

## Let's Learn

### What Is the Function of Our Respiratory System?

We take in air from the surroundings and give out air from our body to the surroundings. This process is called **breathing**.

We have learnt in Stage 5 that we need oxygen to live. The oxygen comes from the air we breathe. Our **respiratory system** allows us to breathe. It brings oxygen from the air to our blood so that it can be transported around the body.

Let us look at the parts of our respiratory system and their functions.

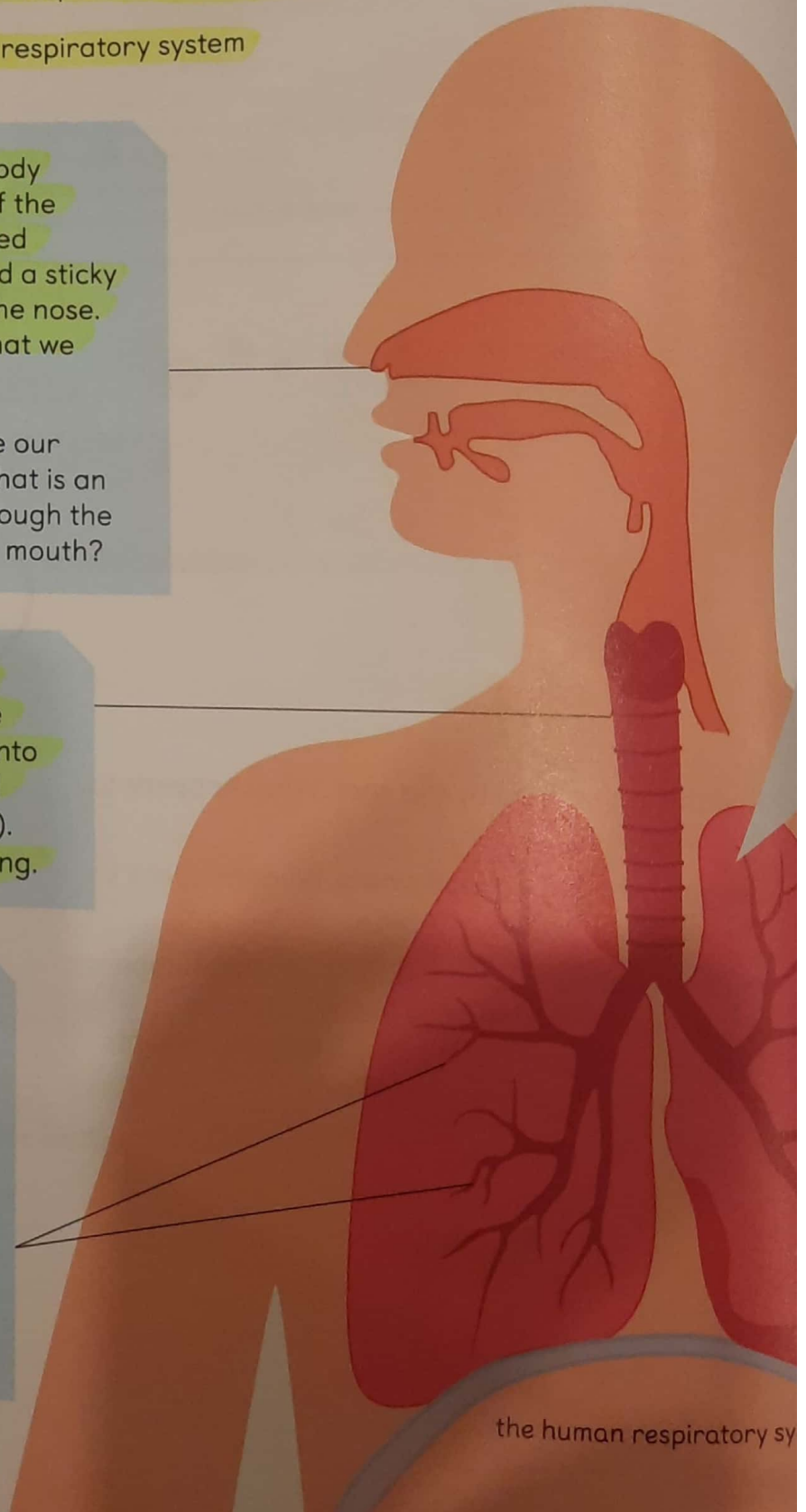
Air enters and leaves our body through the two openings of the nose. The openings are called nostrils. There are hairs and a sticky substance called mucus in the nose. These trap dust in the air that we breathe in.

Air can also enter and leave our body through the mouth. What is an advantage of breathing through the nose instead of through the mouth?

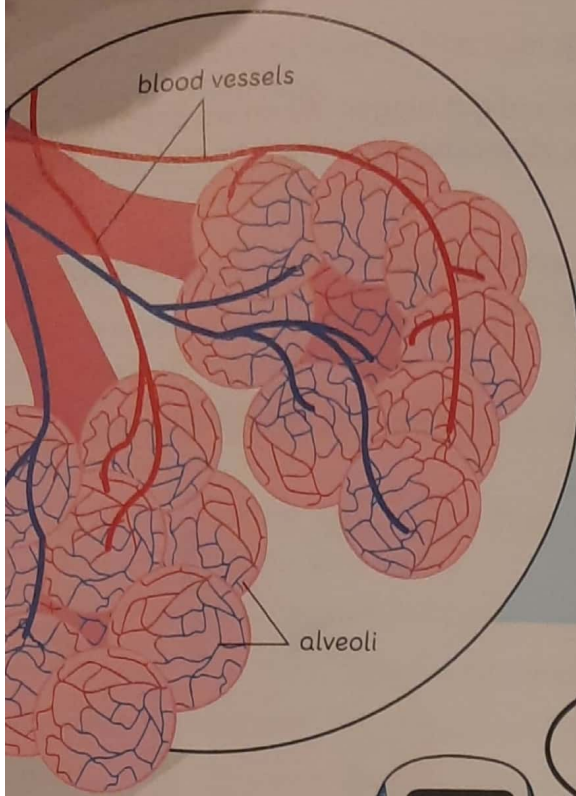
The **trachea** is the main air tube that connects the nose and the lungs. It branches into two smaller air tubes called bronchi (singular: bronchus). Each bronchus leads to a lung.

The **lungs** are sponge-like organs. They fill up with air when we breathe in. The lungs are protected by the ribs.

In the lungs, the bronchi branch into tiny tubes called bronchioles. These bronchioles end in alveoli.



the human respiratory sy



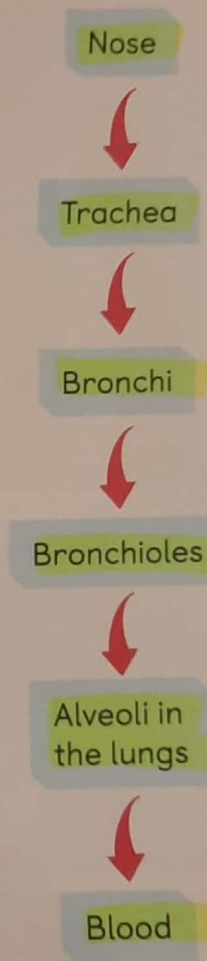
The **alveoli** (singular: **alveolus**) are tiny air sacs that look like bunches of grapes. They are covered with many blood vessels. Blood vessels are tubes that carry blood around the body. The exchange of gases takes place in the alveoli.



What is the advantage of having many blood vessels around the alveoli?

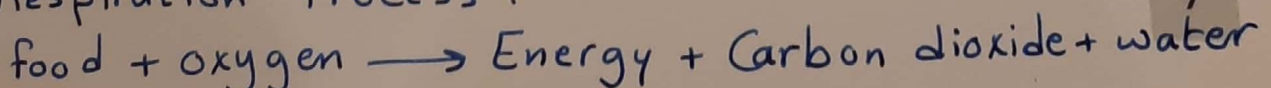
We breathe in or **inhale** air that is rich in oxygen. The air moves down the trachea into the lungs. Oxygen from the air passes through the alveoli into the blood. The blood transports the oxygen around the body. The diagram on the right shows the path of oxygen when we breathe in.

Our body uses oxygen to break down the food we eat to release energy. Carbon dioxide is produced in the process. The blood transports the carbon dioxide to the lungs. The carbon dioxide passes from the blood into the alveoli. It is removed from our body when we breathe out or **exhale**.



We need oxygen to release energy from the food we eat.

Respiration Process :



### Word Boost

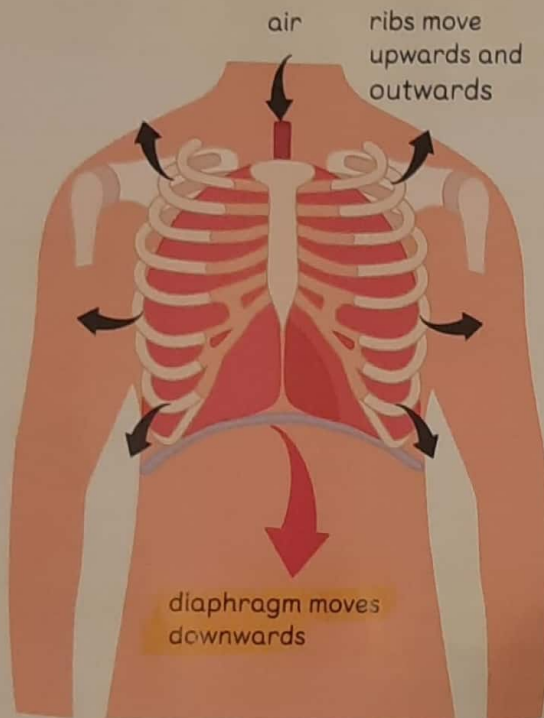
sacs  
exchange

## How Do We Breathe In and Out?

When we breathe in, our lungs fill up with air and get bigger. When we breathe out, our lungs get smaller as air leaves the lungs. How does air move into and out of the lungs easily?

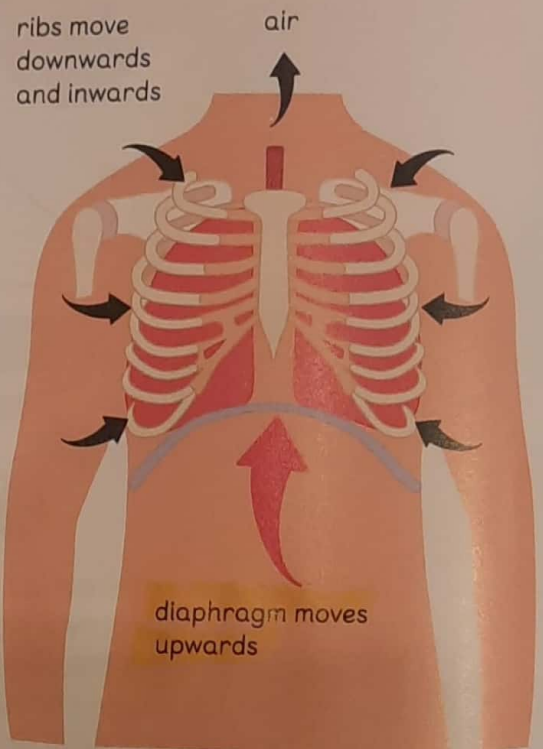
There is a thin sheet of muscle called the diaphragm below our lungs. The diaphragm works with our ribs to help us breathe in and out.

### Breathing in



Our diaphragm contracts and moves downwards. Our ribs move upwards and outwards. This makes our chest bigger, and air enters our lungs.

### Breathing out



Our diaphragm relaxes and moves upwards. Our ribs move downwards and inwards. This makes our chest smaller, and air is pushed out of our lungs.



We use a model to help us understand and describe a scientific event or idea. Look back at the model that you made in the Let's Explore! activity on pages 4 and 5.



Which part of the model represents the diaphragm? Can you describe how your model shows the process of breathing? Think of a way to improve the model to demonstrate the respiratory system more accurately.


**Activity Book**  
Activity IA, p. 1  
Activity IB, p. 3

We breathe in and out all the time. The number of times we breathe in and out in one minute is our **breathing rate**.



How does our breathing rate change when we carry out different physical activities? Let us find out.

1. Use a timer to keep time.
2. Count the number of breaths you take in one minute, while sitting. Record your measurement in a table.
3. Walk on the spot for one minute. Then, count and record the number of breaths you take in one minute.
4. Now, run on the spot for one minute. Then, count and record the number of breaths you take in one minute.
5. What should you do to ensure that your results are reliable?
6. When was your breathing rate the highest? What is the pattern you observe?
7. How can you improve your investigation? Explain why you would like to have those changes.



When we exercise, our body needs more energy.

Our breathing rate increases to bring more oxygen into the blood.

Vertebrate	Does it have nostrils?	Does it have a trachea?	Does it have lungs?
Bird			
Lizard			
Whale			
Cat			

Many vertebrates have a similar respiratory system to humans. Air enters their bodies through the nostrils. The air moves down the trachea into the lungs. In the lungs, the exchange of gases takes place. Oxygen is taken in by the blood and carbon dioxide is removed from the blood. Why do other vertebrates need oxygen?

## Check Your Learning

In which part of our respiratory system does the exchange of gases take place?



Tick (✓) to show what you can do.

- I can describe the human respiratory system.
- I can recognise that many vertebrates have a similar respiratory system.
- I can use a model to illustrate and explain a scientific event.
- I can describe how a model can help us understand a scientific event.
- I can suggest and explain how an investigation could be improved.
- I can create tables to present the results of my measurements when appropriate.
- I can decide when to repeat measurements to get reliable results.
- I can describe patterns in results and identify any unexpected results.
- I can use evidence I have researched in various sources of information to answer questions.

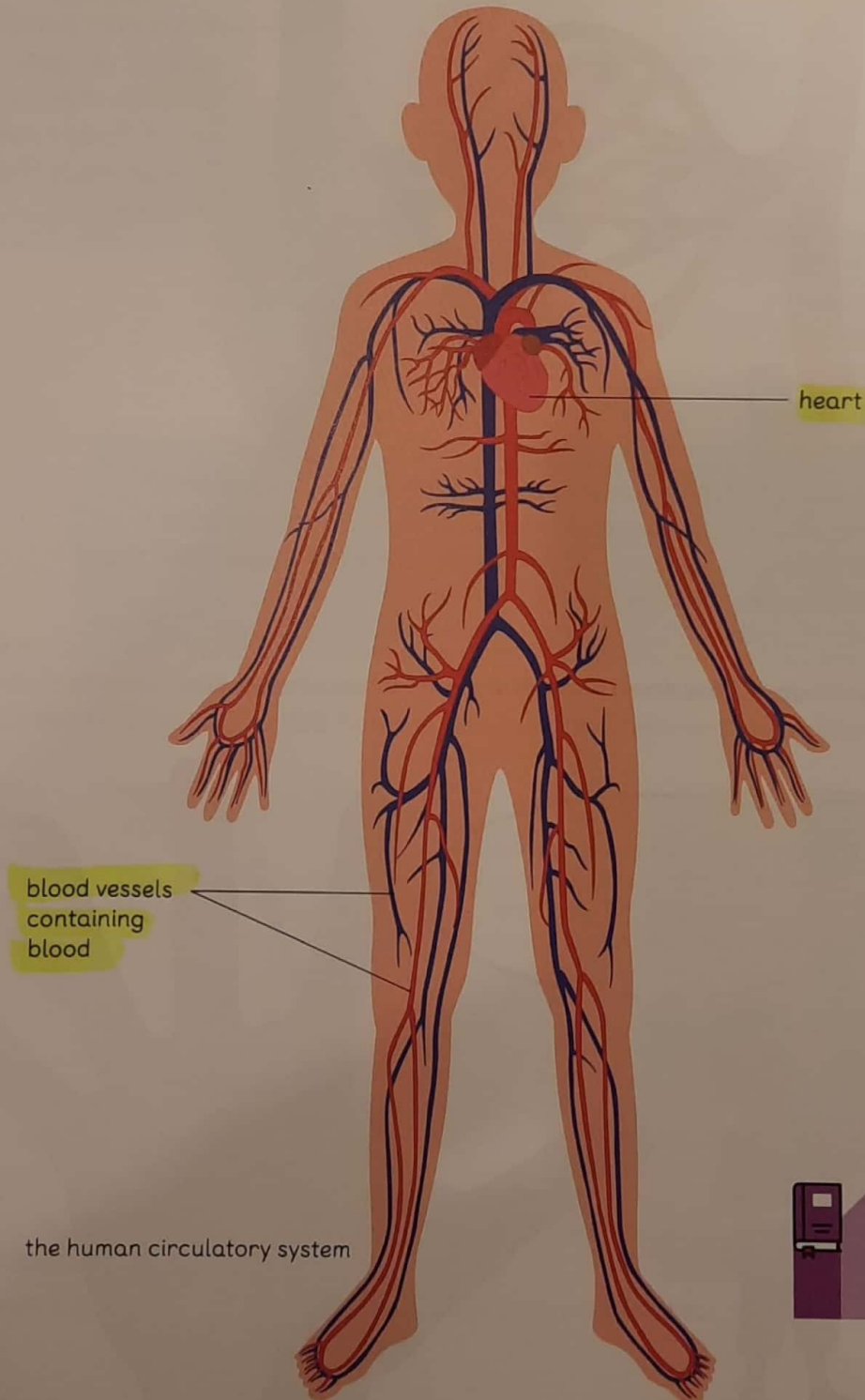
## Let's Learn

### What Is the Function of Our Circulatory System?

We have learnt about the digestion of food in Stage 5. We have also learnt that our body needs oxygen to release energy from the food we eat. How do nutrients from food and oxygen reach every part of our body?

Our **circulatory system** transports useful substances such as nutrients and oxygen to all parts of our body. It also transports waste such as carbon dioxide to parts where it can be removed.

Our circulatory system is made up of blood, blood vessels and the heart.

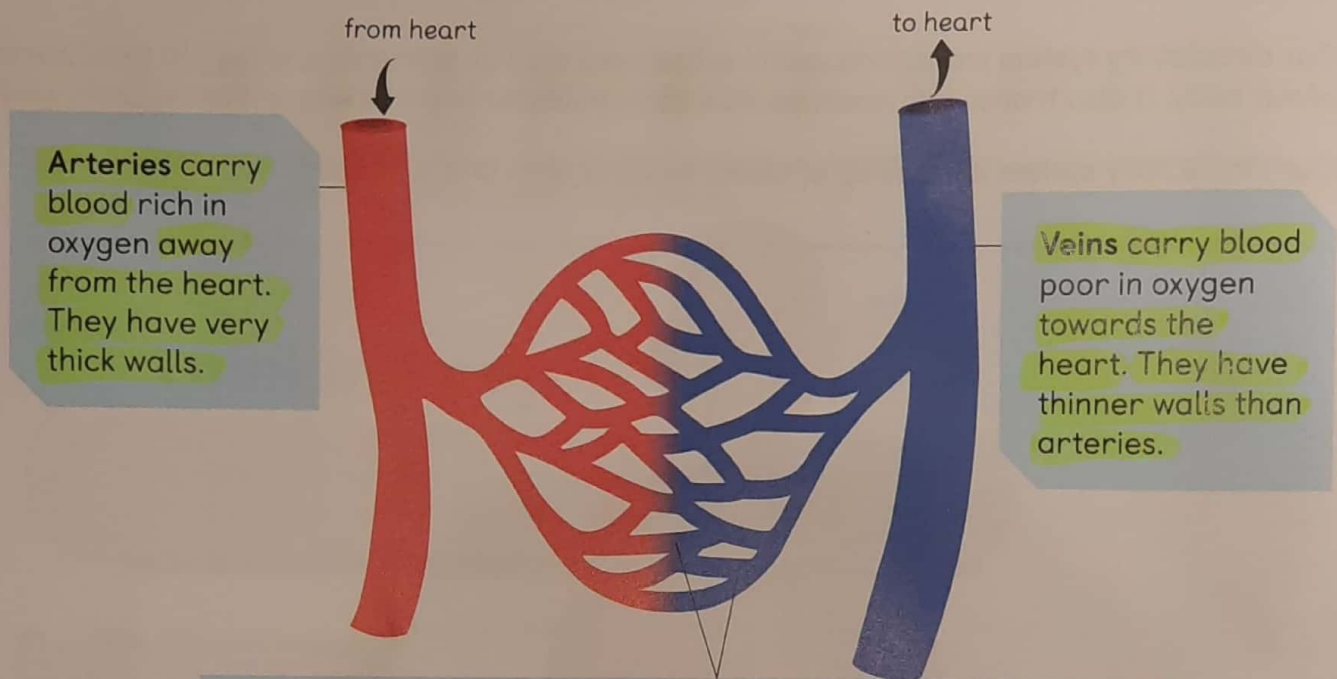


### Word Boost

release

Blood flows around the body to deliver substances from one part to another. It carries nutrients from the digestive system and oxygen from the lungs to all parts of our body. It also collects waste such as carbon dioxide away from different parts of our body.

Blood flows through tubes called **blood vessels**. There are three types of blood vessels. They are the arteries, veins and capillaries.

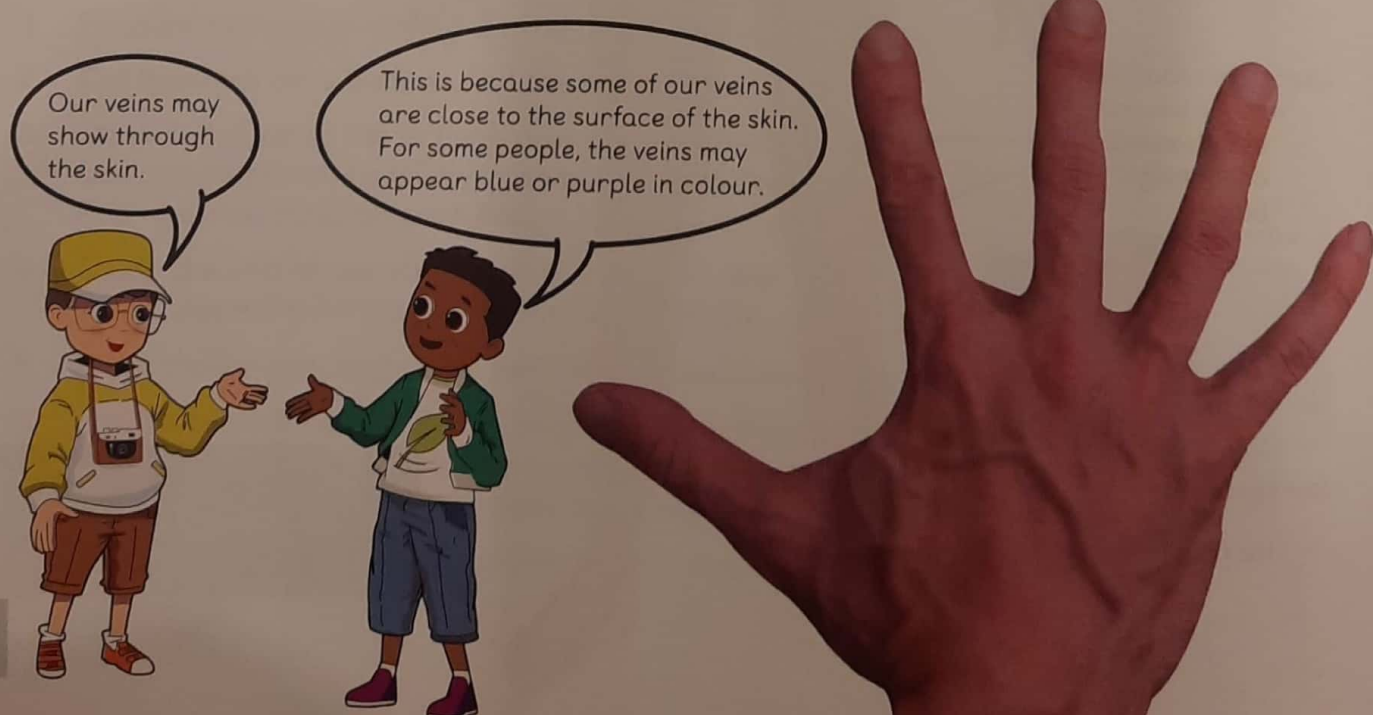


**Arteries** carry blood rich in oxygen away from the heart. They have very thick walls.

**Veins** carry blood poor in oxygen towards the heart. They have thinner walls than arteries.

**Capillaries** join arteries and veins. Capillaries have very thin walls. This allows substances to move into and out of the blood easily. In the lungs, oxygen and carbon dioxide move between the alveoli and the capillaries.

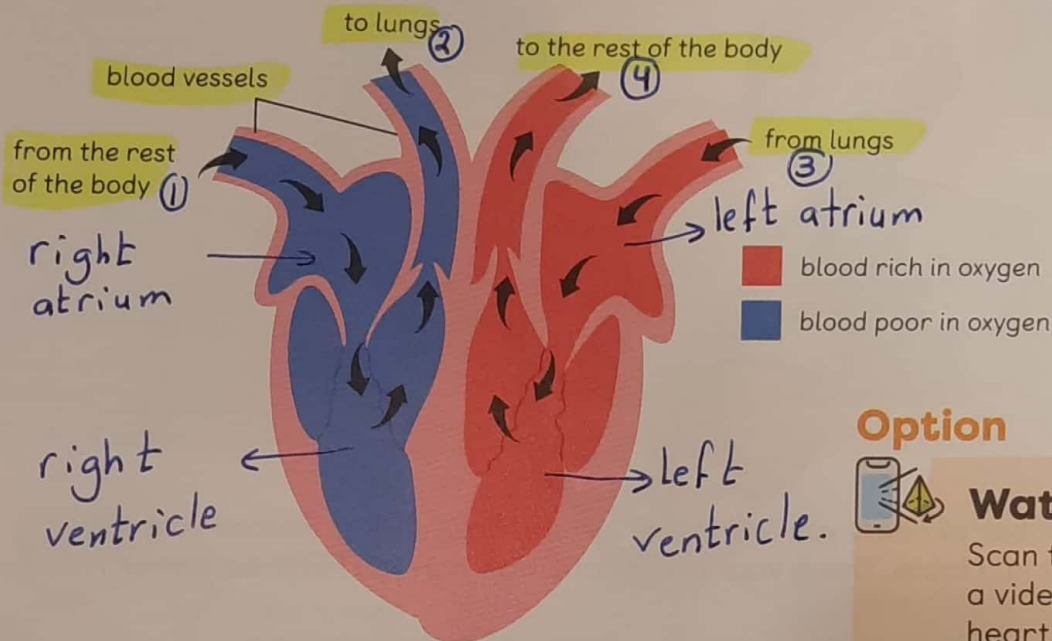
Each type of blood vessel has a different structure and function.



Our heart is a pumping organ. It is made of muscle. Our heart is always contracting and relaxing to pump blood around the body. When the heart contracts, blood is forced out of the heart. When the heart relaxes, blood flows into the heart. We feel a heartbeat every time the heart contracts to pump blood. Our heart is about the size of our fist.

The heart has two sides. One side receives blood rich in oxygen from the lungs and pumps it to the rest of the body. The other side receives blood poor in oxygen from different parts of the body and pumps it to the lungs.

Does your heart beat when you are sleeping? Why?



The heart pumps blood around the body.

**Option**



**Watch!**

Scan this page to watch a video that shows the heart and how it works with the lungs.

Place your right hand on the left side of your chest. Can you feel your heartbeat? The number of times our heart beats in one minute is our heart rate. The heart of a healthy adult beats about 60 to 100 times in one minute. The heart of a child usually beats faster.



Doctors use a device called a stethoscope to listen to our heartbeat.





Let's find out if you and your classmates have the same heart rate.

1. Use a timer to keep time.
2. You can measure your heart rate by taking your pulse. Find your pulse by placing your middle and index fingers gently on your wrist. Move your fingers until you feel a small beat.



3. Count the number of beats you feel in one minute, while sitting. Record your measurement in a table. This is your heart rate. How can you make sure your result is reliable?
4. Compare your measurement with others. Draw a dot plot to show the heart rates of the students in your class.

When we exercise, our heart rate increases. Our body needs more nutrients and oxygen. Our heart needs to pump faster so that nutrients and oxygen can reach different parts of our body more quickly.

Activity Book  
Activity IC, p. 5

## Tech Talk!



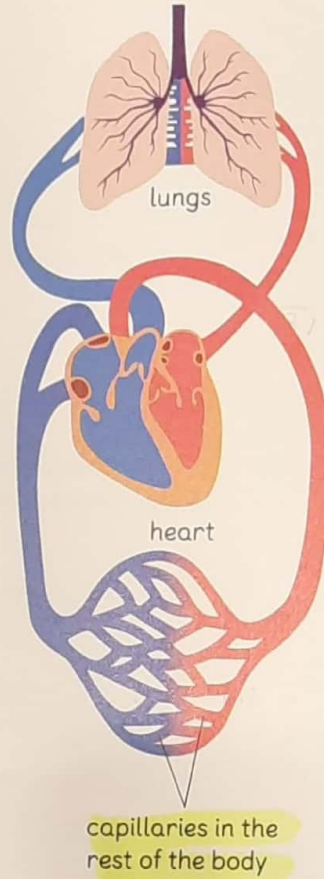
A smart shirt can measure your breathing and heart rates. Athletes wear smart shirts to monitor their breathing and heart rates during exercise.

How do you think smart shirts can help patients with lung or heart conditions?

# How Does Blood Flow in Our Body?

Blood is pumped out by the heart and flows continuously to reach every part of our body. This is called **circulation**. The diagram below shows how the blood flows in our body. Use the stickers at the back of the book and paste them here to show the path of blood.

1. The heart pumps blood poor in oxygen to the lungs. In the lungs, the blood collects oxygen.



2. The blood rich in oxygen flows from the lungs back to the heart.

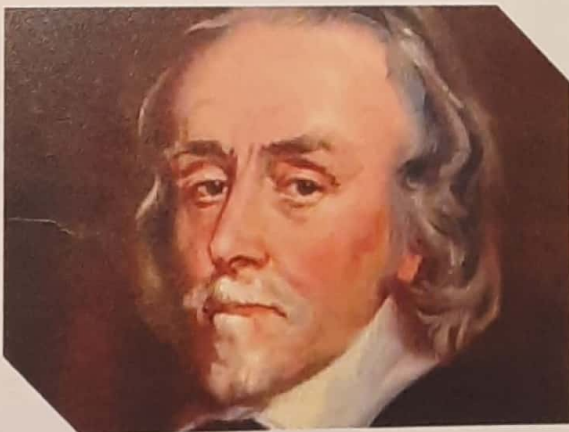
4. The blood is now poor in oxygen. It flows back to the heart through the veins and the cycle begins again.

3. The heart pumps the blood rich in oxygen through the arteries to the rest of the body.



Why is blood circulation so important?

## Science at Work

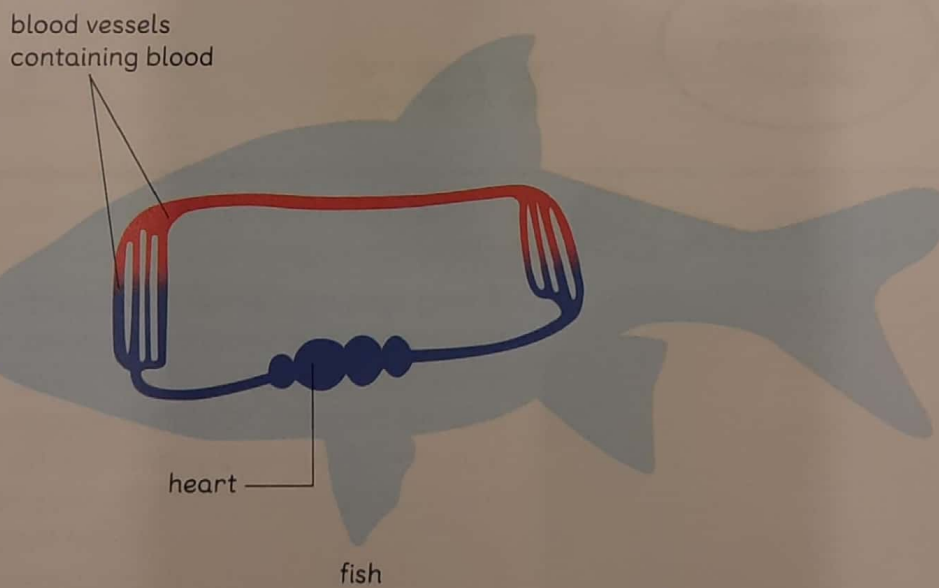
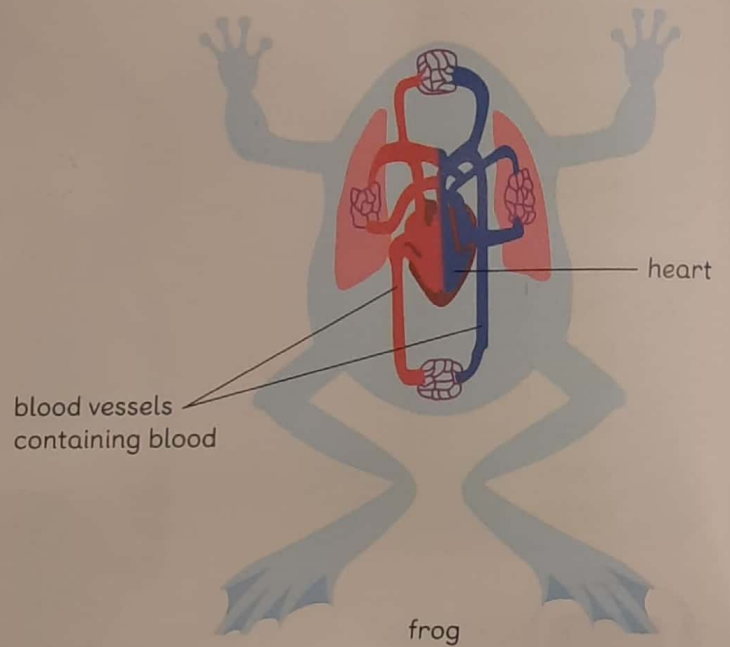
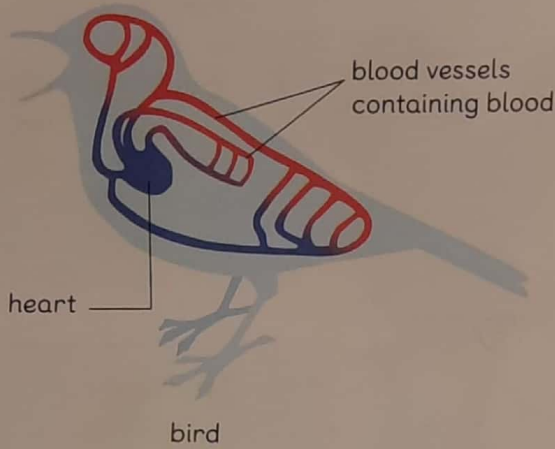


A long time ago, people thought that there were two separate systems to transport different types of blood around the body. William Harvey was a doctor about 400 years ago. He carried out experiments to study blood circulation. His results showed that blood flows through a single system. Now we know that blood is carried away from the heart by arteries and returned to the heart through veins.

Find out how people's ideas about the circulatory system have changed over time through the evidence gained by enquiry.

## Do Other Animals Have a Similar Circulatory System?

Look at the diagrams below. Do these vertebrates have a similar circulatory system to humans? Which parts are similar to those in the human circulatory system?



Many vertebrates have a similar circulatory system to humans. They have a heart that pumps blood around the body. The blood flows through blood vessels. It carries substances such as oxygen, nutrients and waste around the body.

Activity Book  
Activity ID, p. 8