

Welcome to OpenUpScience, the weekly magazine from Cambridge Science Centre. In this issue, we're thinking about Blood. We have experiments, activities, quizzes and challenges to explore this fascinating life-giving liquid!



We need blood to keep us alive. It brings oxygen and nutrients to all areas of the body so that they can keep working. At the same time, blood picks up the waste that the different parts of the body don't need anymore and brings them to the part of the body that can get rid of it. On top of all that, blood also fights infections and carries heat around our body! Phew! The blood gets pushed around the body by our hearts which are made of really strong muscles that squeeze and relax to pump the blood.

Spark, Ignite, Fuel, Illuminate

Blood Model in a Bottle

In our blood we have our red blood cells, white blood cells and platelets. Red blood cells transport oxygen from lungs to tissues and give the blood its red colour. White blood cells protect us against disease. Platelets help the blood to clot and form scabs.

We also have plasma. Plasma is a yellow liquid, and transports dissolved substances and nutrients around the body.



What you'll need

- 1 - 2 L Plastic bottle
- Water
- Jug
- Yellow and red food colouring
- Salt
- Oat hoops
- Ziplock bag
- Purple pom poms
- Mini white marshmallows

What to do

1. Make the plasma by pouring around 1-1.5 litre (depending on the size of your bottle) of water into the bottle, add 2 drops of yellow food colouring and one teaspoon of salt (the salt represents the minerals and chemicals dissolved in plasma). Add red food colouring, a drop at a time and mix. Add more red colour until you get a nice, strong blood colour.
2. Make the red blood cells by putting 10 table spoonfuls of oat hoops in the ziplock bag, adding lots of red food colouring and shake to mix. Add more food colouring as required.
3. Add the red coloured hoops to the bottle.
4. Add a handful of mini white marshmallows to the bottle to represent the white blood cells, then add a handful of purple pom poms to represent the platelets (you could use raisins if you don't have pom poms to hand).

Blood Cell Sudoku

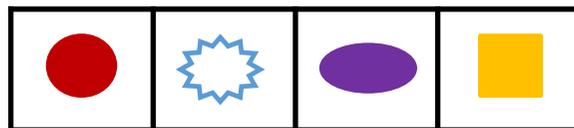
(Answers on back page)



Instructions

Draw in the pictures of the components of blood, shown underneath the grid, following these rules:

- Each column, row and smaller (2x2) block must contain all 4 pictures.
- You cannot have more than one of the same picture in each row, column or smaller (2x2) block.
- You cannot change the pre-filled squares



Red blood cells, white blood cells, platelets, plasma

Where does my blood come from?!

Believe it or not, blood comes from inside your bones! At the centre of your bones is bone marrow and everyday your bone marrow makes 500,000,000,000 blood cells!



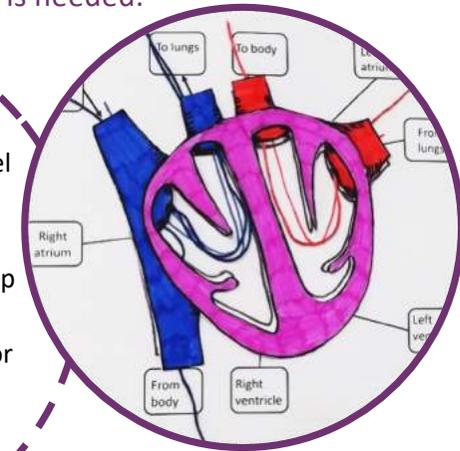
Make a Heart Model



Blood travels in a figure of eight pattern around the heart – it comes in from all round the body and is then pumped to the lungs to collect oxygen. From the lungs it comes back to the heart and is pumped back round the body to take oxygen where it is needed.

What you'll need

- A heart template
- A heart sheet with label boxes
- Paper glue
- Coloured pencils/felt tip pens/paint
- Some coloured string or wool 2 blue and 1 red, approximately 24cm long
- Scissors

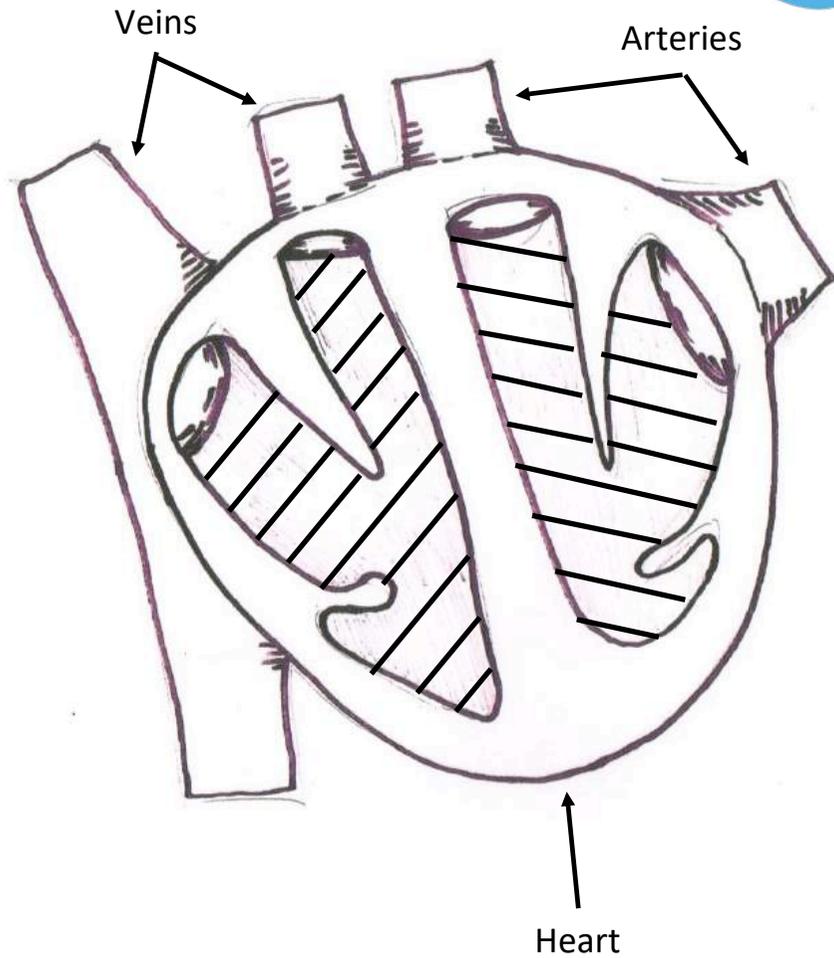


The heart is around the size of your fist. It sits between your lungs in your chest, where it is protected by the rib cage.

What to do

1. On the drawing with the shaded centre, colour in the arteries in red, veins in blue and the heart itself a purple.
2. Cut around the outside of the diagram and the inner chambers (shaded).
3. Take your first piece of blue string. On the heart sheet follow the route through from the body, through the veins, through the heart and to the lungs. Stick the string along this route on the heart sheet. Do the same coming in from the end of the vein from the body with the other piece of string.
4. With the piece of red string, follow the route from the lungs, through the arteries, through the heart and to the body. Stick the string along this route on the heart sheet.
5. Stick the coloured in cut out onto the heart sheet.

Make a Heart Model

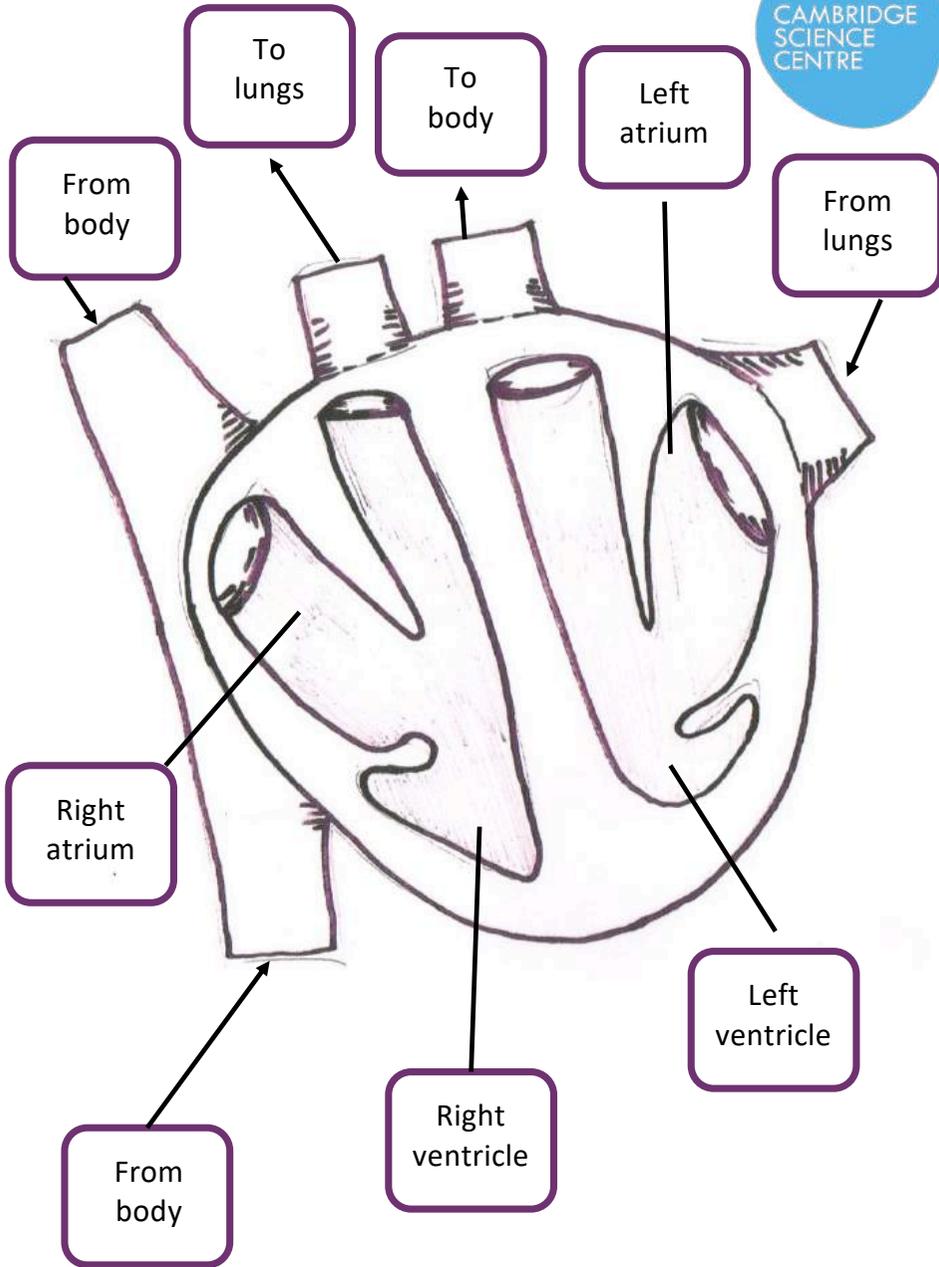


Make a Heart Model



Heart template
Cut out

Make a Heart Model



Make a Heart Model



Heart template
Sheet

Watch your heartbeat

There is a point on your wrist where you can feel your pulse - we're going to use that point and make your pulse more visible.

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What you'll need

- A marshmallow
- A straw
- A stopwatch
- A pair of child-friendly scissors



When you exercise your muscles need more blood and oxygen, so your heart will beat faster.

What to do

1. Gather your equipment.
2. Push the straw into the marshmallow so that it stands upright.
3. Locate your pulse on your left wrist with the fingers of your right hand. You can do this the other way round if you are left handed.
4. With your arm resting on a table or bench, place the marshmallow/straw on the point where you felt your pulse.
5. Keep very still and you will be able to see the straw move with your heartbeat.
6. Use a stopwatch to see how many times your heart beats in 1 minute – This is your heart rate - (it's easier to count for 15 seconds and multiply the number by 4).

What's happening?

From the heart, the blood travels along the arteries. The pulse is what you feel when you press your fingers over an artery as the pressure inside increases following each heartbeat. The heart normally beats between 60-80 times a minute, although it will depend on lots of things like how old you are and what you've been doing in the last few minutes – try jumping and see how your heartbeat changes.

Blood Type Matching

Matching blood types is very important. If you get a blood transfusion of the wrong blood type, your body can start attacking this new blood which can be life threatening! Blood cells express antigens (proteins) on their surface, which determine blood type. Can you work out which blood type each statement is describing?

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A antigens on the red blood cells with anti-B antibodies in the plasma

B

Both A and B antigens, but no antibodies

O

No antigens, but both anti-A and anti-B antibodies in the plasma

A

B antigens on red blood cells with anti-A antibodies in the plasma

AB

Did you know..?

Blood vessels are tubes that move blood to and from your heart. You have about 60,000 miles of blood vessels in your body and a grown up has close to 100,000 miles of blood vessels – that's enough to go around the planet nearly two and a half times!



Blood Test

Lets see how your blood related knowledge is flowing!



1. Where in the body is blood made?

- a) The heart
- b) The arteries
- c) The bones
- d) The brain

2. What part of the blood carries oxygen around the body?

- a) Nutrients
- b) White blood cells
- c) Plasma
- d) Red Blood cells

3. What job do the platelets do?

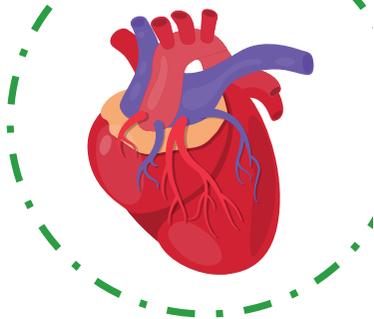
- a) Help to fight infection
- b) Help the blood to clot
- c) Make the blood look red
- d) Keep the blood warm

4. How many miles of blood vessels does an average grown up have?

- a) 100,000 miles
- b) 30,000 miles
- c) 500 miles
- d) 6,000 miles

Why do nurses always have a red pen on them?
In case they need to draw blood!

What is a Vampires favourite fruit?
A blood orange!



This Week's Challenge
Research: Do all animals have red blood?
Let us know what you find out! Send your answers to:
OpenUpScience@cambridgesciencecentre.org

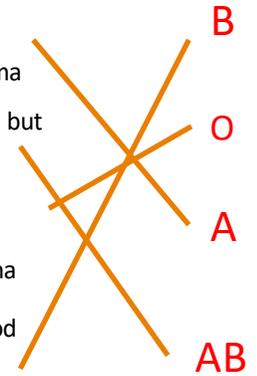
Puzzle Solutions

A antigens on the red blood cells with anti-B antibodies in the plasma

Both A and B antigens, but no antibodies

No antigens, but both anti-A and anti-B antibodies in the plasma

B antigens on red blood cells with anti-A antibodies in the plasma



Next Issue: Maths
Be surprised by some amazing tricks powered by maths

Send us your work! OpenUpScience@cambridgesciencecentre.org

Send us your questions! Look out for the answers on:
[Science@6 - YouTube, Monday, 6pm](#)

Help us improve OpenUpScience! Let us know what you think: link.cambridgesciencecentre.org/feedbackissue9



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Quiz Answers: Q1 – c), Q2 – d), Q3 –b), Q4 – a)