The Spark Magazine

PUZZLES, QUIZZES, EXPERIMENTS

ISSUE No28

TAKE A JOURNEY THROUGH YOUR BODY

HOW DOES YOUR BRAIN WORK?

DISCOVER YOUR LUNG CAPACITY

MAKE YOUR OWN STOMACH

MEET A LAB MANAGER & A MEDICAL DOCTOR

MERCK

GLASGOW SCIENCE CENTRE

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Inside

This issue

Hello!

Welcome to the new edition of The Spark magazine, where we're going to learn all about our amazing bodies! How they work, what the different parts do, and how we can stay healthy and strong!

We'll also meet a **lab manager** and a **medical doctor**.

We've got puzzles, activities and our Bright Sparks quiz too! Time to dive into this exciting edition of The Spark.

Glasgow Science Centre

Share your pics with us!

If you try any of our activities, please show us how they turned out! Share your favourite pictures with us **@GSC1 on X** or **@glasgowsciencecentre on Instagram.**

PUZZLE SPACE

How well do you know your body?

Using the word bank below, draw a line to the matching organ shown inside the body. Then, read on to find out more about them!

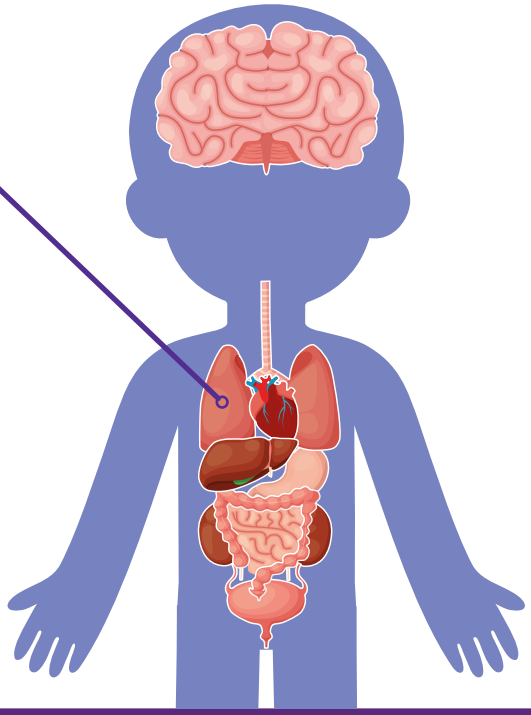
LUNGS

BLADDER

LIVER

BRAIN

STOMACH



HEART

SMALL INTESTINE

LARGE INTESTINE

KIDNEY

Solution on back page

Meet the **Experts**

There are lots of different jobs in medicine. Meet two experts whose job it is to keep you healthy.

Rachael Hewitt – Lab Manager

What do you do?

I specialise in Biosafety testing, which is a fancy way to say that I test drug products, vaccines, and antibodies that people take every day. As Lab Manager, I'm responsible for a team of scientists who work on projects about viruses and bacteria. I also help design new experiments and try to fix tests that fail. To do this I need problem-solving skills and lots of patience!

What's your favourite thing about your job?

No two days are the same. I might be in the lab, analysing data at my computer, or working with robots! There's always something new to learn, and I get to work with a team who are passionate about science.

Favourite food

Cheese – I've yet to find a cheese I don't like!

Both experts loved to read books when they were kids!

Kirsty Thomson – Medical Doctor

What do you do?

I work in a hospital, where I visit older patients who are struggling with their mental health. I arrange special tests, like brain scans, to understand what's going on inside their body. It's my job to make a diagnosis and help them feel better by giving them different types of treatments.

What do you wish people knew about your job?

Being a doctor is not all about being clever at school – you need to be able to communicate with people. If a patient feels comfortable talking to you, they might tell you information that will solve the puzzle to making them feel better!

fun fact

Even though I'm a doctor, I am scared of getting jags!

Feeling Brainy?

Your brain controls everything you do, from thinking and blinking, to sensing the world and being creative. It is always sending and receiving messages.

Your brain is made of 3 main sections:

Cerebrum: This is where your thinking, emotions and memories happen.

Cerebellum: The back part of your brain which controls your balance and movement.

Medulla: In your brainstem, this controls automatic processes like your heartbeat and breathing.

Brain File

Your brain contains around 86 billion microscopic cells called neurons. They send electrical and chemical messages between each other and all around your body.

The structure of your brain changes when you learn something, like a new skill. New connections are made between neurons, the more you practice something, the stronger the connections become.

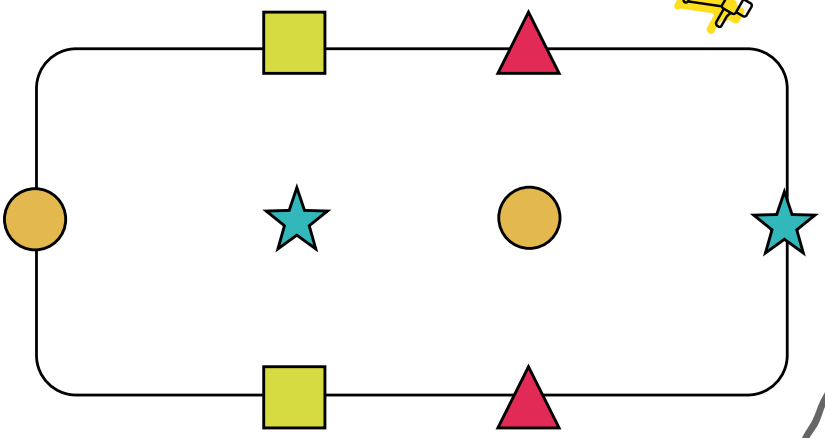
DID YOU KNOW?!

You have more than **5 senses!** You also have a sense of balance, temperature, pain, motion, and many more. Your brain uses all your senses to make decisions.

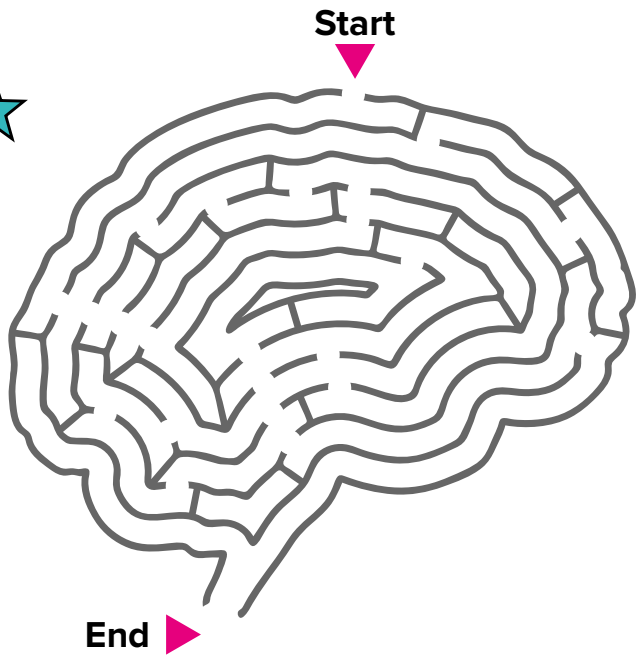
Brain Bashers

Loopy Shapes

Can you connect each similar shape together with a line? The lines cannot touch or go outside the rectangular box.



Brain Maze



Look at the upside-down picture of Adele. Notice anything unusual? Now, turn her the right way up.

Did you notice her mouth and eyes have been flipped?

Our brains don't process images of the whole face. Instead, they tend to recognise individual features like the mouth and eyes.

The Thatcher Effect was created in 1980 by Peter Thompson, University of York.

Check out some of our favourite brain bending exhibits.


Wacky Salon


Ames Room


Floating head

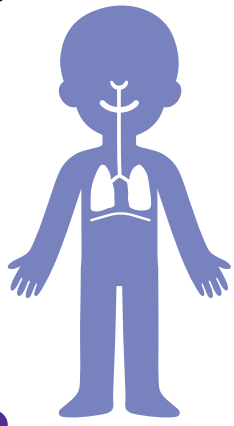
Take a **deep breath in!**

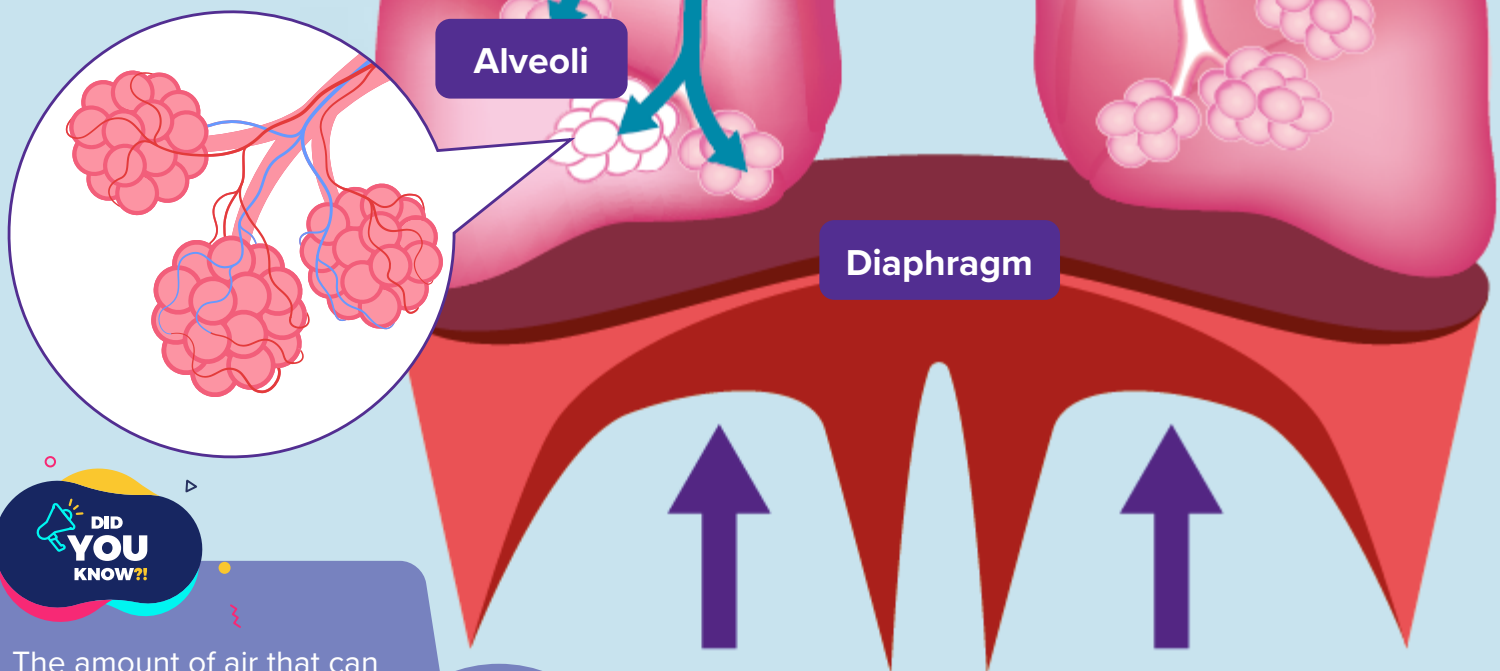
We need oxygen to live, and we breathe that oxygen in through our lungs. Let's follow the journey oxygen takes through our airways!

1. We inhale air through our mouth and nose, which then moves down our **trachea** (sometimes called our **'windpipe'**) into the **lungs**.

2. The tubes in our lungs are called **bronchi** and **bronchioles**. They split off from each other, like branches on a tree! The air moves from our lungs into these tubes and then into our air sacs, which are called **alveoli**.

3. In the alveoli, the **oxygen** in the air passes into our blood, then moves around our body. Our blood also moves **carbon dioxide** into the alveoli, which we then breathe out.





DID YOU KNOW?!

The amount of air that can be held in the lungs varies from person to person. An average person breathes in around 6 litres of air each minute. That's equal to 3 big bottles of fizzy drink!

Your **diaphragm** is a sheet of muscle which moves air in and out of your lungs. When the diaphragm spasms, this causes hiccups!

How much air is in there?

ACTIVITY

Your lung capacity is the volume of air in your lungs. Many different things can affect how much air our lungs can hold, from age, lifestyle and illness. How much air can YOUR lungs hold?

Make your own Spirometer

Follow along with our instruction video here:

What will you need?

- An adult to help you
- A large bottle (3-5 litres volume)
- Measuring jug
- Water
- A bendy straw
- A large tub
- Masking tape
- A pen
- Scissors

What to do

Step 1. Stick masking tape along the length of the bottle.

Step 2. Use the measuring jug to add 250 ml of water to the bottle. With your pen, mark the water level on the strip of masking tape.

Step 3. Repeat step 2 until the bottle is full.

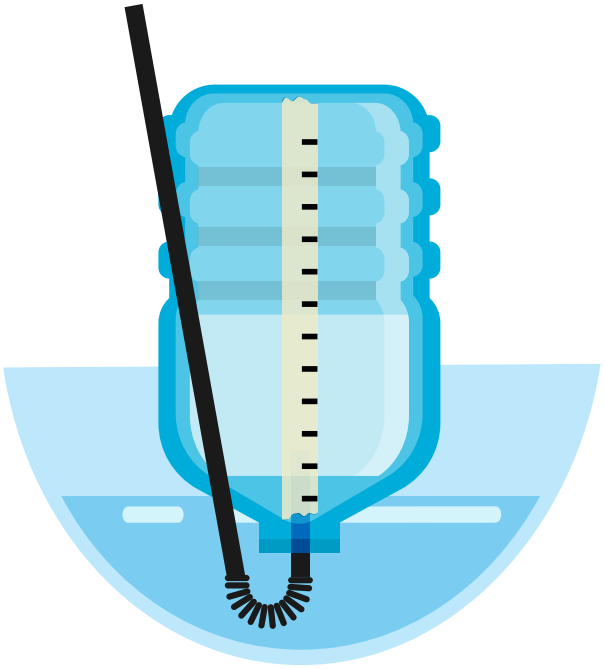
Step 4. Fill the large tub with around 10 cm of water and place the large bottle upright in the tub.

Step 5. Place your hand over the top of the bottle. Invert the bottle into the tub of water. Don't remove your hand until the bottle neck is under the water.

Step 6. Insert the short end of the bendy straw into the neck of the bottle.

Step 7. Holding the straw, take a deep breath and blow slowly into the straw until there is no air left in your lungs.

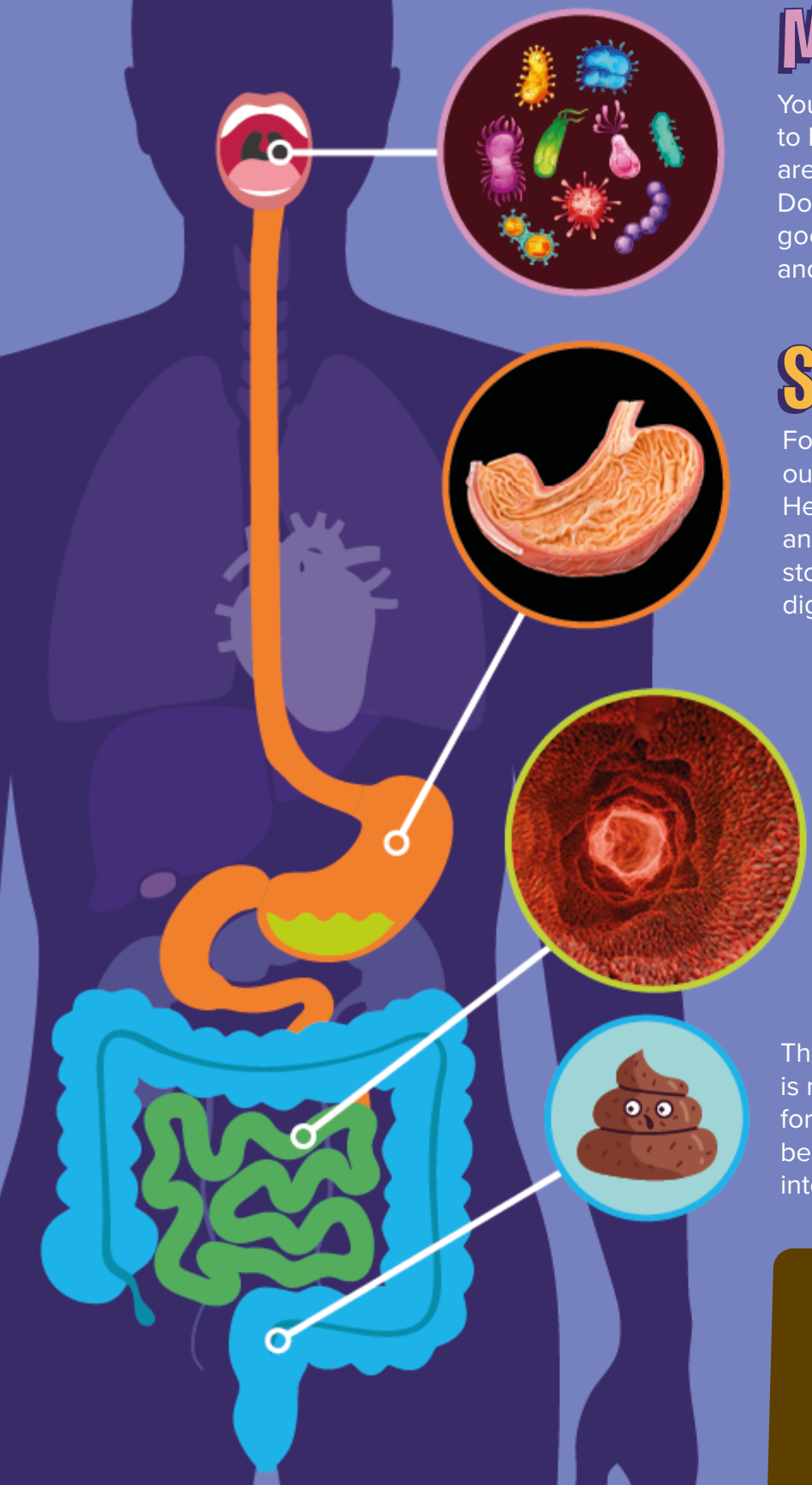
Step 8. Measure how much air is now in the bottle (count the marks). To calculate your lung capacity, multiply the number of marks by 250 and then divide by 1000. e.g. 13 marks x 250 = 3250 ml / 1000 = 3.25 litres.



WHAT IS HAPPENING?

Blowing into the bottle displaced a volume of water and replaced it with air. You measured the maximum amount of air you could exhale after a deep breath. A normal healthy adult has a lung capacity between 3 and 5 litres. A doctor might use a spirometer to test for symptoms of conditions like asthma.

DISGUSTING DIGESTION



Mouth

You use your **teeth**, **tongue** and **saliva** to break down food. But our **mouths** are also home to billions of **bacteria**! Don't worry, these bacteria are the good kind. They break down food and reduce the risk of some diseases.

Stomach

Food travels from our mouth, down our **oesophagus**, and into our **stomach**. Here, the stomach muscles squeeze and break the food down and mix it with stomach acid. This gives us a partly-digested mixture called **chyme** - eww!

Intestines

The **small intestine** is where all the nutrients and water are absorbed from your food. It is around **6.5 metres** long and covered in tiny hair-like folds called villi! These help absorb the nutrients from food.

The **large intestine** is where **faeces** is made (that's just the science word for poo!). It's called the large intestine because it is wider than the small intestine, even though it is shorter.

WHAT IS POO?

Poo is the waste that is left behind when all your food has been digested. But it's not just your food waste that makes up poo. Scientists estimate there are around **100 billion bacteria** in each gram of poo!

DIY Stomach

ACTIVITY

Doctors can learn lots of information from your poo! They use tools like the **Bristol stool chart** to see how healthy your poo is. Try it out with our stinkingly good activity.

What will you need?

- An adult's supervision
- Clear reusable sandwich bag with a good seal
- Tin of soup (chunky is best!)
- Oats
- Water
- Big spoon
- Sieve
- Large bowl
- Kitchen roll

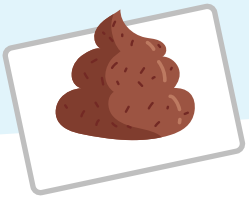
What to do

Step 1. Your sandwich bag is your fake stomach. Add the soup, oats and water into your fake stomach and seal it tightly. (Add some sauce for an extra smelly belly!)

Step 2. Now you are going to act as the stomach muscles. Squish all the ingredients together inside your fake stomach, being careful not to squeeze too hard!

Step 3. The food now moves into our intestines, where all the water and nutrients are absorbed. Put your sieve over your bowl and pour the contents of your fake stomach into it. Use your spoon to smoosh all the water out, until you have a lumpy and dry-ish blob left over.

Step 4. This blob is your waste product. That's right, it's poo! Using kitchen roll, pick it up and hold it. Compare it to the **Bristol Stool Chart** below. What type of poo have you created?



Bristol Stool Chart

Type 1

Separate hard lumps, like nuts

Type 2

Lumpy and sausage-like

Type 3

Sausage shaped with cracks

Type 4

Like a smooth, soft sausage, or snake

Type 5

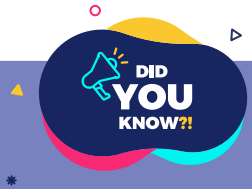
Soft blobs with clear-cut edges

Type 6

Mushy consistency with ragged edges

Type 7

Liquid consistency with no solid pieces - diarrhoea



Did you know? Scientists think **Type 4** is the 'perfect poo'.

Not too hard, not too soft, but just right!

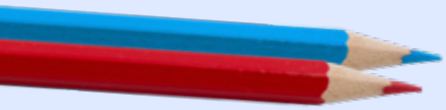
Heart Hero

Colour in the heart:

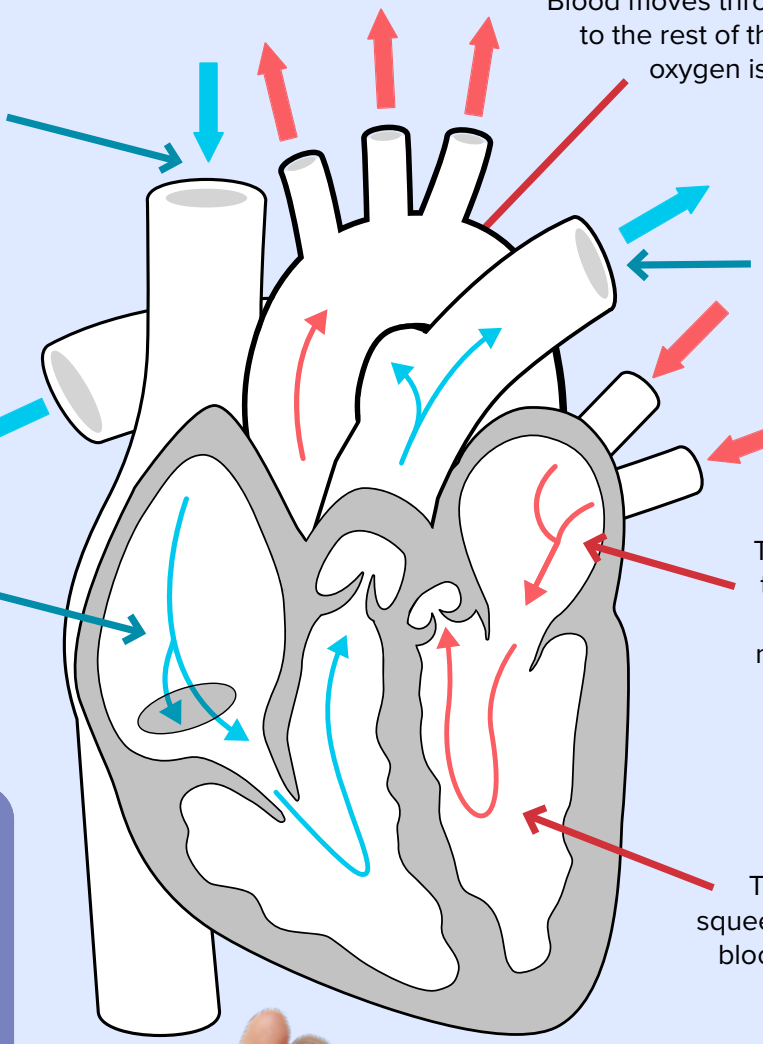
You will need a **red pencil** and a **blue pencil.**

Follow the journey of blood as it gets pumped through your heart. Use a blue pencil to colour where **de-oxygenated** blood flows, and a red pencil where oxygenated blood flows.

Big word of the day!
De-oxygenated means:
Oxygen has been removed.



1. **De-oxygenated** blood enters the heart from the rest of the body. The oxygen has been used up and the blood needs to pick up more.



2. The heart muscle squeezes and pushes the blood out of the heart.

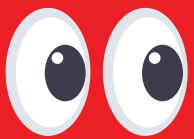
3. The blood leaves the heart and goes to the lungs to pick up oxygen.

4. The blood returns to the heart from the lungs. It is now **oxygenated**.

5. The heart muscle squeezes and pushes the blood out of the heart.

6. Blood moves through your arteries to the rest of the body, where oxygen is needed.

Your blood is always red! However, because of the way light is absorbed and reflected by your skin, your veins might look blue or purple. Veins carry deoxygenated blood back to the heart. This is why it's often shown as blue in diagrams.



Look closely at the inside of your wrist. **Can you spot any veins?**

DID YOU KNOW?!

Your heart beats about **100,000 times** per day, and around **36.5 million times** every year! Your heart is made of cardiac muscle which allows it to keep pumping, even while you sleep.

BRIGHT SPARKS!

Are you a bright spark? Test your knowledge with our tricky questions! Check your answers on the back page.

1 What type of poo is diarrhoea on the Bristol stool chart?

- A) Type 1
- B) Type 2
- C) Type 7

2 Your large intestine is longer than your small intestine.

- True
- False

3 How many neurons are in your brain?

- A) Around 86 thousand
- B) Around 86 million
- C) Around 86 billion

4 What do we use a spirometer to measure?

- A) Lung capacity
- B) Running speed
- C) How much we sweat

5 Which part of your body causes hiccups?

- A) Your heart
- B) Your bladder
- C) Your diaphragm

6 Your blood is always red.

- True
- False

7 Which of the following does not help break down food?

- A) Nostrils
- B) Bacteria
- C) Saliva

8 How many senses do humans have?

- A) Fewer than 5
- B) Exactly 5
- C) More than 5

9 How do you breathe in air?

- A) Through your mouth and nose
- B) Through your eyes and ears
- C) Through your hands and feet

10 Which part of the brain controls balance and movement?

- A) Cerebrum
- B) Cerebellum
- C) Medulla

ABOUT US

Glasgow Science Centre is a 5-star visitor attraction located beside the River Clyde. We are home to hundreds of interactive exhibits where you can discover how the world works.

Glasgow Science Centre is a registered Scottish charity SC030809.

For more information and bookings, visit: our website.

Bright Spark QUIZ ANSWERS

Q1. C A type 7 poo on the Bristol stool chart is diarrhoea.

Q2. False Your small intestine is longer, but your large intestine is wider.

Q3. C There are around 86 billion neurons in your brain.

Q4. A Doctors use a spirometer to measure lung capacity.

Q5. C Your diaphragm causes hiccups when it spasms.

Q6. True Your blood is always red.

Q7. A Nostrils do not help break down food.

Q8. C You have more than 5 senses!

Q9. A You breathe in and out through your mouth and nose.

Q10. B The cerebellum area in your brain controls balance and movement.

WE WANT YOUR FEEDBACK

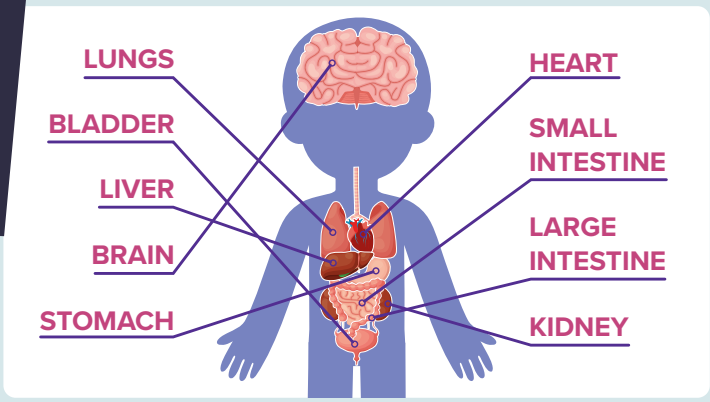
We would love to hear what you think!

We hope you liked this issue, but if you didn't, what could we change? What other things would you like to see? What topics are you most interested in?

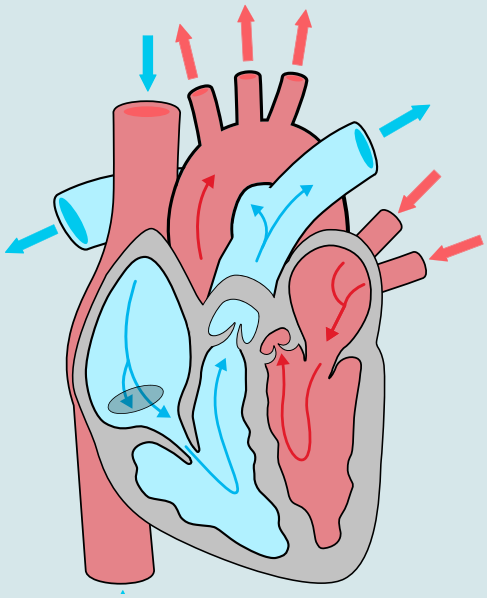
You can send feedback to **CLDteam@GSC.org.uk** or message us on **X @GSC1**

PUZZLE SOLUTIONS

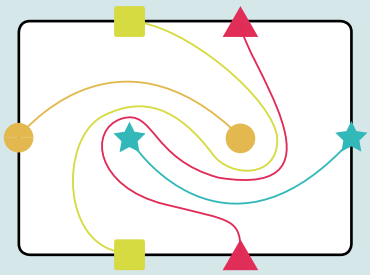
How well do you know your body?



Heart Hero



Loopy Shapes



Brain Maze

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