea (waste product) to the kidneys for excretion.**

TWO TYPES OF BLOOD

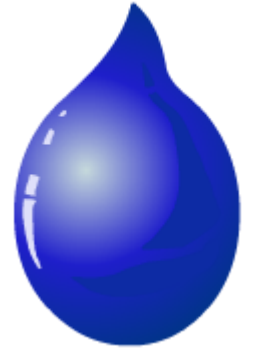
● The circulatory system carries two types of blood:

oxygen-rich blood



- blood travelling to the body cells
- high oxygen content
- low carbon dioxide content

oxygen-poor blood



- blood travelling away from the body cells
- low oxygen content
- high carbon dioxide content

The arrangement of the circulatory system means that these two types of blood do not mix.

WHAT IS DISSOLVED IN PLASMA?

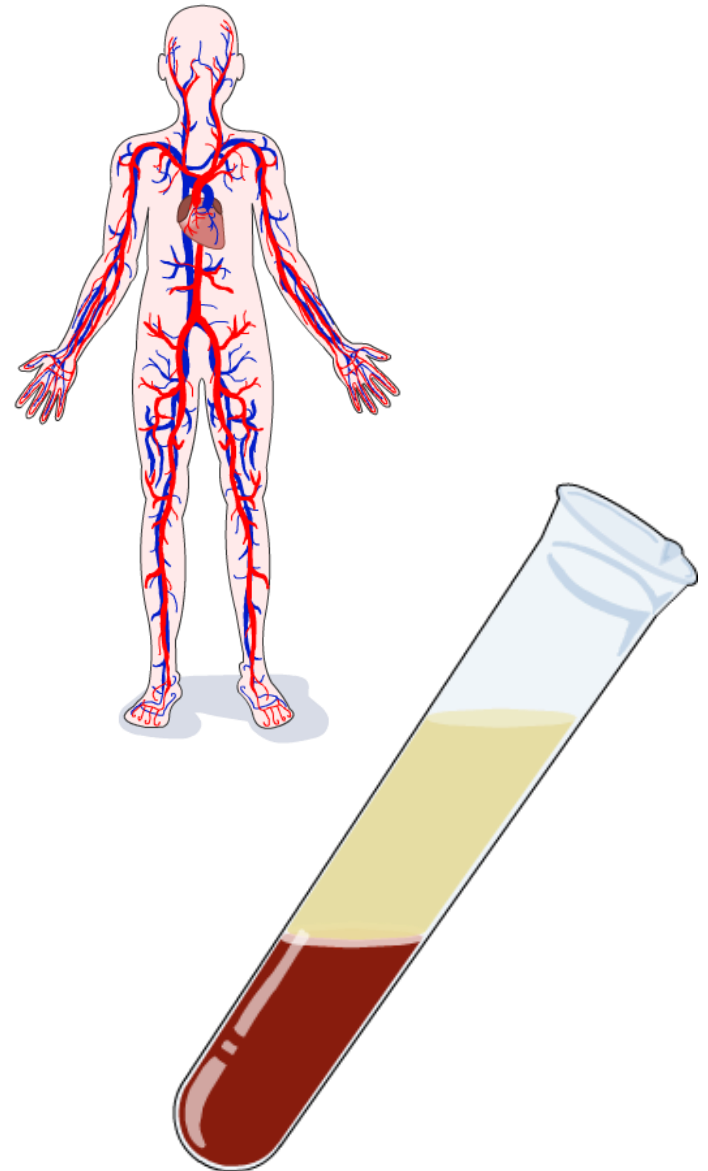
Plasma is mostly water with other substances dissolved in it.

- **Useful substances** dissolved in plasma are **digested food**.

This must be transported to where it is needed in the body.

- **Waste substances** dissolved in plasma are **carbon dioxide** and **urea**.

These must be transported to where they can be removed from the body.



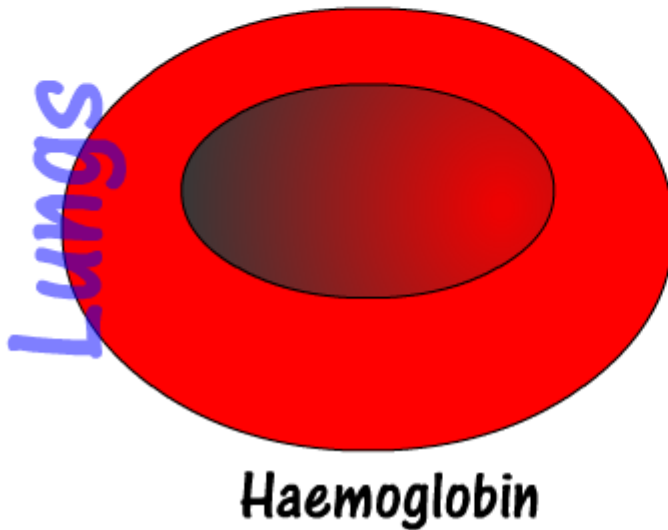
Red blood cells

Red blood cells carry oxygen around the body. They :

1. Have **no nucleus**
(so more oxygen
can attach)

2. Contain a red
pigment called
haemoglobin

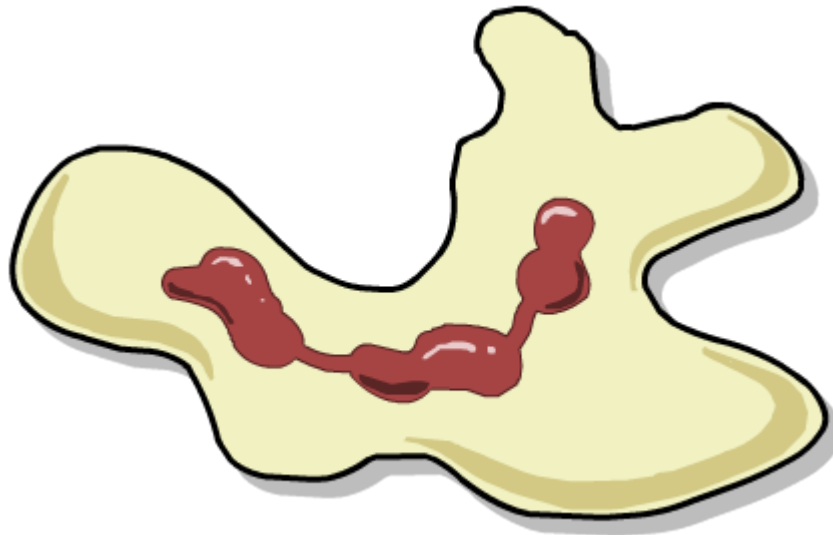
3. Are **biconcave**
to increase the
surface area



Body cells

WHAT DO WHITE BLOOD CELLS DO?

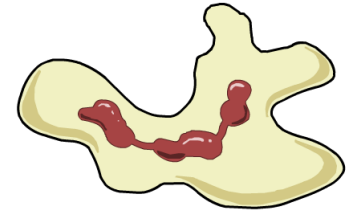
White blood cells are the largest type of blood cell.



White blood cells **protect the body** from disease by **fighting invading microbes** that can cause infection.

WHITE BLOOD CELL COUNT

Doctors can check the number of white blood cells in a person's blood to find out if they are healthy or fighting off an infection.



healthy
white blood cell
count is low



unwell
white blood cell
number is high

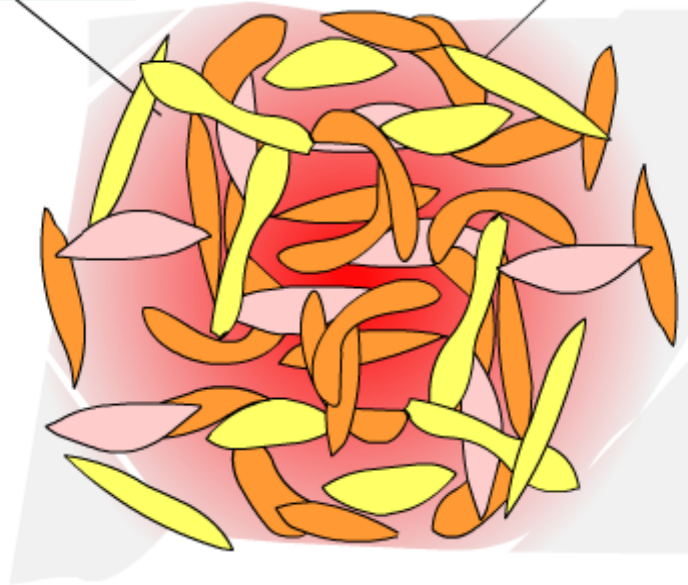
Why is the white blood cell count higher when a person is fighting off an infection?

Platelets

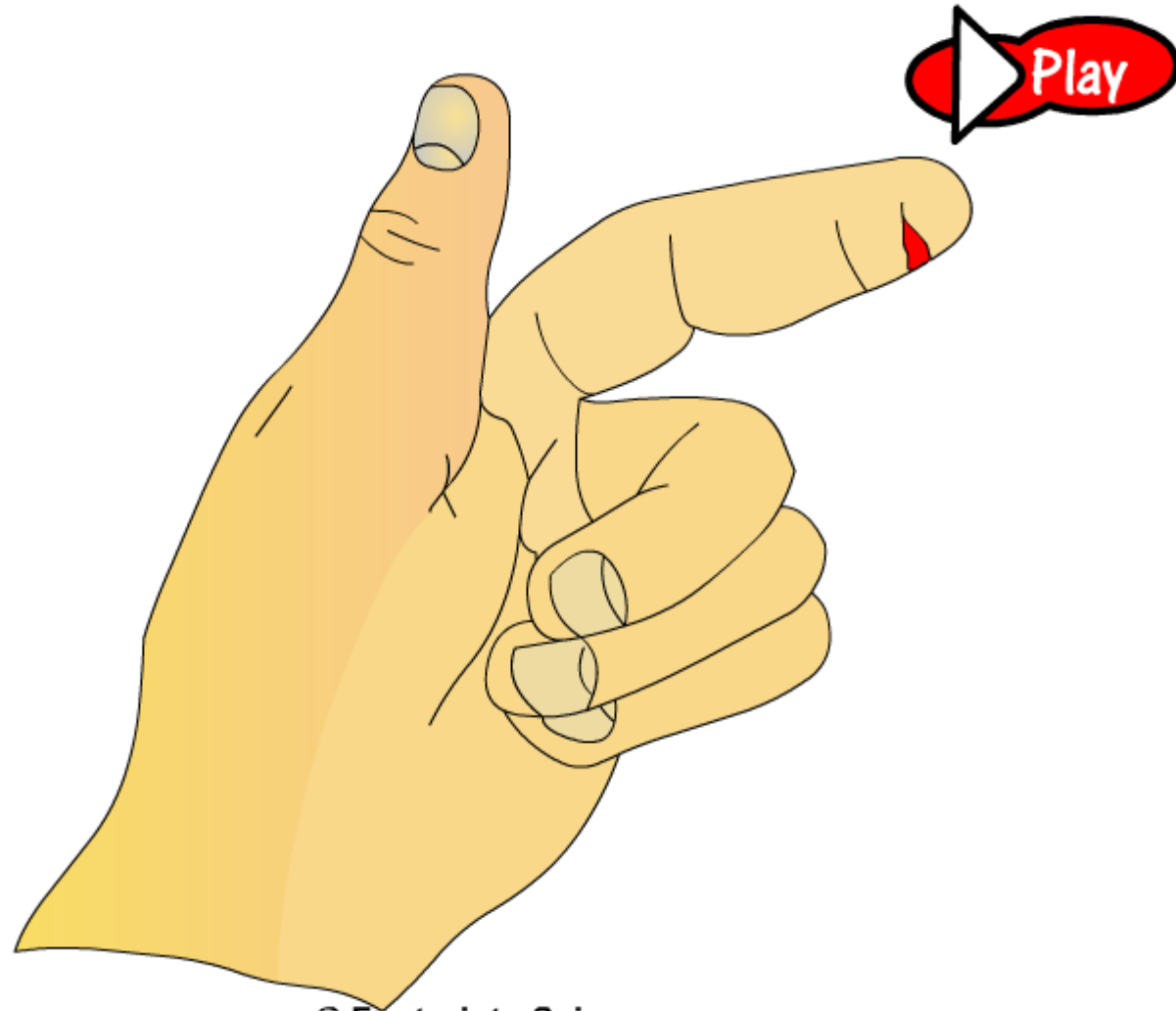
Platelets help to clot the blood. They :

1. Are tiny fragments of cells

2. Have no nucleus



Blood clotting



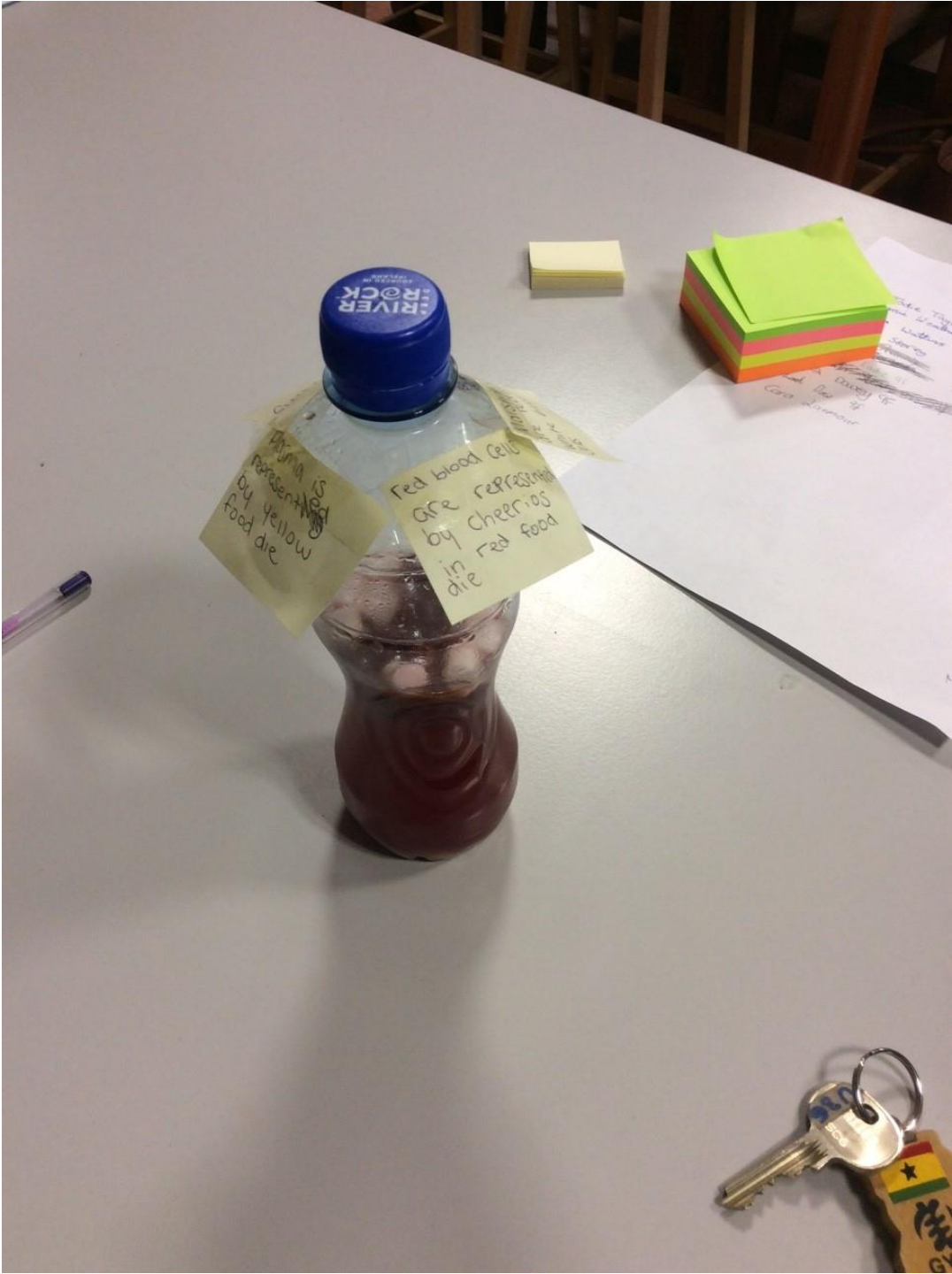
© Footprints-Science

LET'S MAKE BLOOD!

You have been provided with:

1. A plastic bottle.
2. Yellow Food Colouring
3. Cheerios which have been dyed red in colour.
4. Gold confetti.

Remember to include the correct proportion of each component and be able to answer questions about your model!!



Thymin is represented by yellow food die

Red blood cells are represented by cheerios in red food die





Blood

WS
12.2

	Red Blood Cell	White Blood Cell	Plasma	Platelet
What do they do?				
How do they do it?				
Picture				

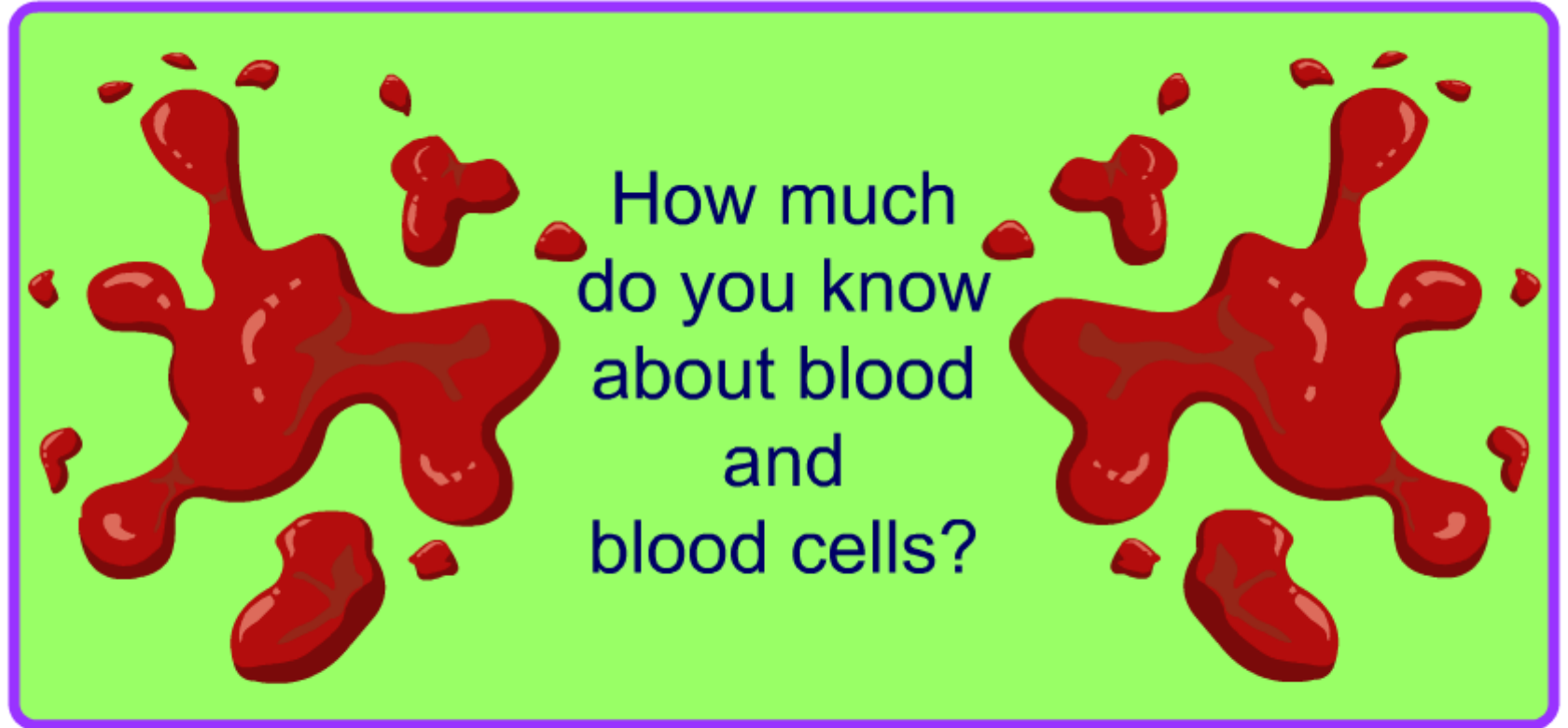


Blood

WS
12.2

	Red Blood Cell	White Blood Cell	Plasma	Platelet
What do they do?	Carries oxygen around the body	Defends the body against infection	Carries nutrients and waste products	Helps the blood to clot
How do they do it?	Has no nucleus, has large surface area and haemoglobin	Can produce antibodies or can carry out phagocytosis	Fluid which blood cells float in and nutrients or waste products can dissolve into.	These are small cell fragments which release chemicals to start blood clotting
Picture				

MULTIPLE-CHOICE QUIZ



How much
do you know
about blood
and
blood cells?

start



LEARNING INTENTION

What will I know?

- Structure of the heart
- The direction of blood flow around the body.

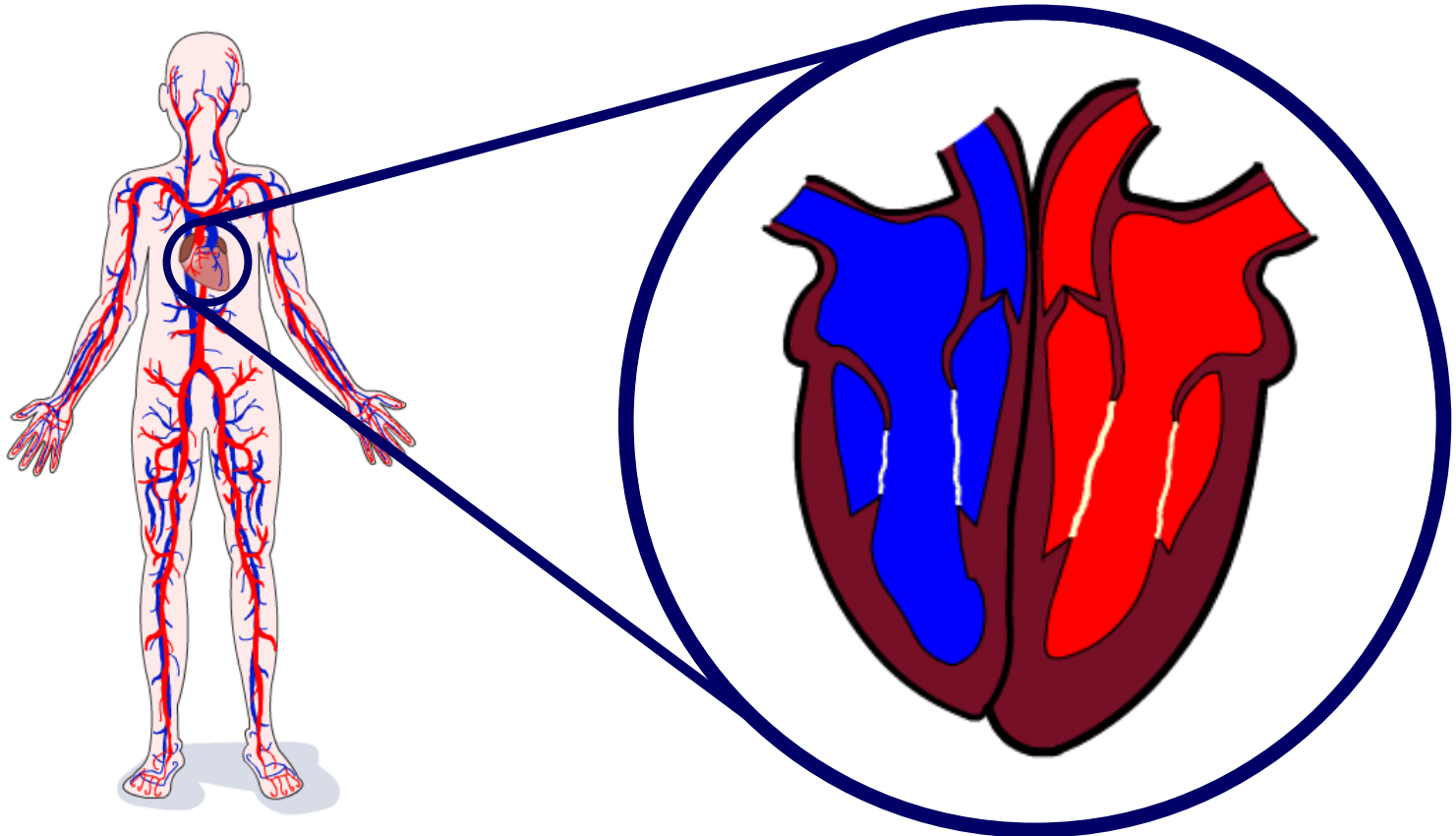
Success Criteria

I can :

- Label a diagram of the heart.
- Complete the flow diagram to describe the direction of blood flow around the body.

AT THE HEART OF THE CIRCULATORY SYSTEM

The **heart** is the organ at the centre of the circulatory system. It pumps blood around the body.



How are the **two types of blood** (**oxygen-rich** and **oxygen-poor**) kept apart **inside** the heart?

Heart Dissection Video

<https://www.youtube.com/watch?v=yE3Y-XR8Ax4>

Heart Model

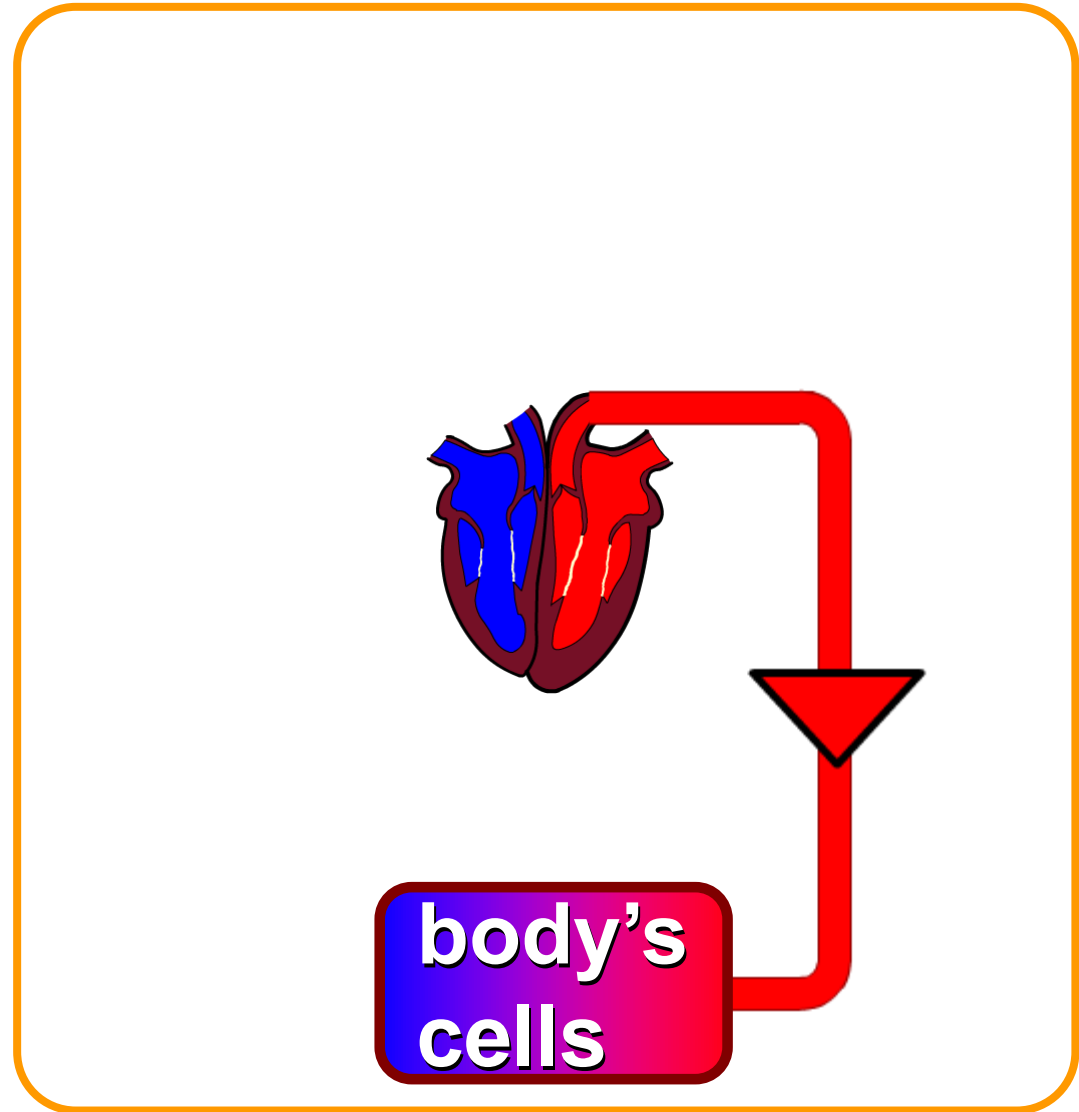
<https://www.youtube.com/watch?v=Tc3A5wGae4U>

HOW DOES BLOOD CIRCULATE AROUND THE BODY?

The left side of the heart pumps **oxygen-rich blood** to the rest of the body.

This blood supplies the body's cells with oxygen.

What gas does the blood then pick up from the body's cells and where does the blood go next?

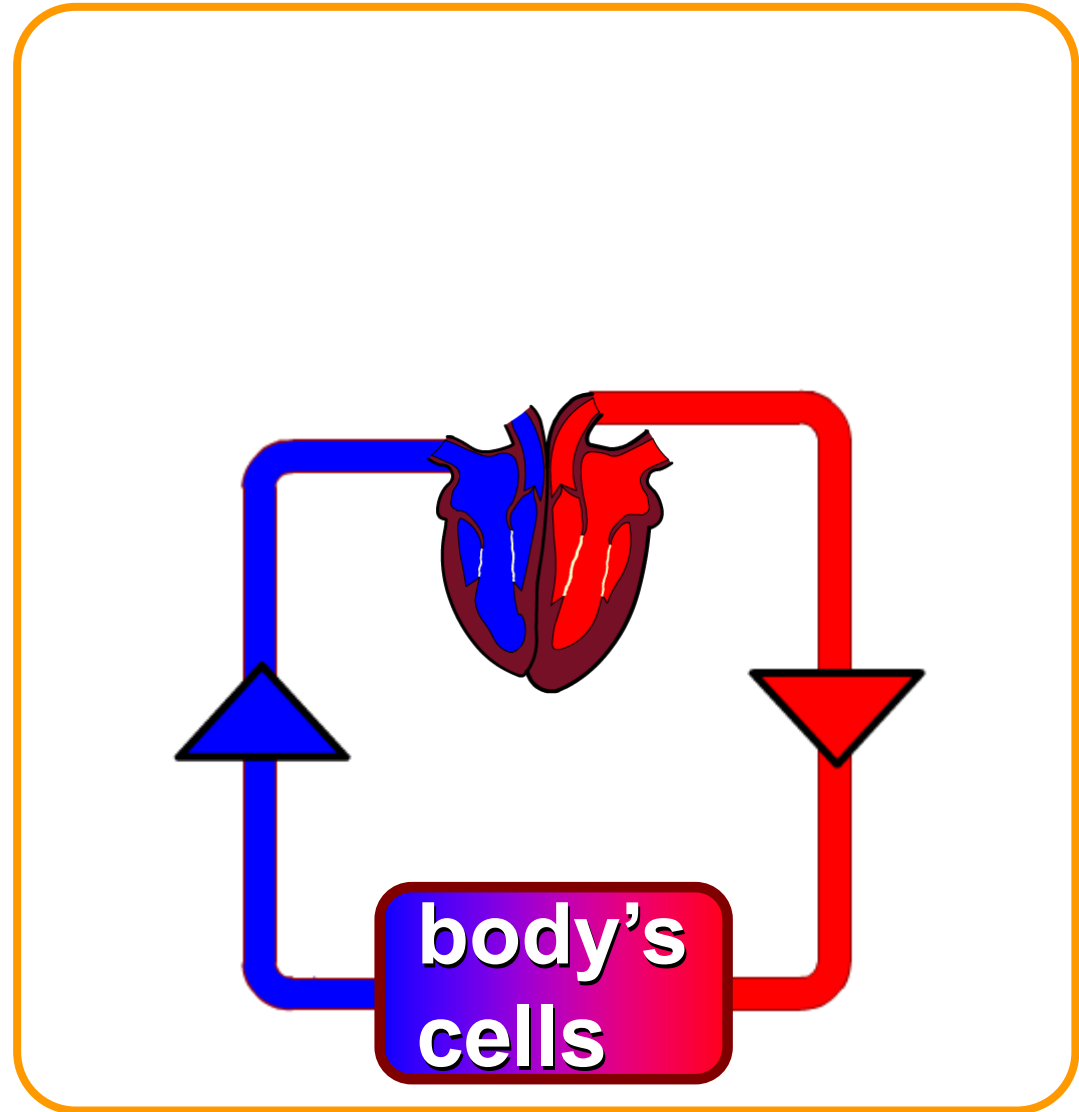


HOW DOES BLOOD CIRCULATE AROUND THE BODY?

Blood picks up **carbon dioxide** from the body's cells.

This **oxygen-poor blood** then travels back to the right side of the heart.

The **oxygen-poor blood** needs to lose the carbon dioxide and pick up more oxygen. How does it do this?

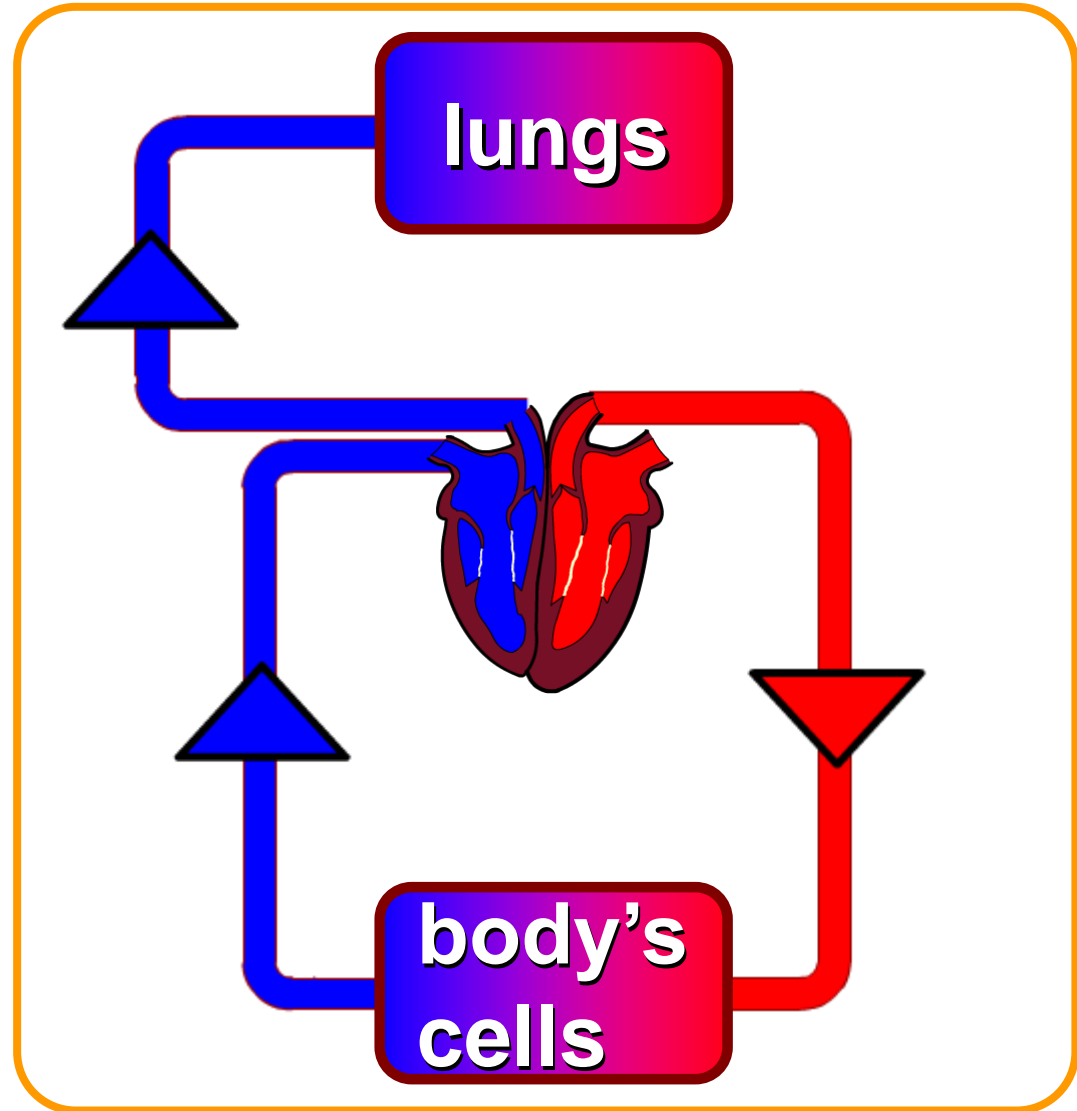


HOW DOES BLOOD CIRCULATE AROUND THE BODY?

Next, the right side of the heart pumps **oxygen-poor blood** to the lungs.

In the lungs the blood gets rid of the waste carbon dioxide and collects more oxygen.

Where does this **oxygen-rich blood** then travel to?

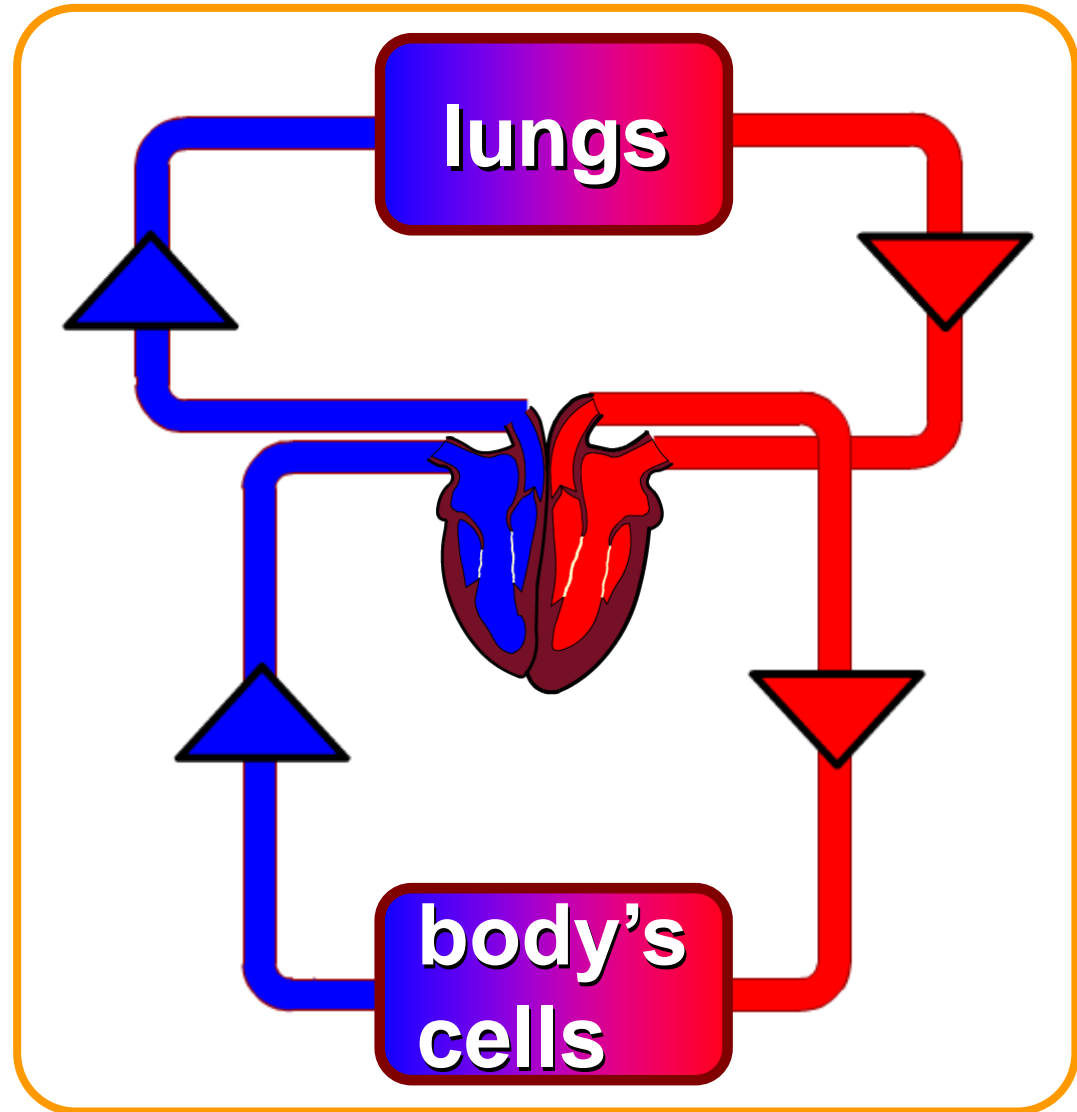


HOW DOES BLOOD CIRCULATE AROUND THE BODY?

The **oxygen-rich blood** then returns to the left side of the heart.

This **completes** the blood's journey around the body.

Why is the journey of blood through the circulatory system called a **double circulation**?

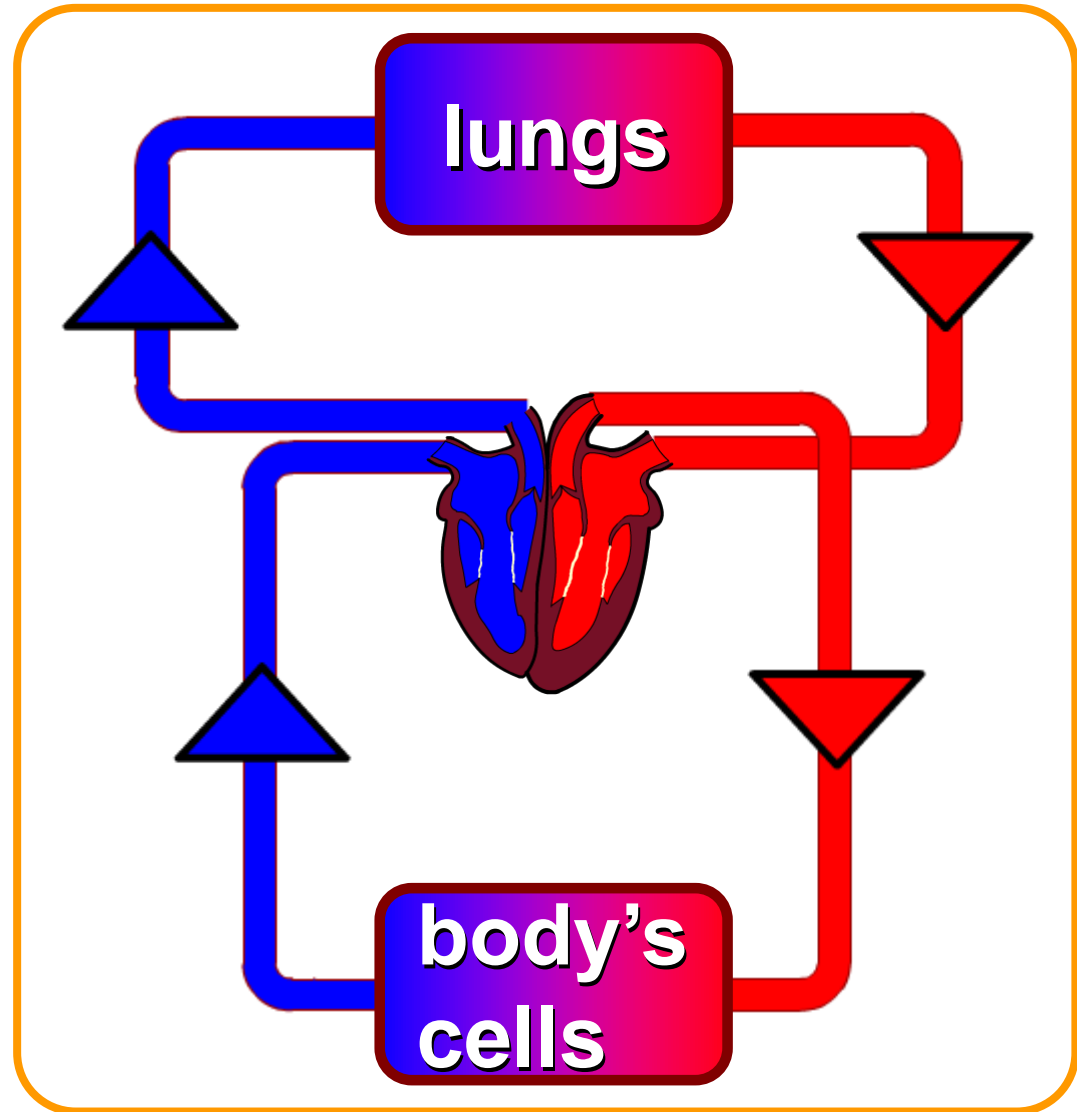


A DOUBLE CIRCULATORY SYSTEM

During one complete circuit of the body, blood passes through the heart **twice**.

The heart has **two jobs** to do and so the circulatory system involves a **double circulation**.

What are the two jobs that the heart carries out during this double circulation?



DOUBLE CIRCULATION

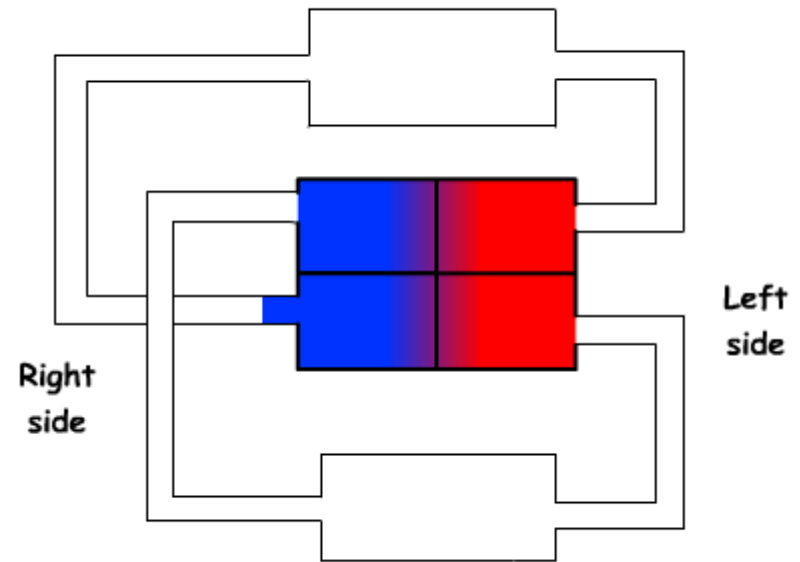
Blood passes through the heart twice on one journey around the body

It goes through the heart first to be sent to the lungs

It then returns to the heart

Second time it is pumped around the body

This is known as **double circulation**



The Heart

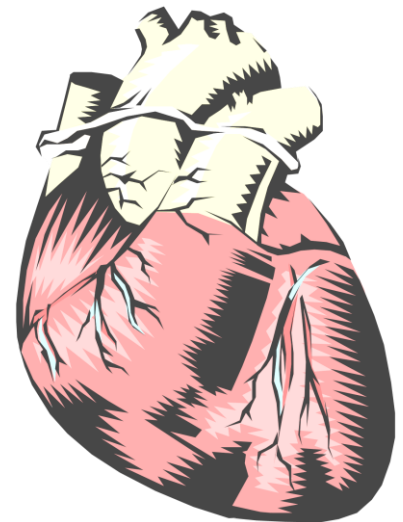


The heart is a pump

It is made of a special type of muscle called cardiac muscle

It pumps blood around your body

It is the size of your fist



It is divided in half to produce a left and a right side. Each side has two chambers

The upper chambers are called the **ATRIA**

They receive blood into the heart

The lower chambers are called the **VENTRICLES**

They pump blood out of the heart





The pulmonary vein takes **oxygenated** blood to the heart.

The pulmonary artery takes **deoxygenated** blood away from the heart and to the lungs.

The aorta takes **oxygenated** blood to the rest of the body.

The vena cava takes **deoxygenated** blood from the body to the heart.



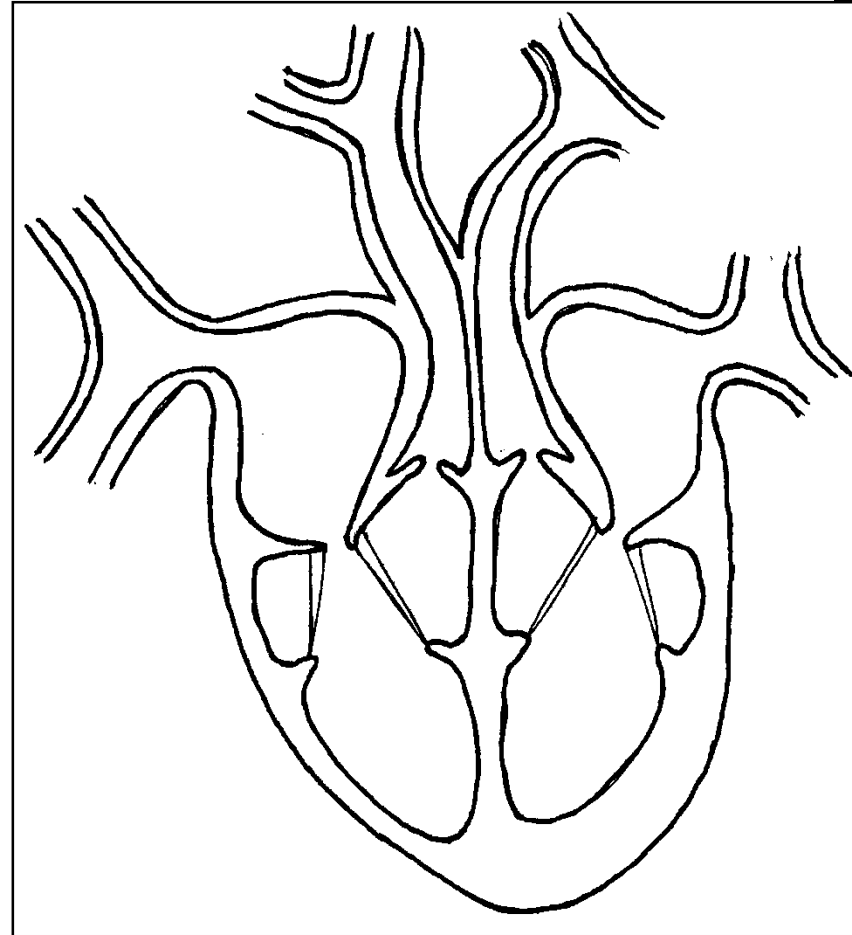
The walls of the **left** ventricle are much **thicker** than the walls of the right ventricle because it has to pump oxygenated blood all around the body.

The right ventricle only has to pump blood to the lungs.



On your diagram of the heart put
on the following labels

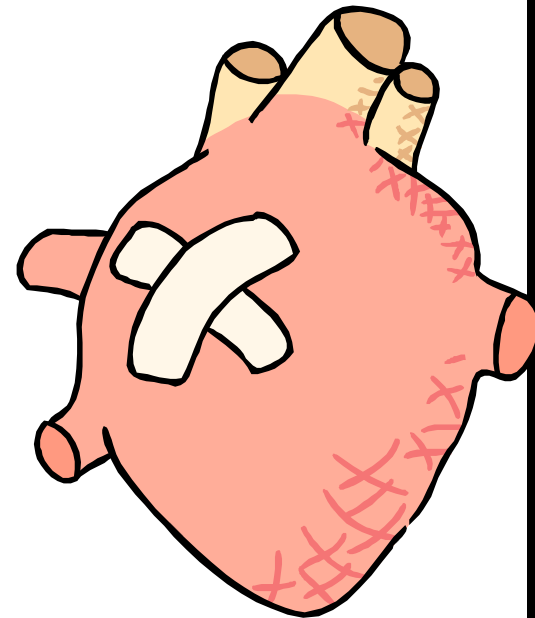
- Right atrium
- Left atrium
- Right ventricle
- Left ventricle

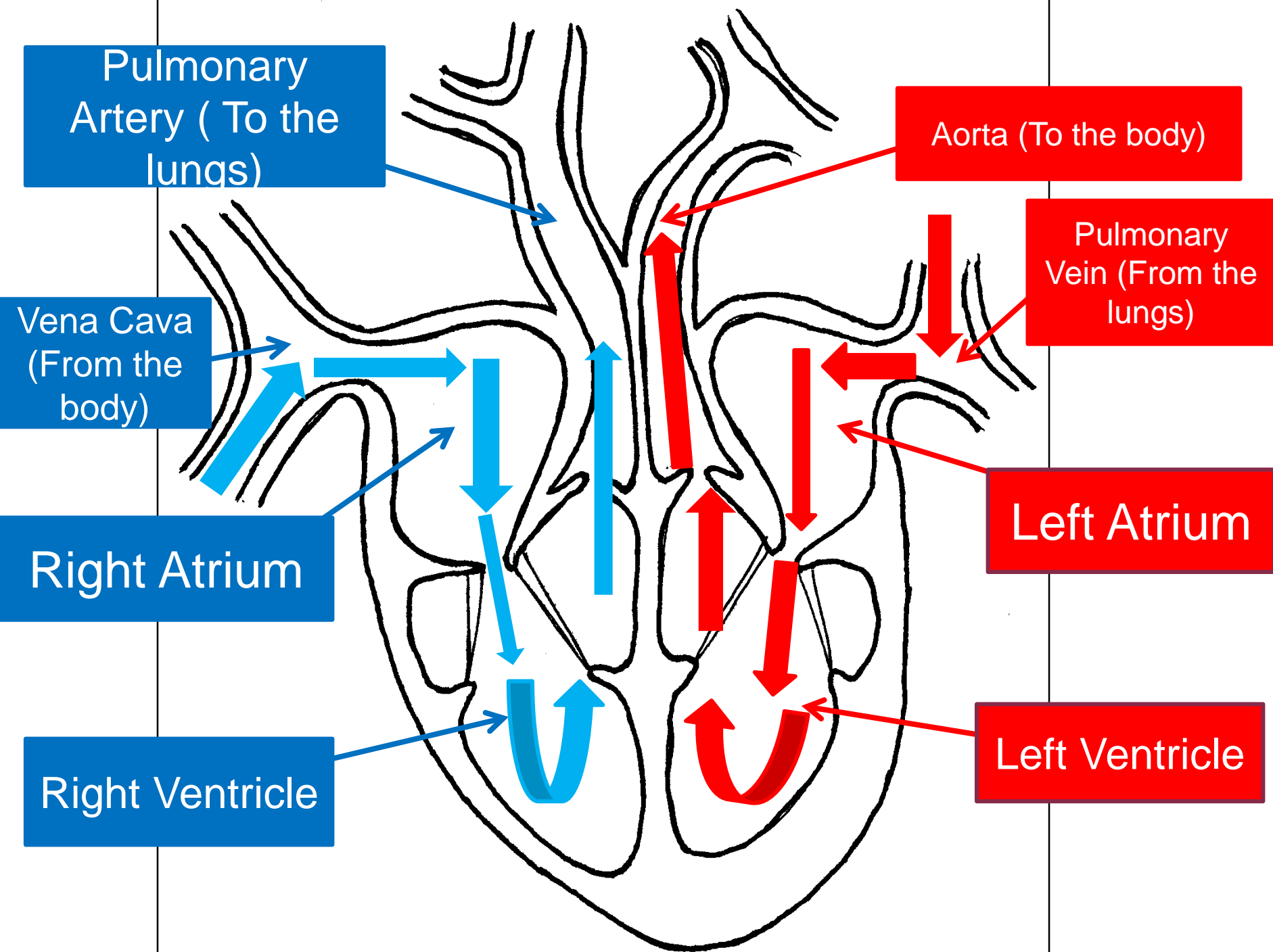




On your diagram of the heart put
on the following labels

- From the lungs
- To the lungs
- From the body
- To the body





Pulmonary Artery (To the lungs)

Aorta (To the body)

Pulmonary Vein (From the lungs)

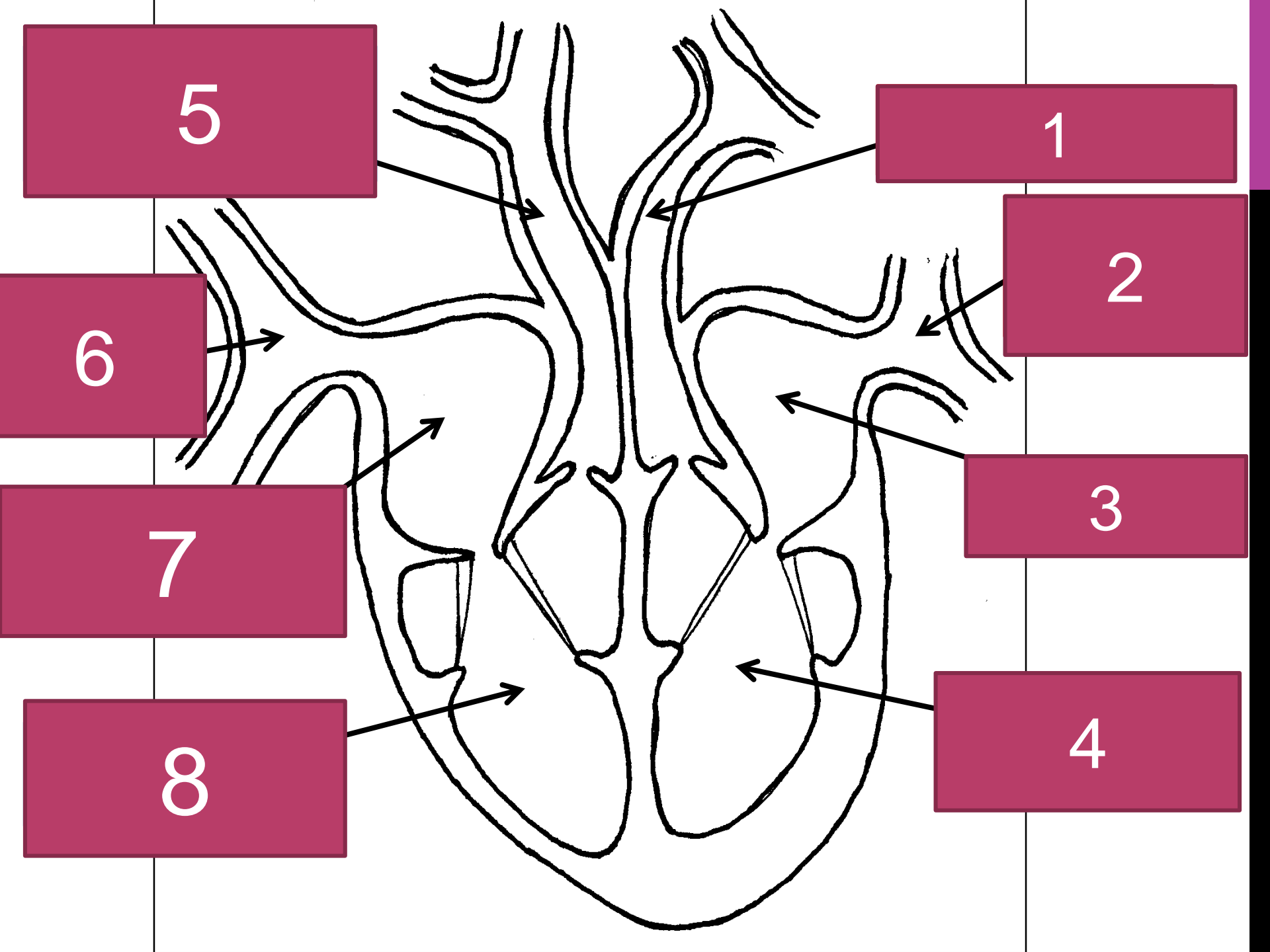
Vena Cava (From the body)

Right Atrium

Left Atrium

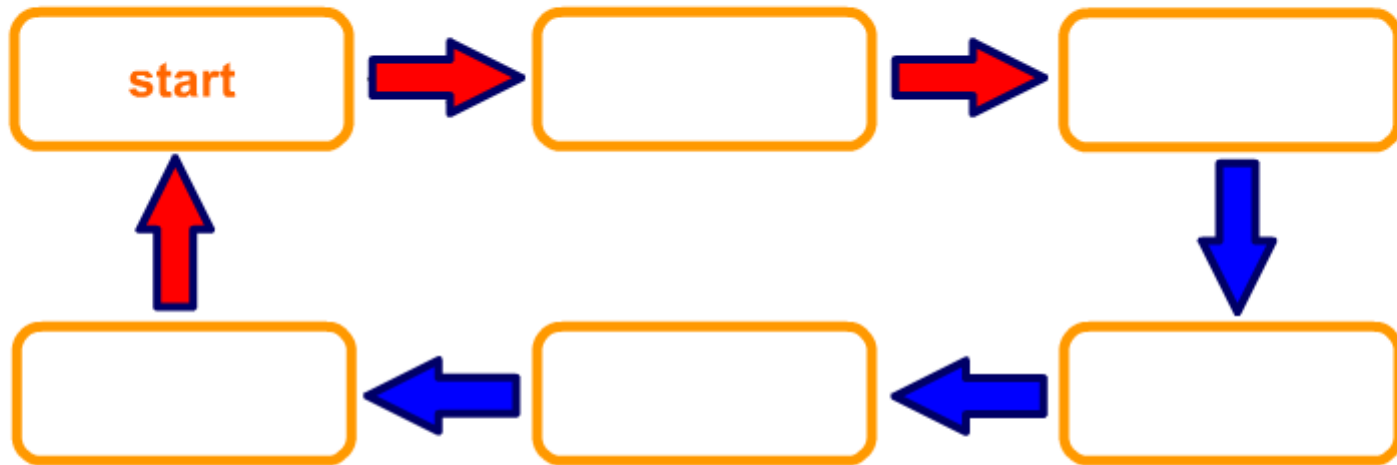
Right Ventricle

Left Ventricle



JOURNEY OF BLOOD AROUND THE BODY

Starting with the left atrium, what is the order of the blood's journey around the body?



left
ventricle

right
atrium

right
ventricle

body
cells

left
atrium

lungs





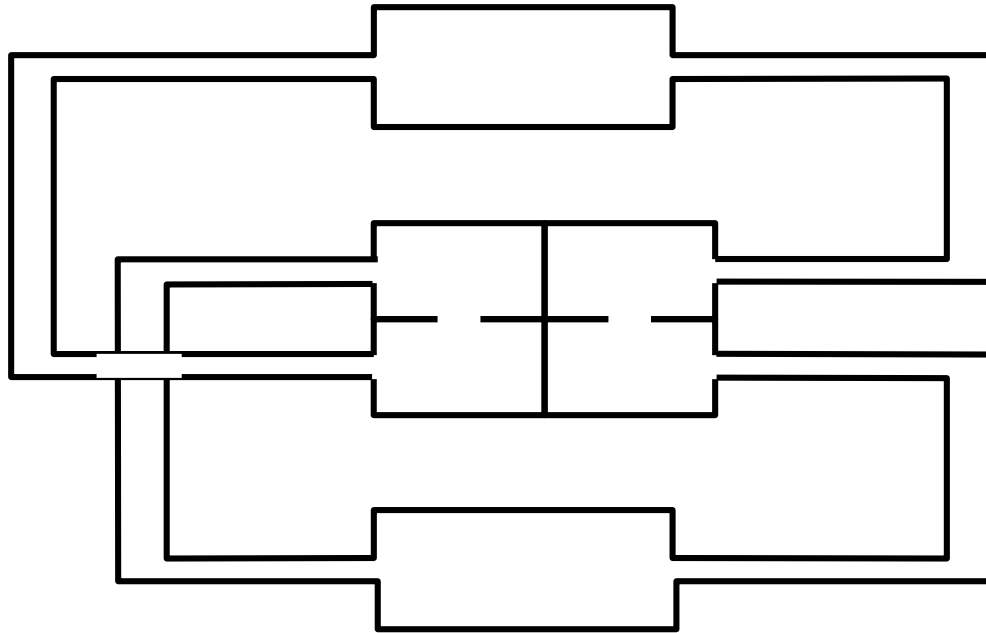
The Heart

Mr. Parr



THE CIRCULATORY SYSTEM

WS
124



1. On the diagram above label the four chambers of the heart using the following abbreviations.

LV - Left ventricle

RV - Right Ventricle

LA - Left Atrium

RA - Right Atrium

2. Also label the lungs and the rest of the body.

3. Use a red pencil to colour the parts where oxygenated blood is found and blue for the parts containing deoxygenated blood.

Cut out the sentences below. Starting with the blood in the right ventricle put them into the correct order.

4

Oxygen leaves the blood to be used by different cells in the body.

1

Deoxygenated blood is pumped out from the heart.

3

The oxygenated blood is then pumped to the body.

5

The deoxygenated blood enters the heart again and the process is repeated.

2

Oxygen enters the blood in the lungs.

Finally place arrows on the diagram to show the direction in which the blood flows around the circulatory system.

Deoxygenated blood is pumped out from the heart.

Oxygen enters the blood in the lungs.

The oxygenated blood is then pumped to the body.

Oxygen leaves the blood to be used by different cells in the body.

The deoxygenated blood enters the heart again and the process is repeated.

Image you are “Rob the Red Blood Cell”. Write a story that describes his journey around the body – start with the right atrium.

You must include the following terms:

1. **Aorta**
2. **Lungs**
3. **Right Atrium**
4. **Capillary**
5. **Pressure**
6. **Right Ventricle**
7. **Left atrium**
8. **Pulmonary Artery**
9. **Left Ventricle**
10. **Pulmonary Vein**
11. **Vena Cava**
12. **Respiration**
13. **Body Cells**

Marking Criteria:

Has the person included all the key words?

Has the person written in paragraphs?

Are all words spelt correctly? (If not, circle and write sp beside it)

Is all the information correct?

Has the person included full spots, Commas, Capital letters? (Punctuation)

Have they been creative?

Does the story flow?/ Is it in the right order?

At the bottom of the page include;

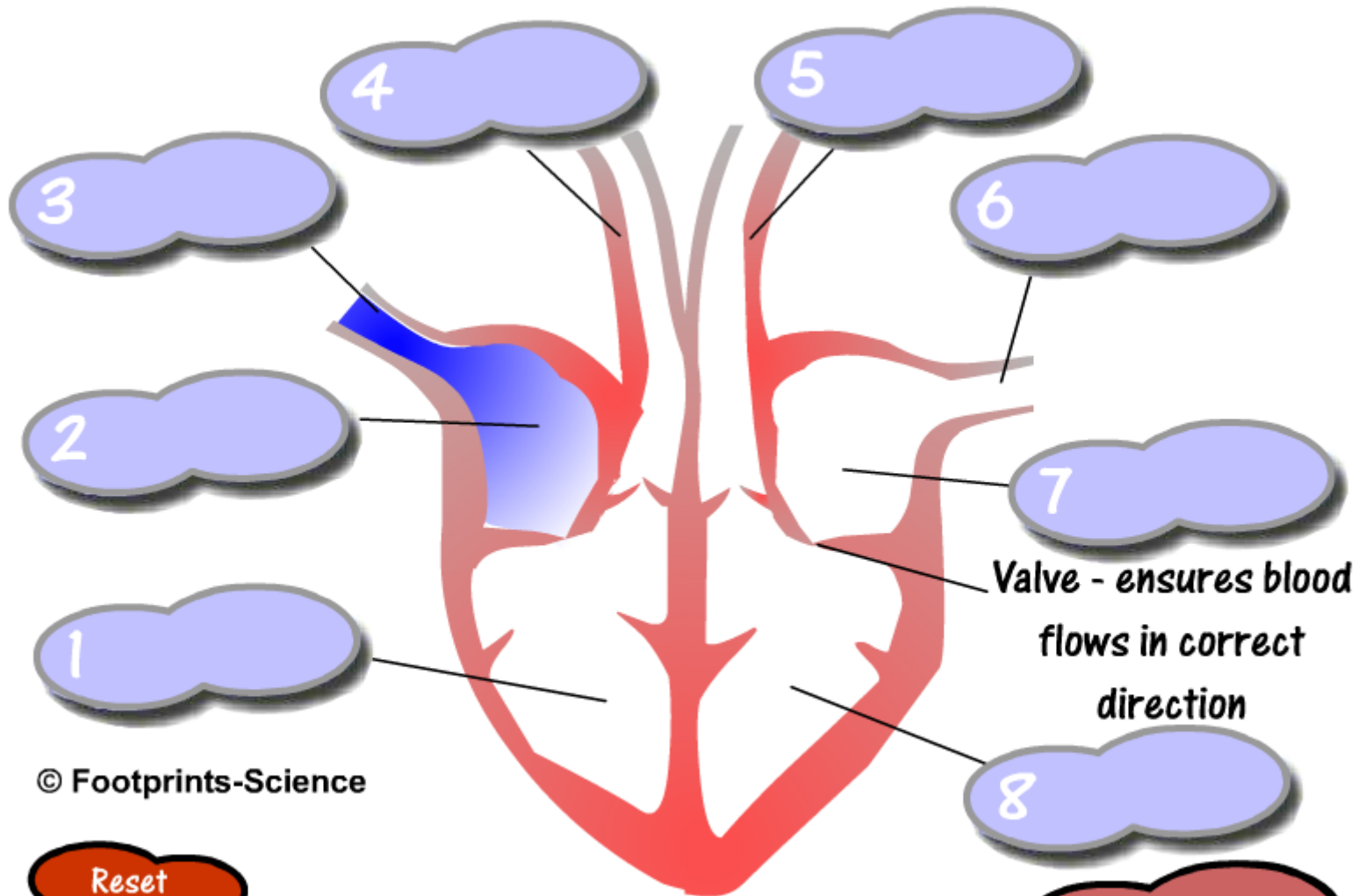
Peer assessed by:

Date:

WWW:

EBI:

The Heart



© Footprints-Science

Reset

Show answers

Drag and Drop the following labels :

To lungs

LEARNING INTENTION

What will I know?

- Types of Blood Vessels

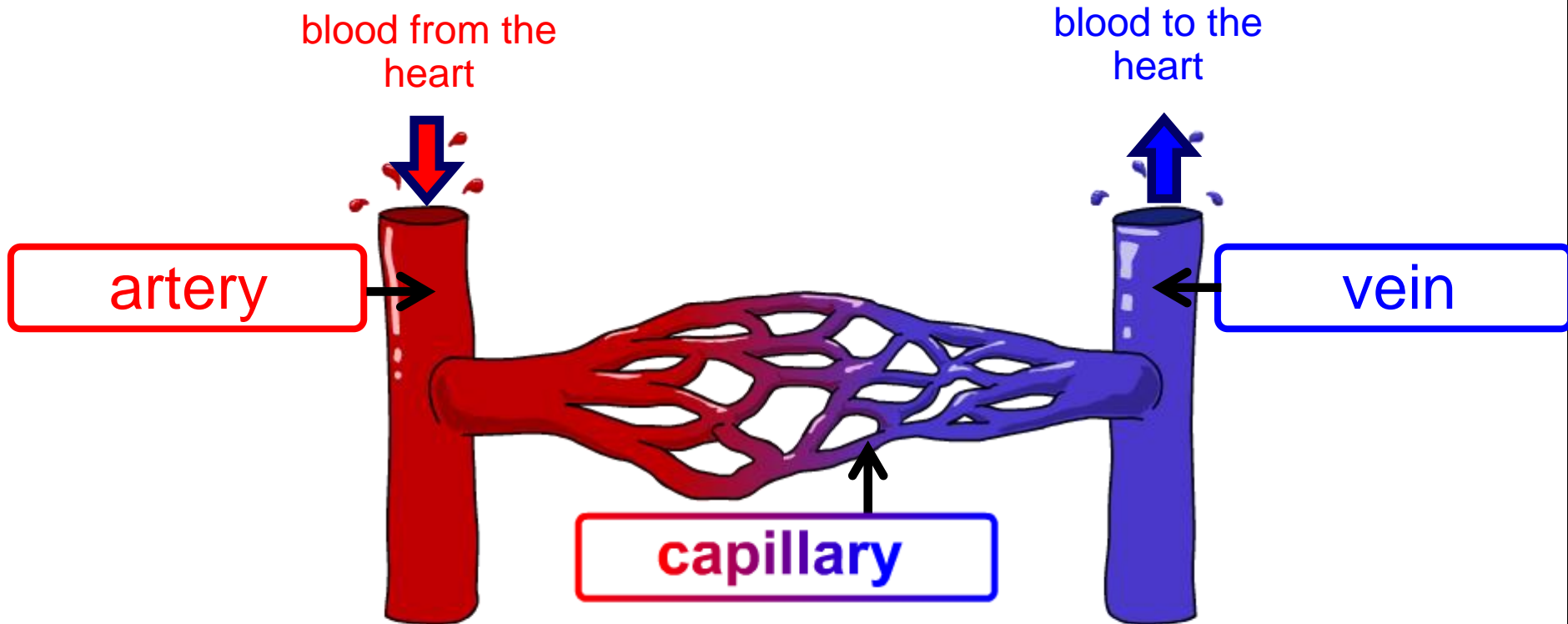
Success Criteria

I can:

- State the three main types of blood vessels and describe how they are adapted for their function.

DIFFERENT TYPES OF BLOOD VESSELS

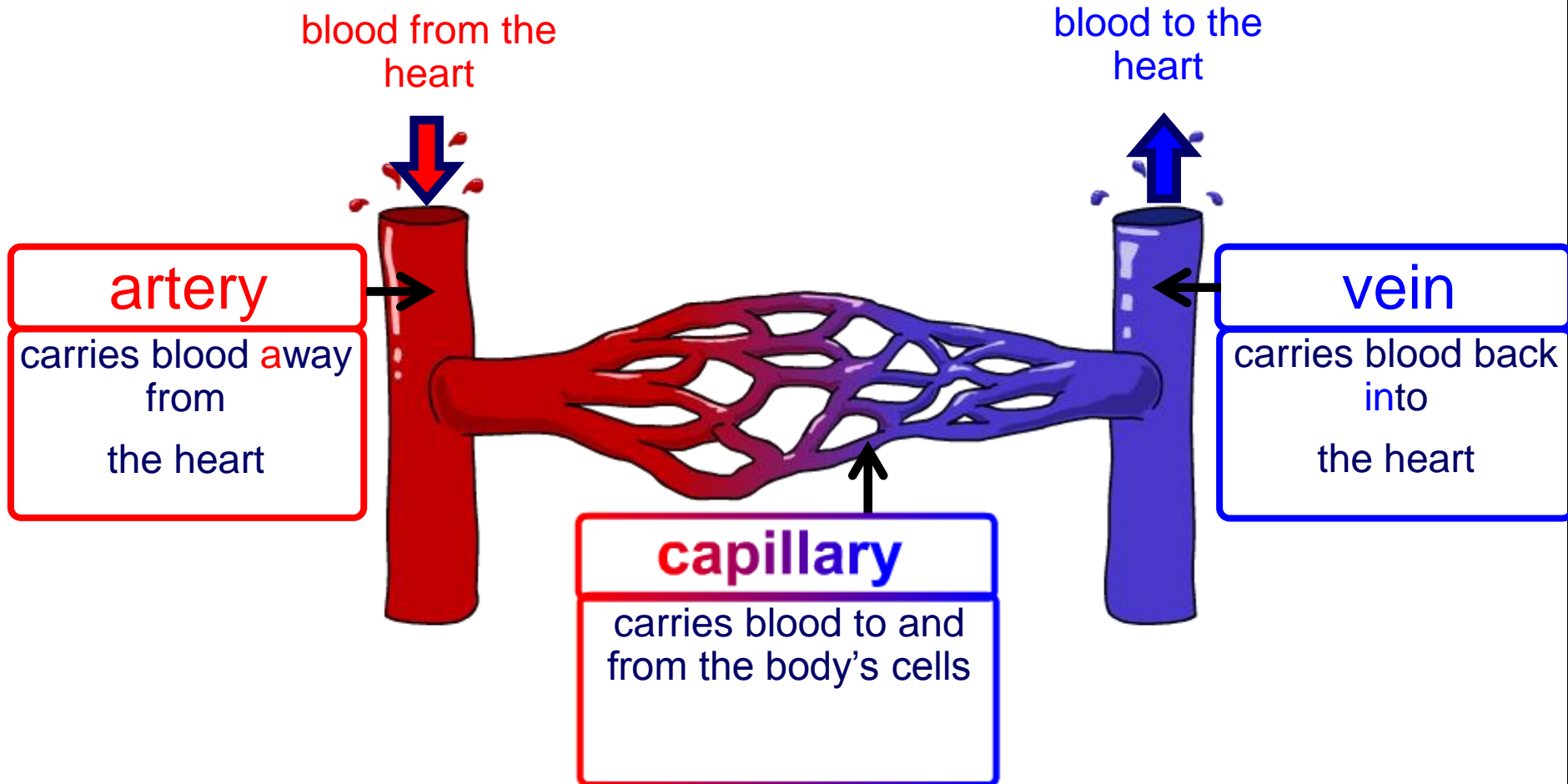
There are three types of blood vessels, as shown in this magnified part of the circulatory system.



Why are there different types of blood vessels?

DIFFERENT TYPES OF BLOOD VESSELS

The different blood vessels have different jobs to do in carrying blood around the body.



Do all blood vessels carry the same type of blood?

CROSS-SECTION OF AN ARTERY

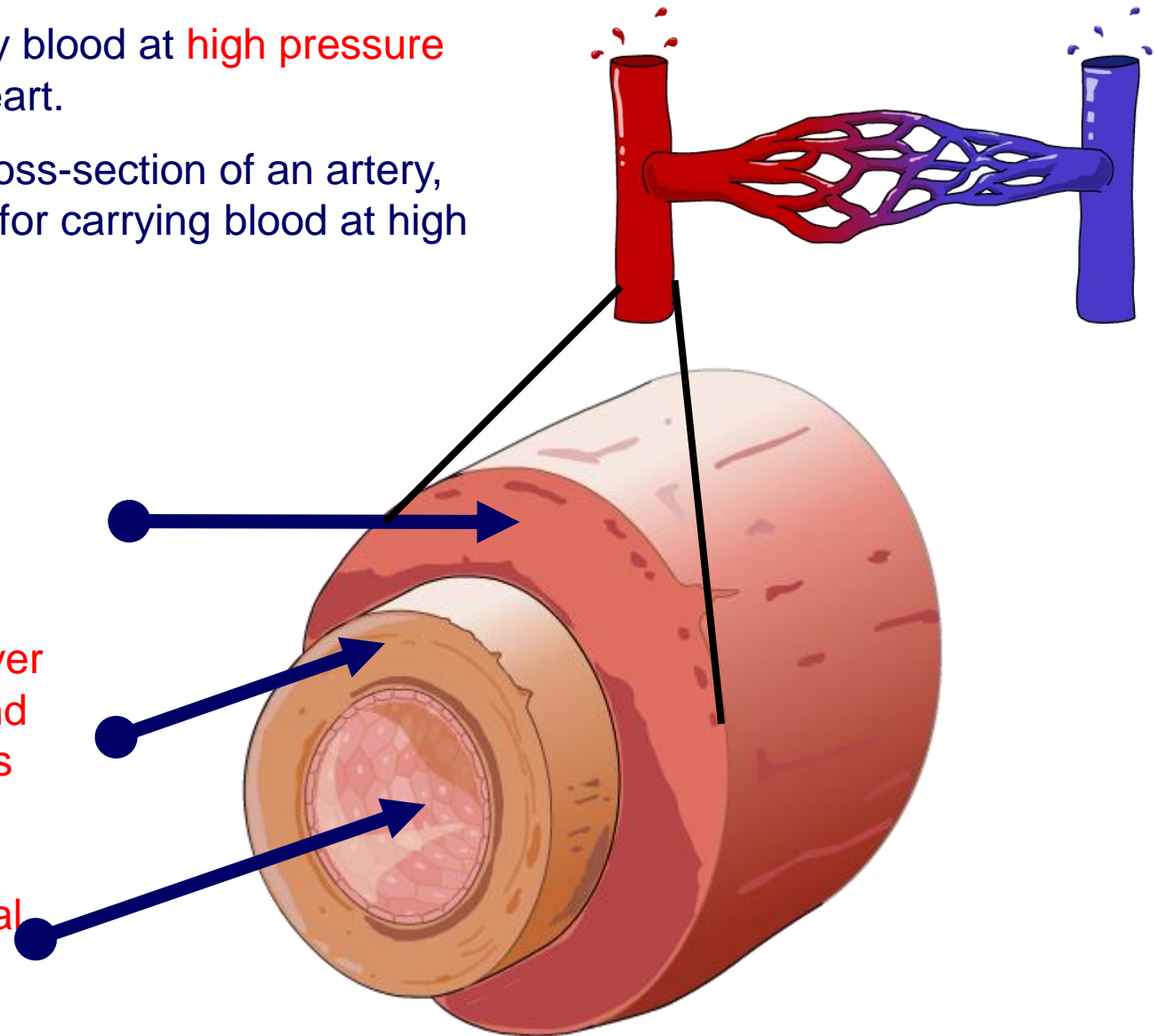
The arteries carry blood at **high pressure** away from the heart.

Looking at the cross-section of an artery, why is it suitable for carrying blood at high pressure?

thick outer wall

thick inner layer
of muscle and
elastic fibres

narrow central
tube



Arteries

The **elastic** tissue in the walls allows them to **stretch** as blood is pushed out of the ventricles at **high pressure** and **recoil** as the ventricles refill.

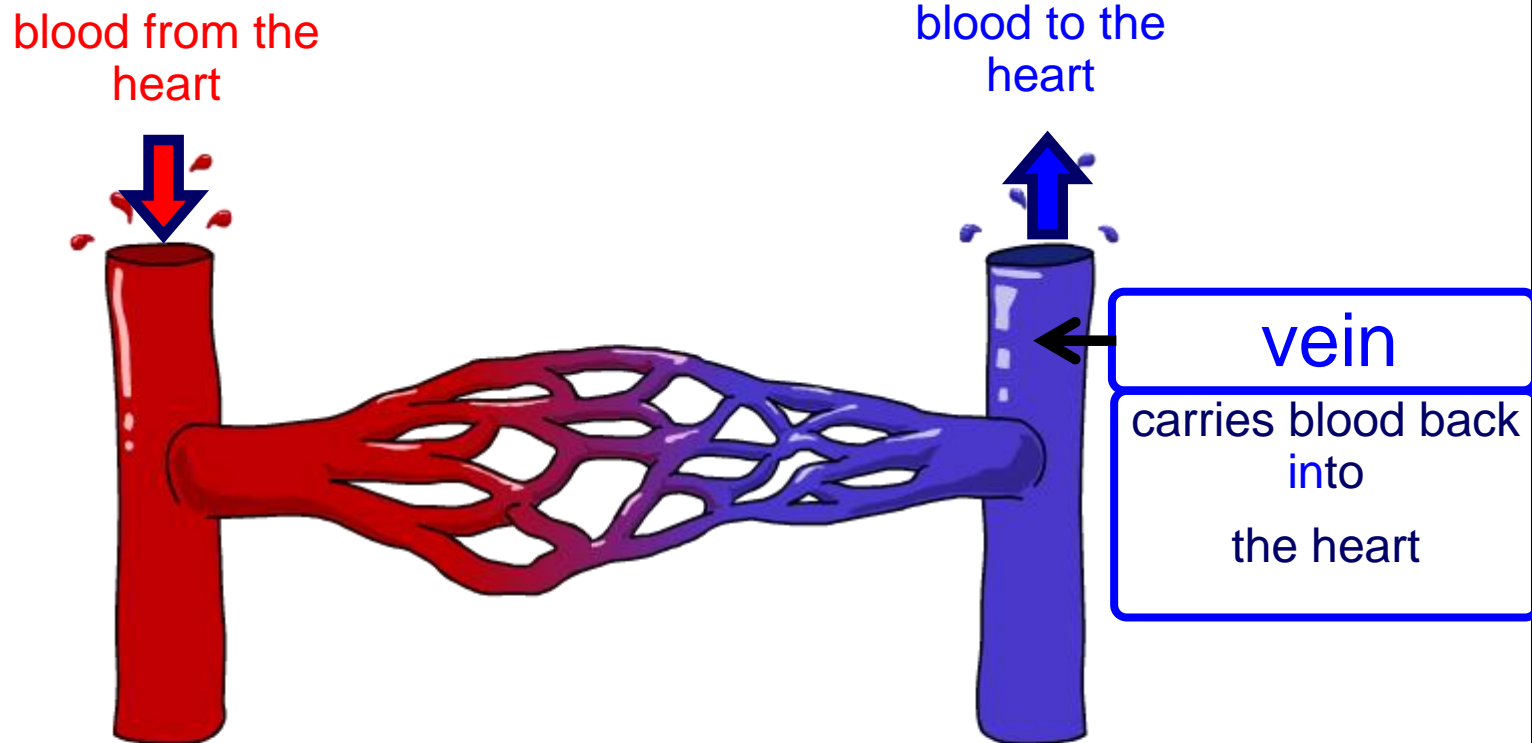
Thick muscle helps to withstand high pressure

The **pulse** is felt as the blood is forced through the arteries.

**ARTERIES DO NOT PUMP
BLOOD!!!**

WHAT IS A VEIN?

- Veins are the blood vessels that carry blood **back into** the heart.



Blood that travels from the body's cells to the heart along the veins is **oxygen-poor**.

Is this oxygen-poor blood under high or low pressure as it returns to the heart?

Veins

Blood is at **low pressure**, therefore veins contain **less elastic** and muscle tissue.

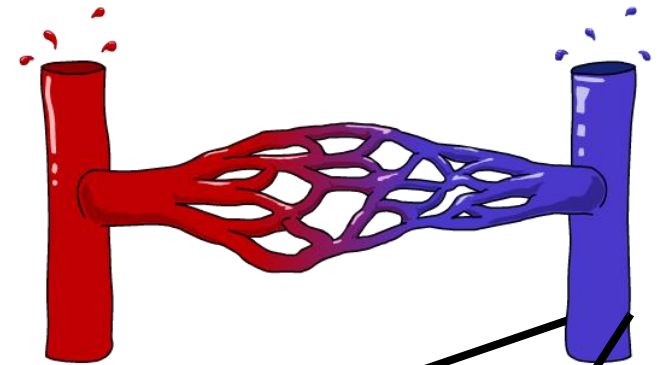
The walls have one way **valves** to ensure all blood returns to the heart.

Most large veins are found deep inside skeletal muscle. As this contracts it helps to push the blood towards the heart.

CROSS-SECTION OF A VEIN

- The veins carry blood at low pressure back into the heart.

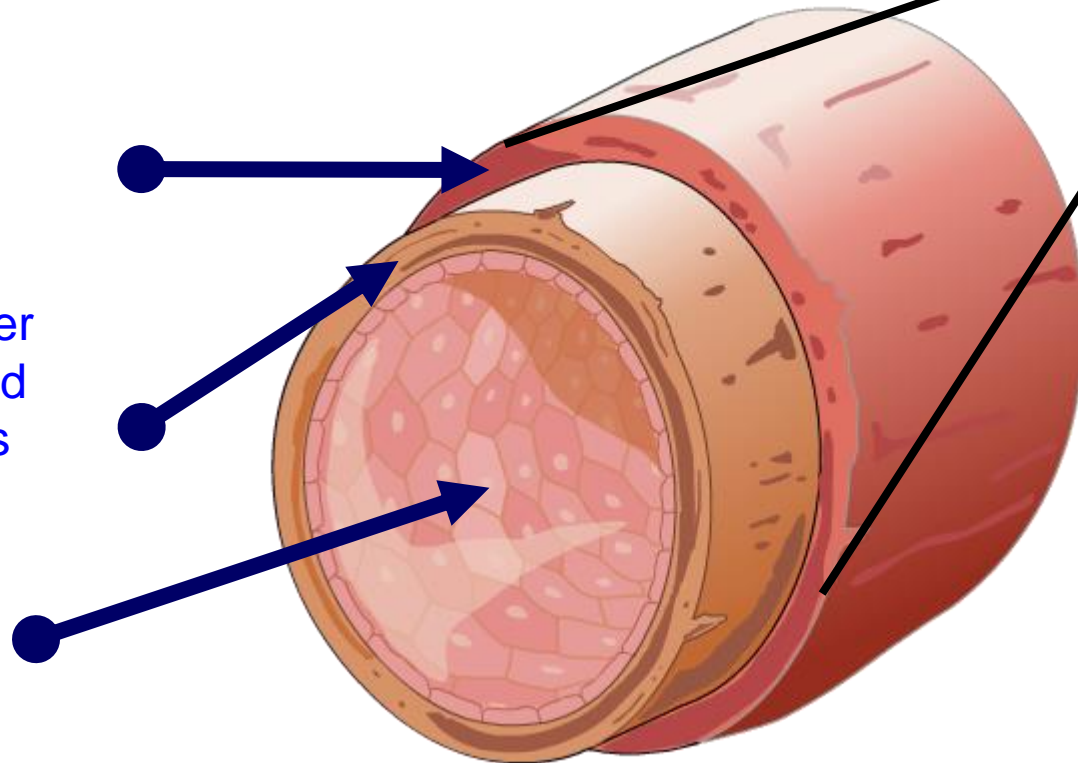
Looking at the cross-section of a vein, why is it suitable for carrying blood at low pressure?



thin outer wall

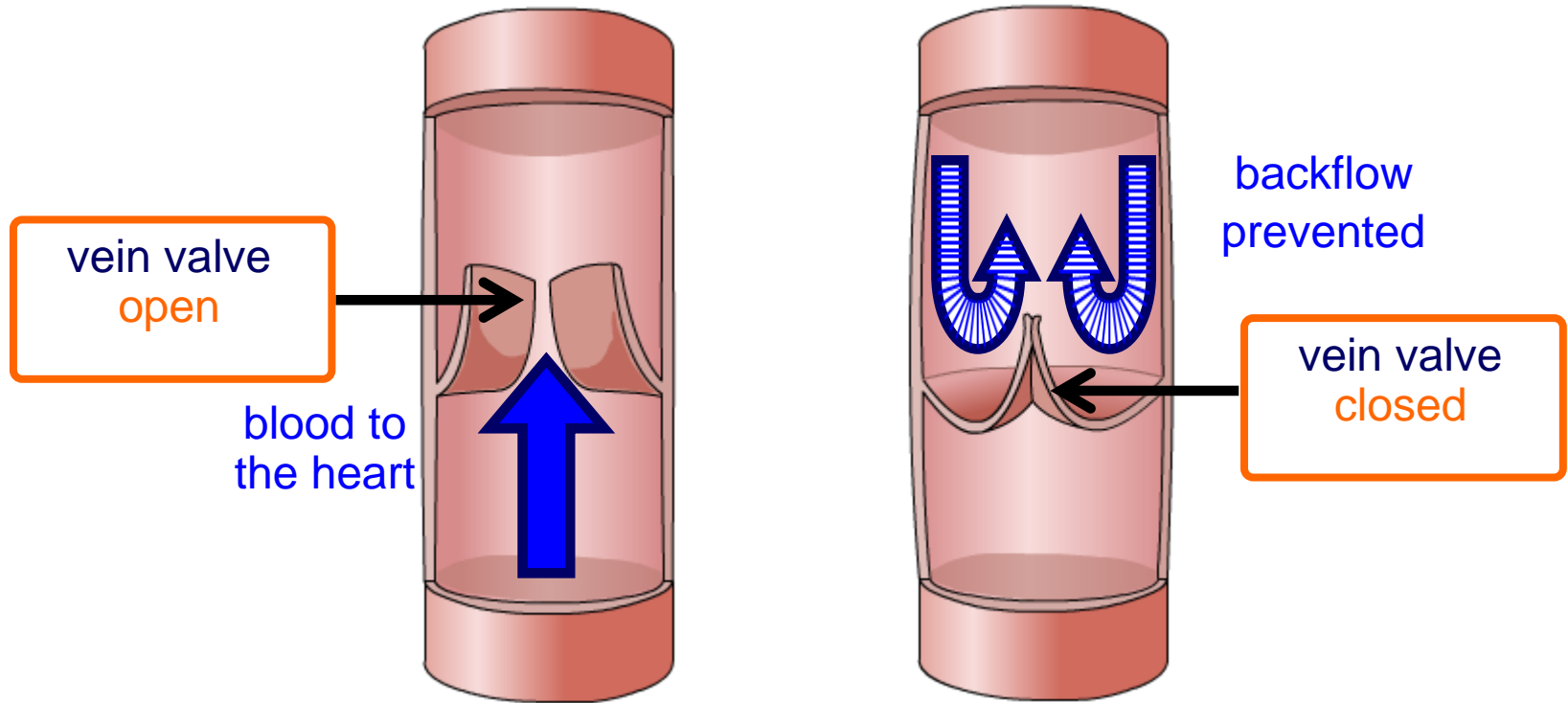
thin inner layer
of muscle and
elastic fibres

wide
central tube



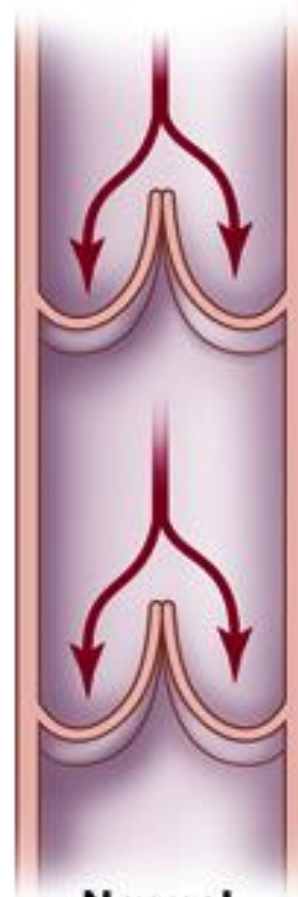
BLOOD FLOW IN VEINS – VALVES

- Veins have valves to prevent backflow.



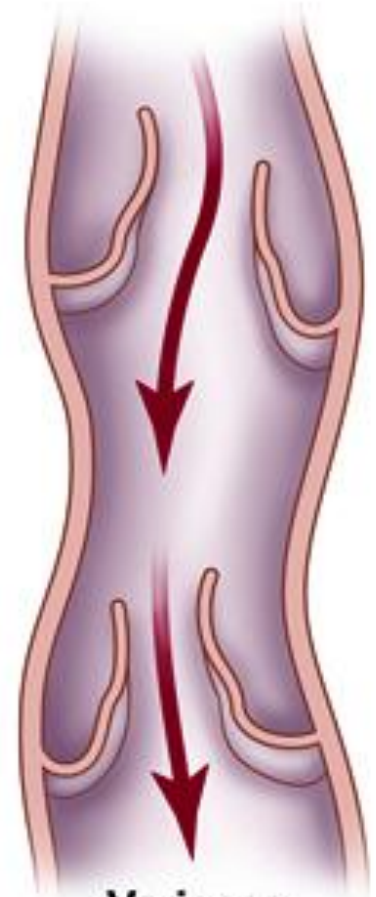
When blood flows along veins it pushes past the valves, which can only open in one direction.

If blood in a vein does flow backwards, it is trapped by closed valves.



**Normal
vein**

Copyright
SVS 2004

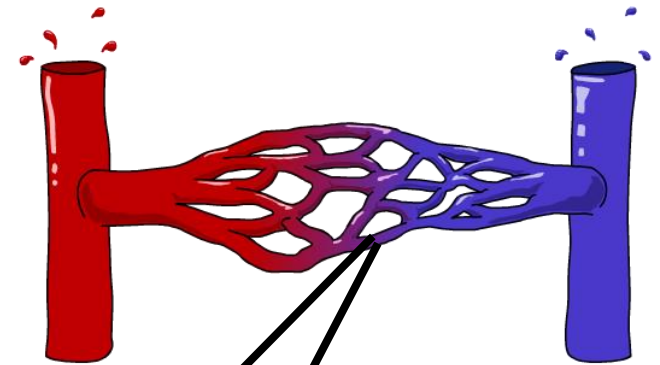


**Varicose
vein**

CROSS-SECTION OF A CAPILLARY

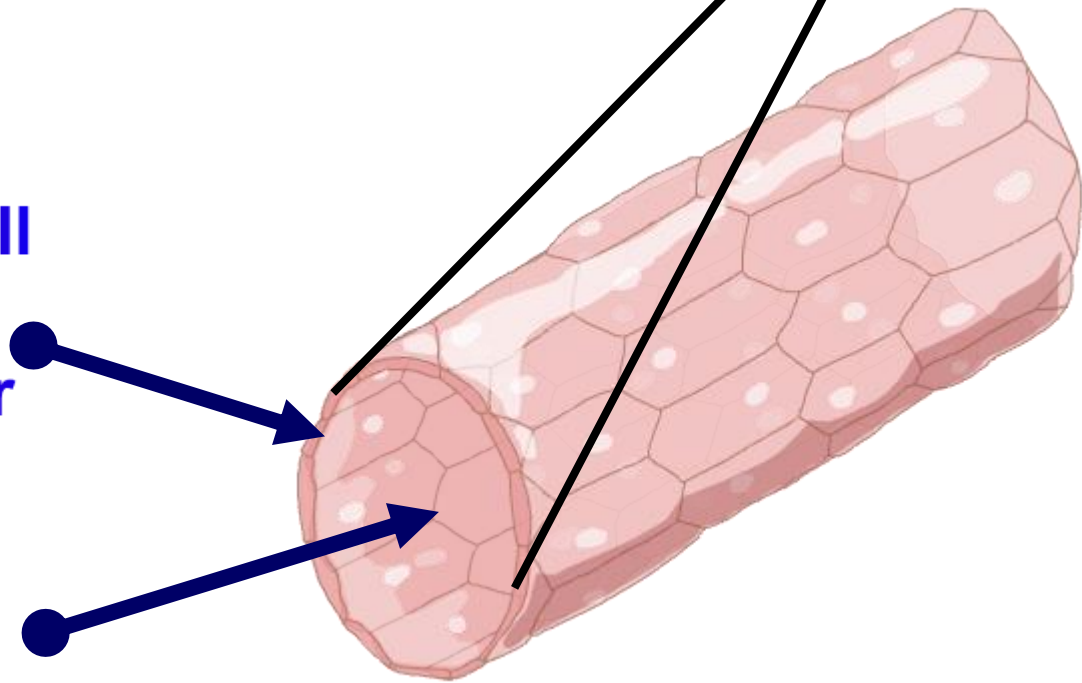
- The capillaries carry blood to and from the body's cells.

Looking at the cross-section of a capillary, why is it suitable for the exchange of substances between the blood and body cells?

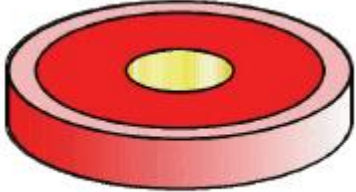
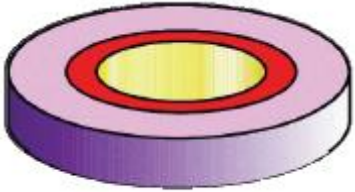
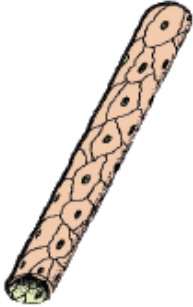


very thin wall
made of a
single layer
of cells

narrow
central tube



BLOOD VESSELS – TO SUMMARISE

Blood vessel	Artery	Vein	Capillary
Picture			
Carries blood...	Away from the heart	Into the heart	From small arteries to small veins
Walls	Very thick. Lots of muscle and elastic tissue	Thinner than artery walls	One cell thick. 'Leaky' to allow exchange of substances with tissues
Valves	None	Present to prevent backflow	None
Pressure	High	Low	Drops quickly as fluid enters tissues

Drag the characteristics of each blood vessel to the correct place in the table.

Carries blood to the heart

Blood flows at medium pressure

The vessel wall is one cell thick

Takes blood away from the heart

Contains low oxygen levels

Blood flows at high pressure

Connects veins to arteries

Contains high oxygen levels

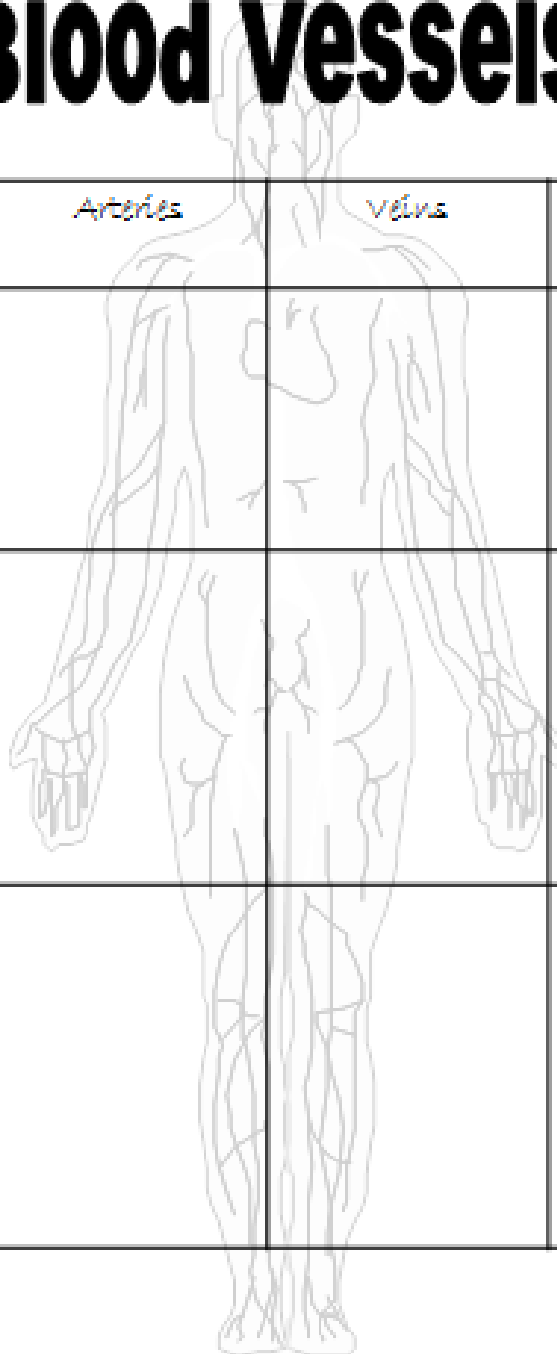
Carries blood between the cells

Artery	Vein	Capillary



Blood Vessels

	<i>Arteries</i>	<i>Veins</i>	<i>Capillaries</i>
<i>What do they do?</i>			
<i>How do they do it?</i>			
<i>Picture</i>			



LEARNING INTENTION

What will I know?

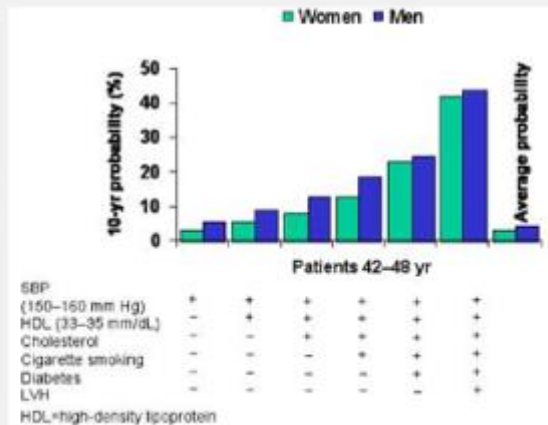
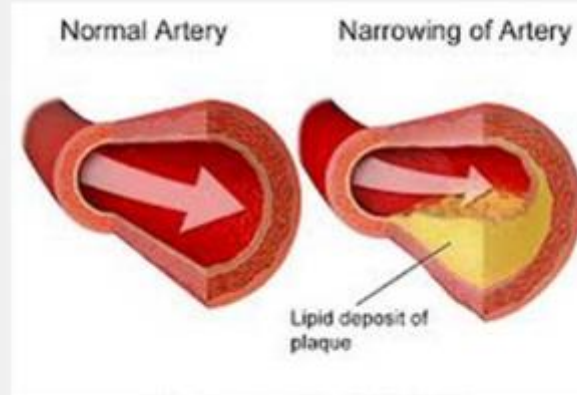
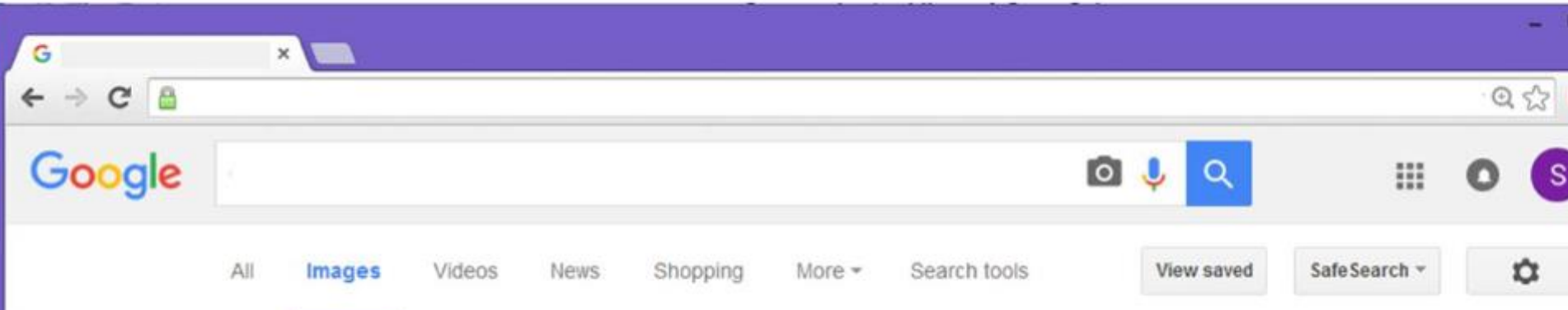
- The link between diet and health.

Success Criteria

I can:

- Describe how a poor diet can lead to a heart attack.
- State the risk factors for heart disease.
- State ways (both lifestyle and diet) of how heart disease can be reduced.

What did I search for?

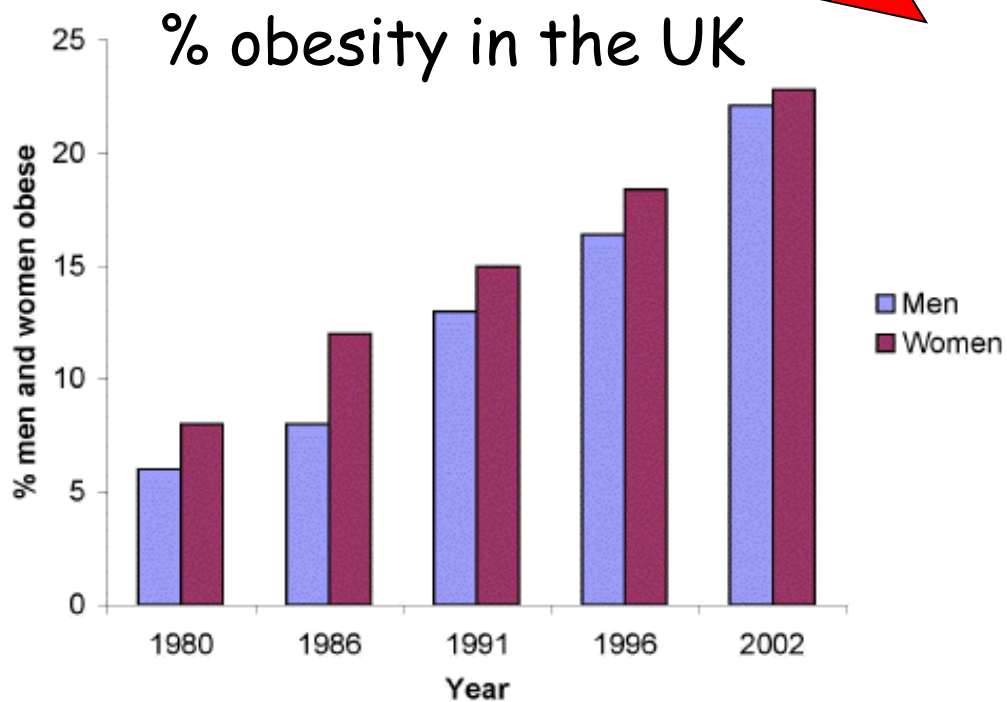
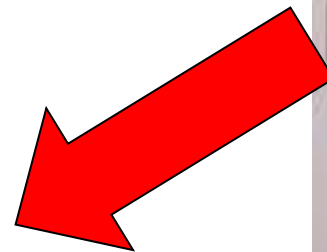
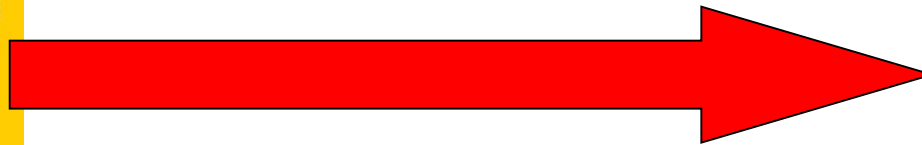


DIET AND HEALTH

There is a clear link between diet and health.

Heart disease is an example of a circulatory disease. Heart disease can cause a **heart attack.**

MODERN DIETS AND HEALTH PROBLEMS



[HTTP://WWW.BBC.CO.UK/EDUCATION/CLIPS/ZQSQ6SG](http://www.bbc.co.uk/education/clips/zqsq6sg)

SOME INTERESTING FACTS

CHD is responsible for more than 73,000 deaths in the UK each year.

About 1 in 6 men and 1 in 10 women die from CHD.

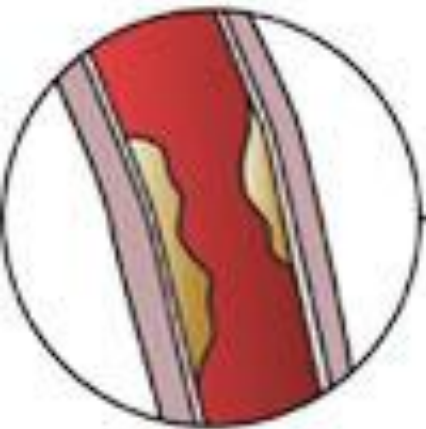
Approx 2.3 million people living in the UK with CHD.



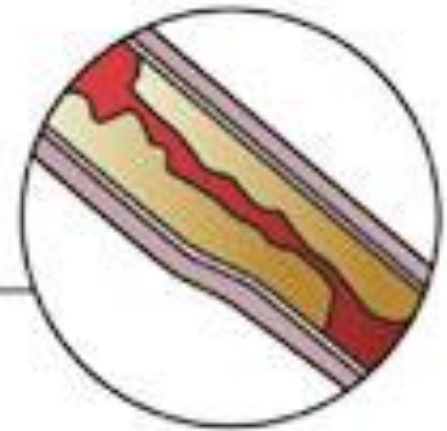
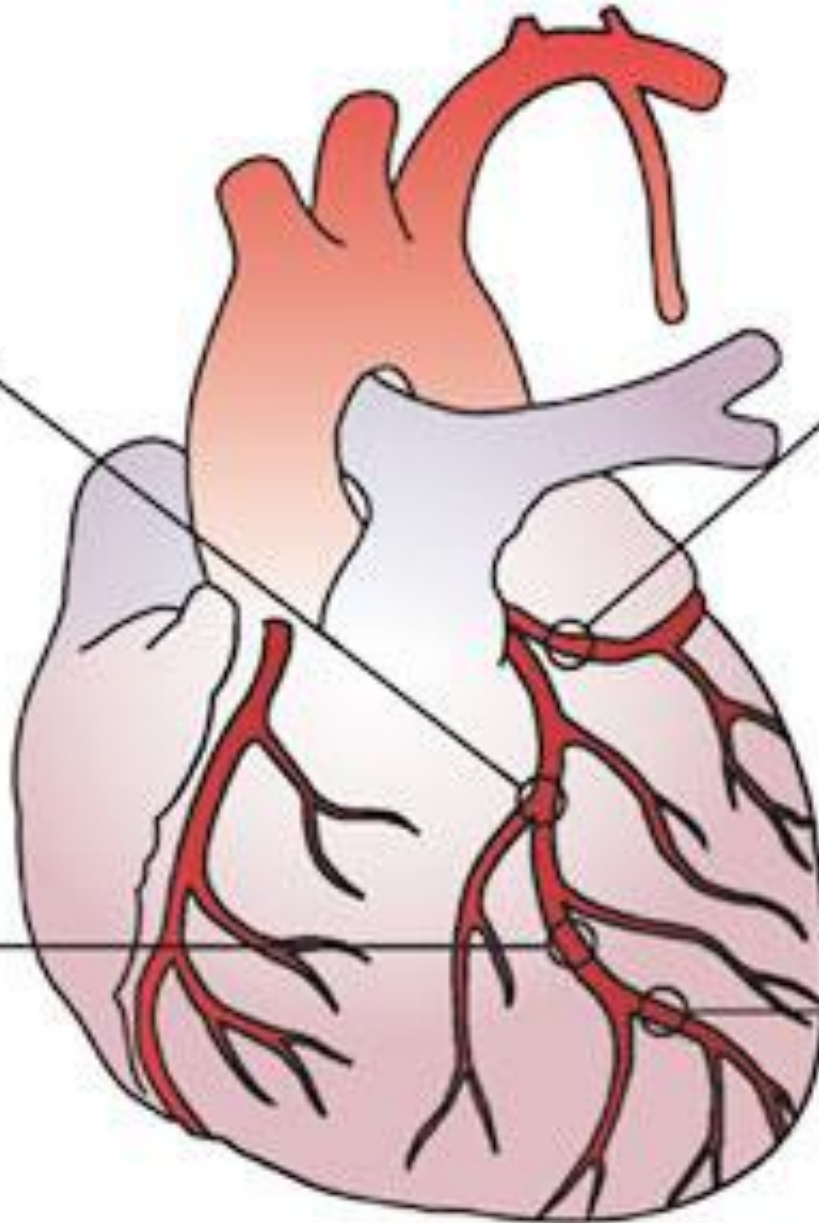
50% blockage



99% blockage



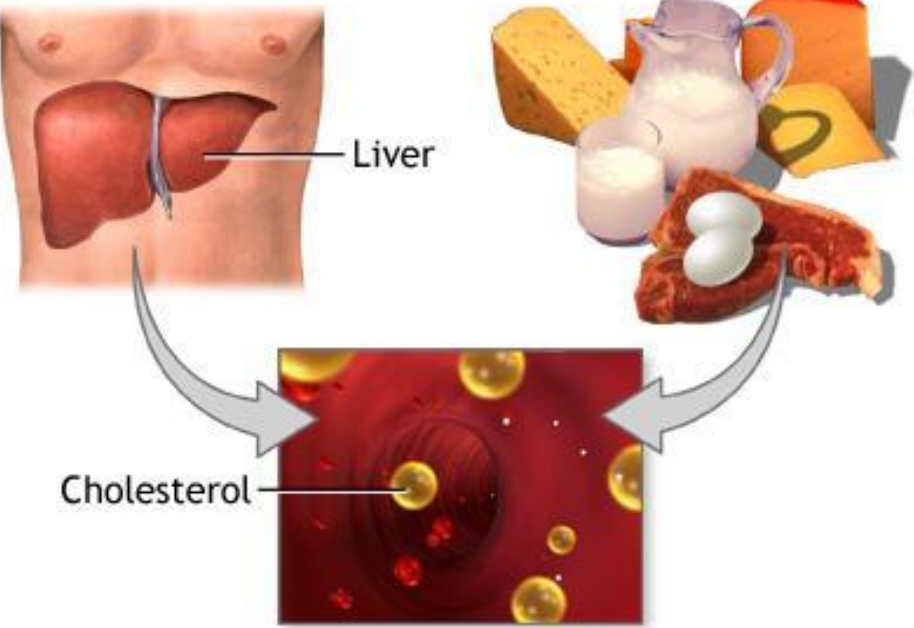
30% blockage



90% blockage

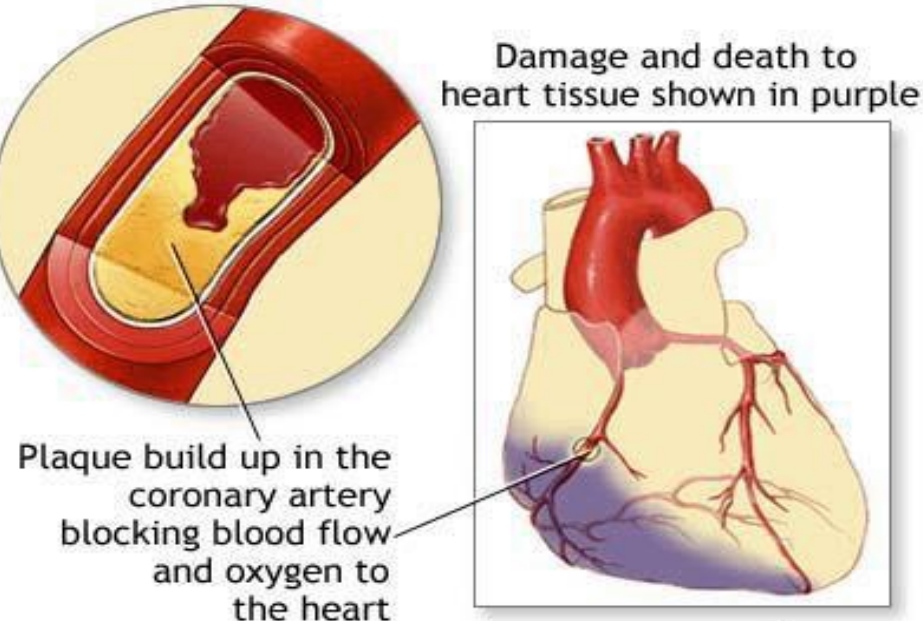
Coronary arteries

Cholesterol is produced by the liver and we consume it from meat and dairy products

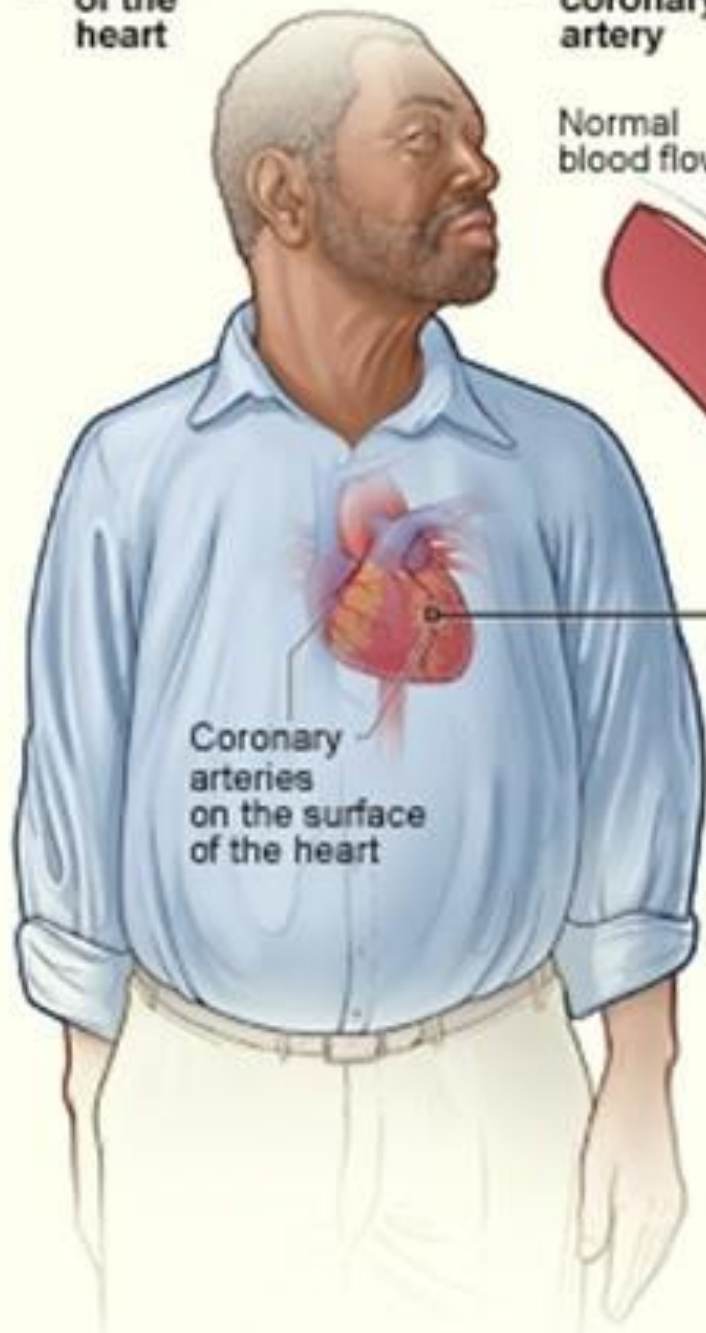


CHOLESTEROL

Cholesterol is a substance found in the blood. It is made in the liver and is needed for healthy cell membranes. However, too much cholesterol in the blood increases the risk of heart disease, and of diseased arteries.

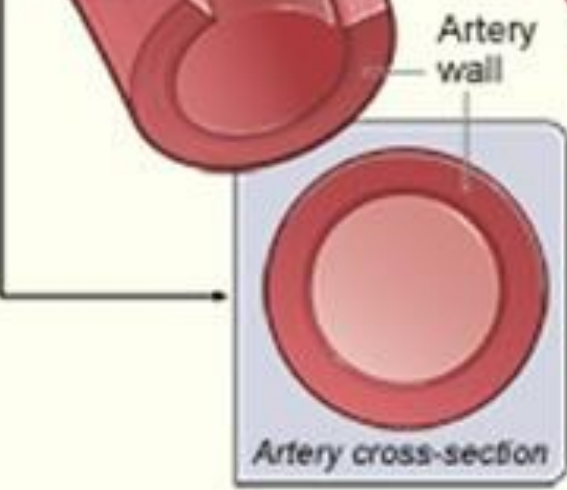


A Location of the heart



B Normal coronary artery

Normal blood flow



C Narrowing of coronary artery


Abnormal blood flow

Plaque



HOW IS DIET A CONTRIBUTING FACTOR?

Cholesterol (a fatty substance) builds up on the **coronary artery walls**.



The **blood flow** to the heart becomes **blocked**.



Oxygen and **Glucose** cannot reach the heart muscle.

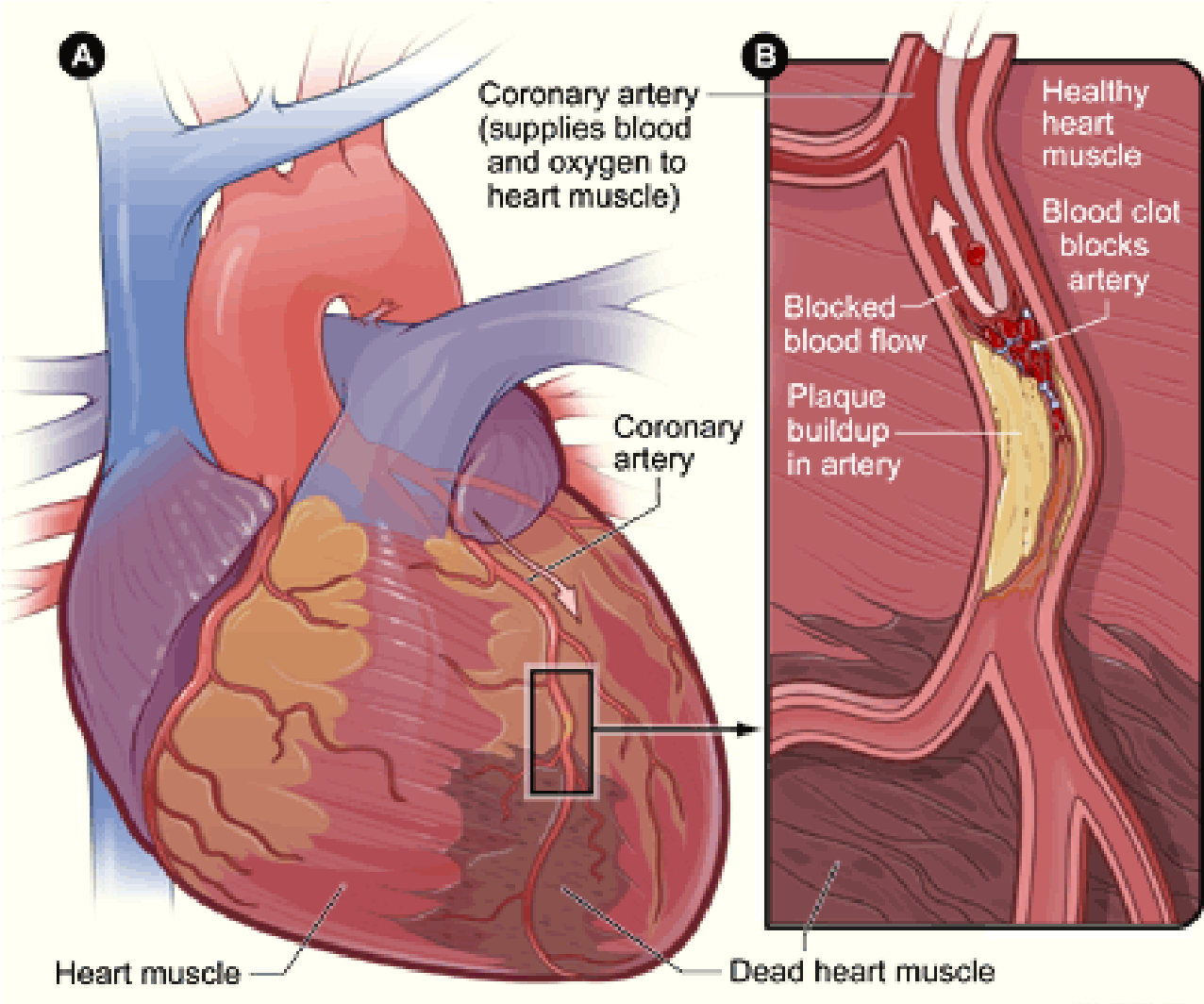


The **heart muscle cells die** as they **cannot respire** to produce **energy**.



Heart muscle cannot contract therefore the heart stops **beating**.

HEART ATTACKS

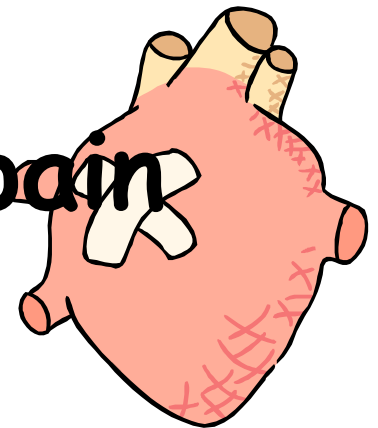


HEART ATTACKS

The muscle cells will respire anaerobically for a short time.

This produces lactic acid and cramp

This is what causes the pain in a heart attack



RISK FACTORS

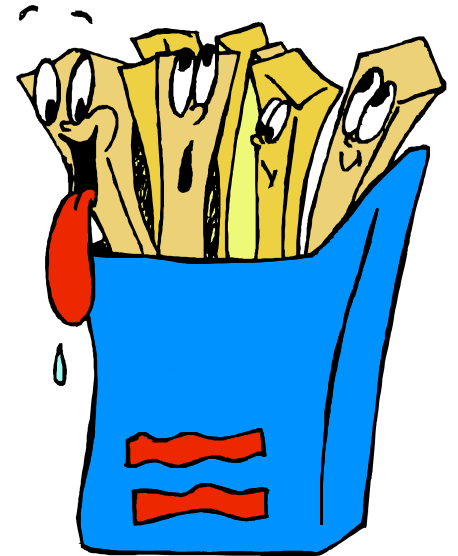
High Cholesterol Diet

Stress

Smoking

Lack of Exercise

High Blood Pressure



factors to reduce CHD

lifestyle



reduce stress

increase exercise

stop smoking



diet

reduce cholesterol level

reduce salt intake

reduce saturated fat intake

“People who have CHD have only themselves to blame. The NHS should not fund their treatment. ”



LEARNING INTENTION

What will I know?

- The link between diet and health.

Success Criteria

I can:

- Prepare a 10 minute presentation which examines the relationship between health and diet and circulatory diseases such as heart disease and strokes.
- OR
- Prepare a poster which could be displayed in a doctor's surgery to illustrate 3 circulatory diseases.

ICT Task

Prepare a 10 minute presentation which examines the relationship between health and diet and circulatory diseases such as heart disease and strokes.

The presentation must include the following:

What are circulatory diseases?

What is coronary heart disease?

What is a stroke?

How does diet contribute to circulatory diseases?

The ways in which heart disease and strokes can be reduced.

The cost of circulatory diseases to society.

An explanation of how the circulatory system benefits from regular exercise.

POSTER

- **In pairs, research circulatory diseases.**

Prepare a poster which could be displayed in a doctor's surgery to illustrate 3 circulatory diseases. It must include:

- a) A description of the disease**
- b) What causes the disease**
- c) How to prevent the disease.**

Remember posters need to be eye catchy, colourful and informative!