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# CAMBRIDGE Primary Science

Learner's Book 6

Fiona Baxter & Liz Dilley

# Introduction

**Welcome to Stage 6 of Cambridge Primary Science.** We hope you will enjoy using this book and find out how interesting and exciting Science can be.

People have always asked questions about things they observed and looked for answers to their questions. For example, in Stage 6 you will find the answers to these questions:

- Why do our hearts beat?
- How do our bodies protect us against diseases?
- How can people harm food chains?
- How can we tell if a chemical reaction has taken place?
- How do rocks and fossils form?
- How does the Moon stay in orbit around the Earth?
- How do huge ships manage to float on the ocean?
- What is the difference between a series circuit and a parallel circuit?
- Why does the Moon look different at different times of the month?

You will work like a scientist to find the answers to these questions. You will also ask your own questions to investigate.

We have included a variety of different activities and exercises for you to try. Sometimes you will work with a partner or work in a group. You will be able to practise new skills such as drawing and interpreting circuit diagrams, presenting results on a scatter graph and interpreting food webs.

As you practise these new skills, you can check how you are doing and also challenge yourself to do better. You will be able to reflect on how well you have worked and what you could do differently next time.

We use science in our lives every day. You will see how science knowledge is important when we discuss issues such as pollution and the spread of diseases. You will learn about some of the things that scientists in the past discovered and invented and how scientists today are still improving on these designs. You will also see how people use science to divide the year into months.

We hope you enjoy thinking and working like a scientist.

Fiona Baxter and Liz Dilley





# Contents

Page	Unit	Science strand	Thinking and Working Scientifically strand	Science in Context
ix	Working like a scientist			
2	<b>1 The human body</b>	<b>Biology</b>	Models and representations	Use evidence to show how our scientific knowledge and understanding have changed over time.
2	1.1 The circulatory system	Structure and function	Scientific enquiry: purpose and planning	
12	1.2 The respiratory system	Life processes	Carrying out scientific enquiry	
19	1.3 The reproductive system		Analysis, evaluation and conclusions	
24	1.4 Diseases			
35	<b>2 Materials: properties and changes</b>	<b>Chemistry</b>	Scientific enquiry: purpose and planning	Find out who uses science where you live and how they use it.
35	2.1 Properties of substances	Properties of materials	Carrying out scientific enquiry	Describe how science is used where you live.
42	2.2 Thermal and electrical conductors	Changes to materials	Analysis, evaluation and conclusions	
49	2.3 Reversible changes			
56	2.4 Chemical reactions			
63	<b>3 Rocks, the rock cycle and soil</b>	<b>Earth and Space</b>	Models and representations	Find out who uses science where you live and how they use it.
63	3.1 Igneous rocks	Planet Earth	Scientific enquiry: purpose and planning	Describe how science is used where you live.
70	3.2 Sedimentary rocks and fossils	Cycles on Earth	Carrying out scientific enquiry	
78	3.3 Metamorphic rocks and the rock cycle			
87	3.4 Soil			
97	<b>4 Food chains and food webs</b>	<b>Biology</b>	Models and representations	Discuss how science positively and negatively affects the environment where you live.
97	4.1 Food chains, food webs and energy transfers	Ecosystems	Carrying out scientific enquiry	Use science in discussions to support your ideas.
104	4.2 Harm to food chains and food webs		Analysis, evaluation and conclusions	

Page	Unit	Science strand	Thinking and Working Scientifically strand	Science in Context
112	<b>5 Forces and electricity</b>	<b>Physics</b>	Models and representations	Use evidence to show how our scientific knowledge and understanding have changed over time.
112	5.1 Mass and weight	Forces and energy	Scientific enquiry: purpose and planning	
119	5.2 The effects of forces		Carrying out scientific enquiry	
124	5.3 Floating and sinking	Electricity and magnetism	Analysis, evaluation and conclusions	
130	5.4 Different circuits and circuit diagrams			
142	<b>6 Light and the solar system</b>	<b>Physics</b>	Models and representations	Describe how science is used where you live.
142	6.1 Reflection	Light and sound	Scientific enquiry: purpose and planning	Find out who uses science where you live and how they use it.
149	6.2 Refraction		Carrying out scientific enquiry	
154	6.3 The solar system	Earth and space	Analysis, evaluation and conclusions	
		Earth in space		
167	New science skills			
173	Glossary and index			



# How to use this book

In this book you will find lots of different features to help your learning.

What you will learn in the topic. →

## We are going to:

- draw food chains
- explain a food web and identify food chains in a food web
- explain how a food web shows feeding relationships in nature
- identify the source of energy in food chains and food webs
- describe how energy is transferred in food chains and food webs

Questions to find out what you know already. →

Important words and their meanings. →

barrier  
defence  
host  
hygiene

mucus  
parasite  
repellent  
vectors

An investigation to carry out with a partner or in groups. →

## Getting started

The parts inside your body are called organs. The body organs do different jobs to keep you alive and healthy. Discuss these questions with a partner. Be prepared to share your ideas with the class.

- 1 Which organ is found in the head?
- 2 Which organs are found in the chest?
- 3 Which organ pumps blood around the body?
- 4 Name two organs in the digestive system.

## Think like a scientist

### How people use rocks in my area

Work in pairs.

Look for ways people use rocks in your area.

For example: for building walls and roofs of houses, making pots, statues, gravestones, furniture, ornaments, roads, polished walls of bank and government buildings.

**Safety:** Take care not to wander around alone.

Don't climb onto roofs to get a closer look at building materials.

Make a list of what you find. Use references to identify the rocks used.

Take photographs if you can. Draw pictures of what you see.

### How am I doing?

How well did you work in your group? Did you contribute well?

Did you help to answer the questions?

Rate yourself 😊 or 😐 or ☹️

## Activity 1

### Types of soil

- 1 Go back to the soil sample you studied earlier. Test it to see how well it holds water. Can you roll it into a ball or does the ball break up? Does it contain organic matter? What type of soil do you think this is? Give reasons for your answer.

A fun activity about the science you are learning. →

Questions to help you think about how you learn. →

This is what you have learnt in the topic. →

At the end of the unit, there is a project for you to carry out, using what you have learnt. You might make something or solve a problem. →

Questions that cover what you have learnt in the unit. If you can answer these, you are ready to move on to the next unit. →

How can you use what you have found out in this topic to look after soil in the future?

## Look what I can do!

- I can find out that there are different types of soils and they can be classified based on their clay, sand and organic content.
- I can find out that the composition of soil can change making it better or worse for plants to grow in it.
- I can make a prediction and see whether observation supports my prediction.
- I can observe and sort different materials in soil.
- I can record observations in a table.

## Project: How people use soil

In this project you will identify a person who uses soil in your area and ask them questions about how they use the soil.

You can do this project on your own or with a partner.

Speak to a person in your area who uses soil.

You could speak to a farmer or someone with a garden or an allotment.

Make an appointment to speak to the person. Introduce yourself and say why you want to speak to them.

Prepare a list of questions and leave space to write in your answers when you speak to the person.

Ask questions such as:

- What sort of soil do you have? What are its colour and texture? Is there any organic matter?
- Is it sandy, clay or loam?
- What do you grow in the soil?
- What do you need to add to the soil to make your plants grow well?
- How do you look after the soil?

If possible, take some photographs.

Remember to thank the person when you have finished.

Present the information you have collected as a poster.

## Check your progress

- 1 The table shows the melting points of some substances.

Substance	Melting point/°C
gold	1064
candle wax	60
silver	962
copper	1083
ice	0
aluminium	660

- a What is a melting point?
  - b List the substances in the order of highest to lowest melting point.
  - c Describe a pattern you can see in the melting points.
  - d Does the melting point of a substance change? Say why or why not.
- 2 a Why does food cook faster in the oven in a metal dish than in a glass dish?
  - b If you used a dish made of a different metal, would the cooking time change? Explain why.
  - 3 a Sort the following processes into two groups: reversible processes and irreversible processes

rusting   boiling   freezing   dissolving   burning   evaporating

- b Add another process that you know of to each of the groups.





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# Working like a scientist

We can work like scientists and use the five different types of scientific enquiry to find answers to different kinds of science questions.

## Research

Sometimes we cannot find the answer to a scientific question in a direct way, such as by doing an investigation. This might be because it is impossible or unsafe to do. Instead, we can do research to find the information we are looking for. We can use books, use the internet or watch videos. These are called secondary sources of information. We can use this type of scientific enquiry to:

- find out about new scientific discoveries, such as how the coronavirus is spread, or discoveries made in the past, for example how scientists first invented batteries
- build on our knowledge of a topic, such as finding out about the respiratory systems of different vertebrates
- compare information from different sources and decide which answer is best, for example finding out how different factors can affect pulse rate, or the effects of harmful substances in food chains
- help us realise that sometimes there are questions that scientists don't yet know the answers to. For example, why does the force of gravity only pull and not push?



## Fair testing

In a fair test we change one factor or variable and keep all the others the same, to try to answer a scientific question. By changing only one variable, we know that no other variable will affect the results of the test. For example, if we investigate the question in Unit 2, 'Does water temperature affect the rate of dissolving?' then:

- the water temperature is the **independent variable** that we change



- the time it takes the solute to dissolve is the **dependent variable** that we measure
- the amounts of water and solute and number of times we stir the solution are the **control variables** that we keep the same.

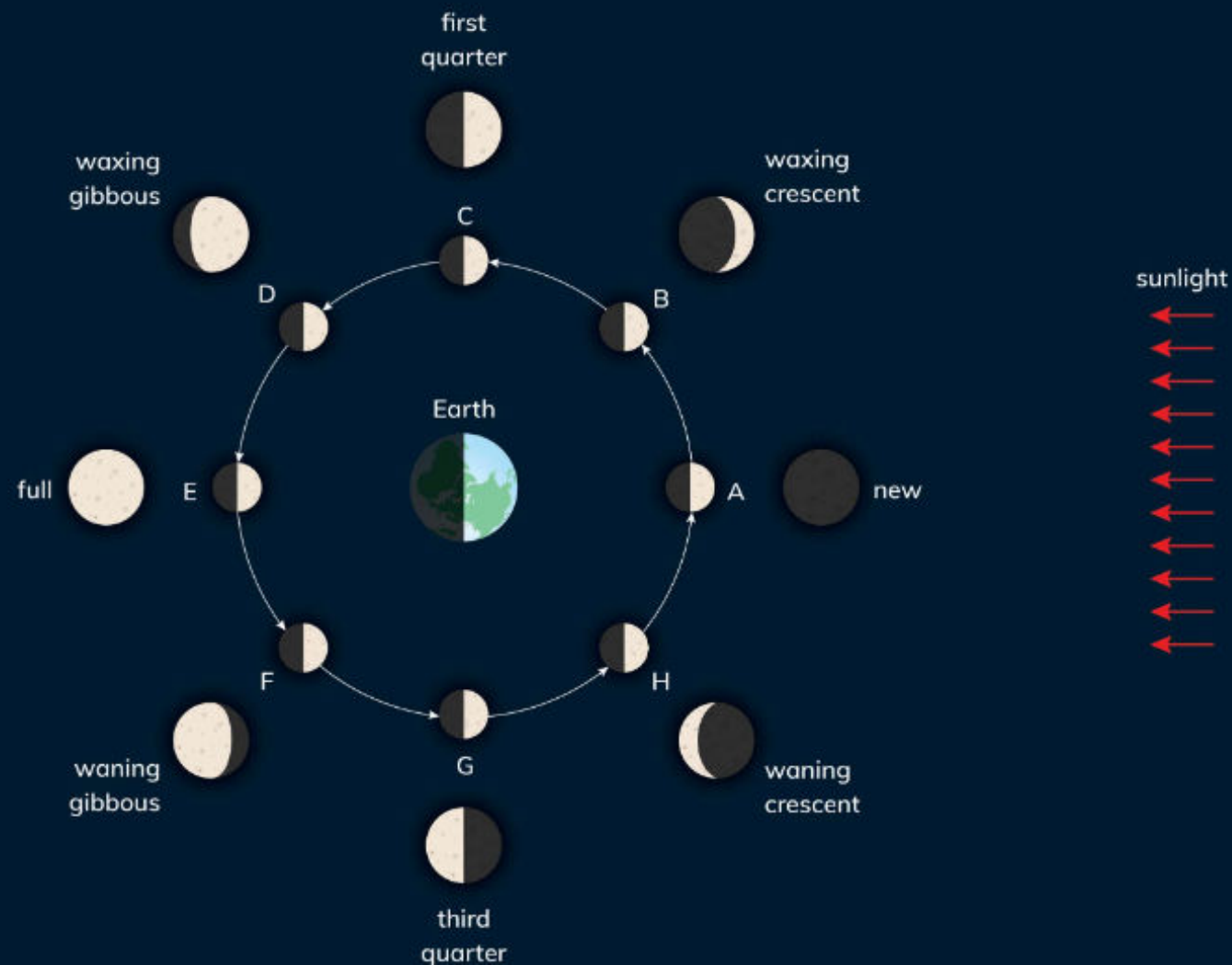


## Observing over time

In investigations we often need to observe changes that are caused by the things we do.

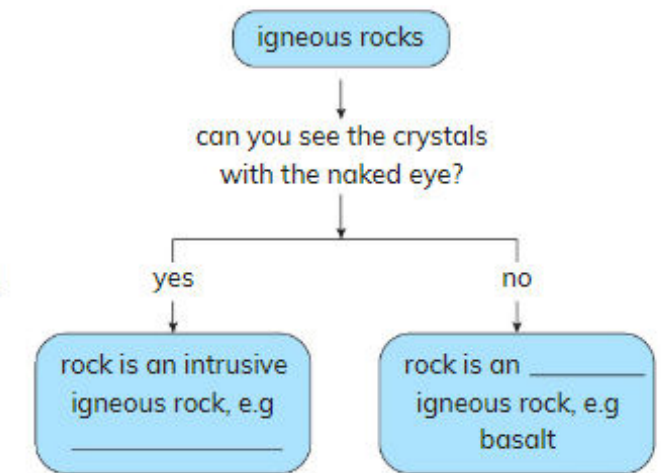
How often we need to observe depends on the changes we are looking at.

We can see some changes straight away, such as the formation of a gas when we mix vinegar and baking soda. If we observe what happens to our breathing rate when we exercise, we can see the change in a few minutes. Observing changes in nature can often take longer. We will need a month to observe the changes in the Moon's appearance as it orbits the Earth.



## Identifying and classifying

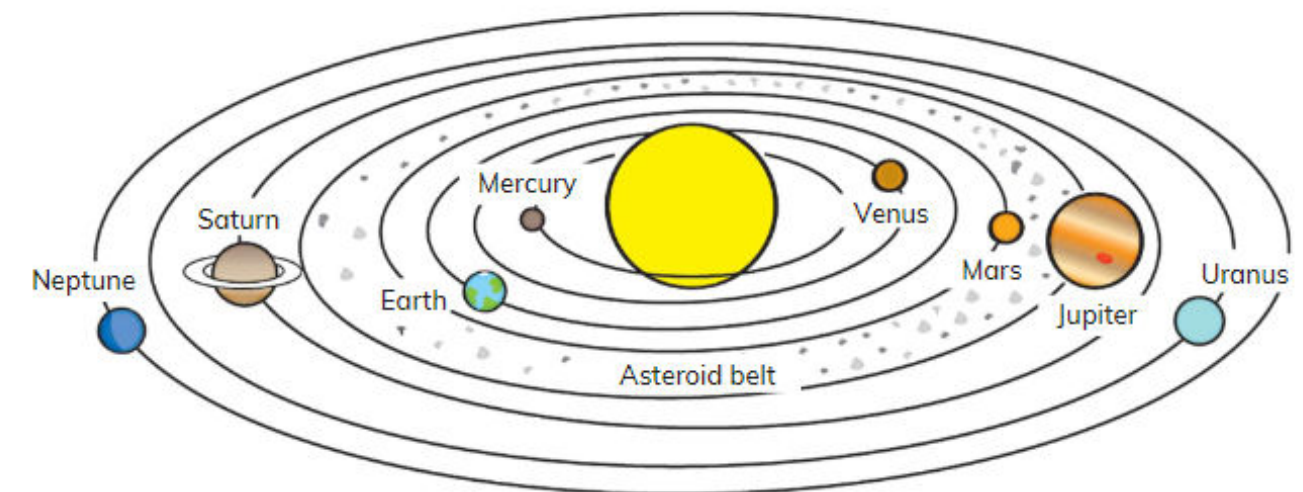
Identifying is the process of naming something, for example the different types of blood vessels in the human body. We can name them because they have features we recognise, such as the thickness of the blood vessel wall. We classify objects, materials and living things in groups by observing the ways in which they are different. We can usually classify these things by asking a series of 'yes or no' questions. For example, we can use a key to find out the type of igneous rock in a sample we have found.



## Pattern seeking

Pattern seeking involves observing, recording and analysing data. The patterns we observe can help us to identify a trend or relationship between two or more things. We often find patterns in nature where we cannot easily control the variables. For example:

- a pattern linking mass of an object with its weight
- a pattern between the time a planet takes to travel around the Sun and its distance from the Sun.





# 1 The human body

## > 1.1 The circulatory system

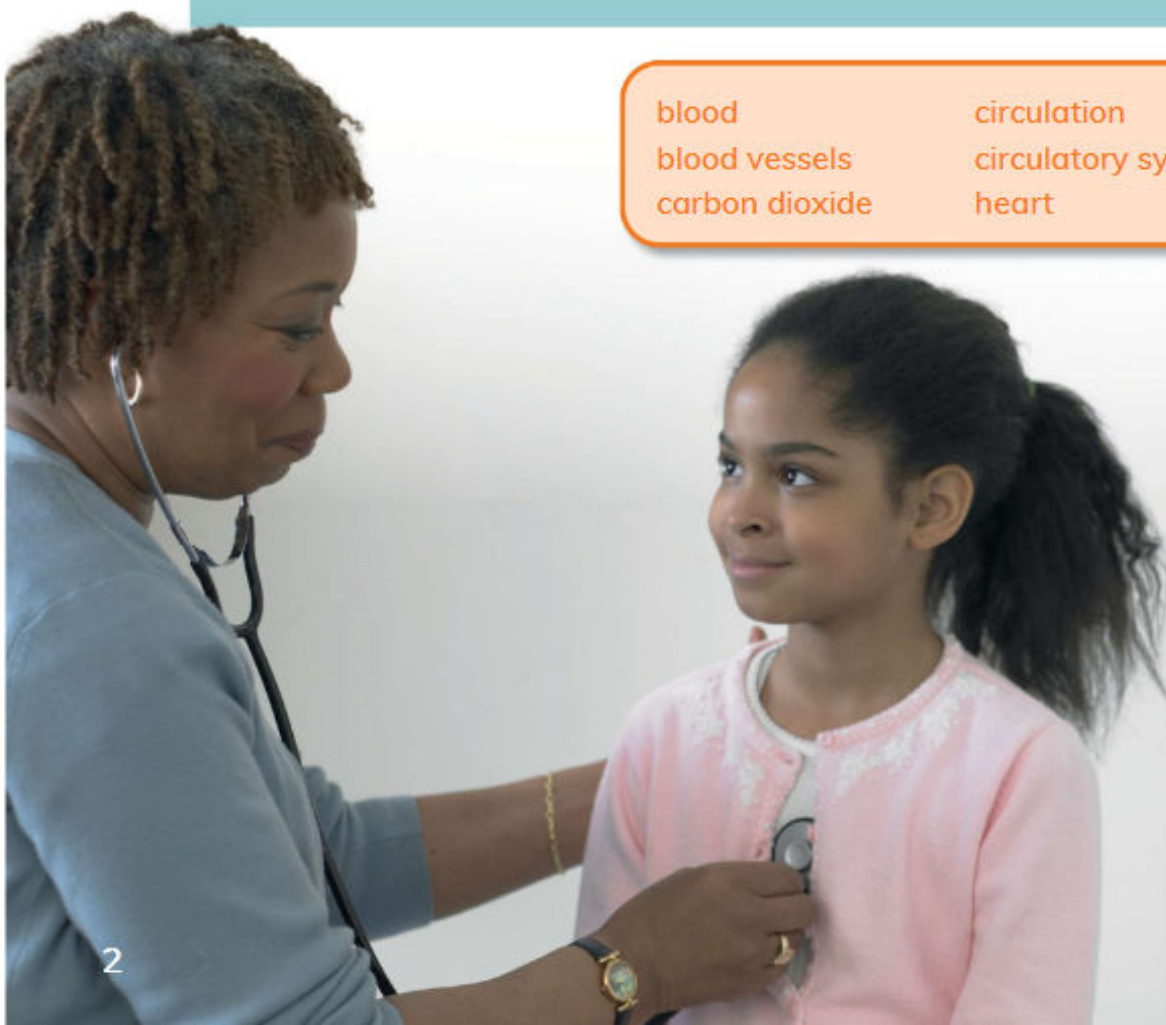
### We are going to:

- describe the parts of the circulatory system and their functions
- learn that the circulatory systems of other animals are similar to ours
- measure pulse rates and record results in tables
- make a prediction and plan a fair test on the effect of exercise on pulse rate
- use results to say if the prediction was accurate
- describe any patterns in results and use results to make a conclusion
- find information to answer a scientific question
- ask a question to investigate and find the answer.

blood  
blood vessels  
carbon dioxide

circulation  
circulatory system  
heart

oxygen  
pressure  
pulse

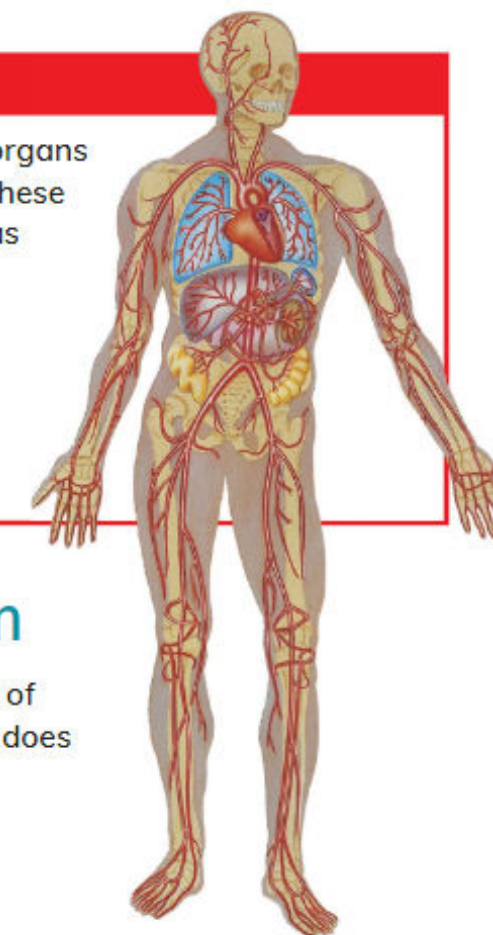


### 1.1 The circulatory system

#### Getting started

The parts inside your body are called organs. The body organs do different jobs to keep you alive and healthy. Discuss these questions with a partner. Be prepared to share your ideas with the class.

- 1 Which organ is found in the head?
- 2 Which organs are found in the chest?
- 3 Which organ pumps blood around the body?
- 4 Name two organs in the digestive system.



## Parts of the circulatory system

The **circulatory system** carries food and **oxygen** to all parts of your body. It also carries waste substances that your body does not need. The circulatory system has three main parts:

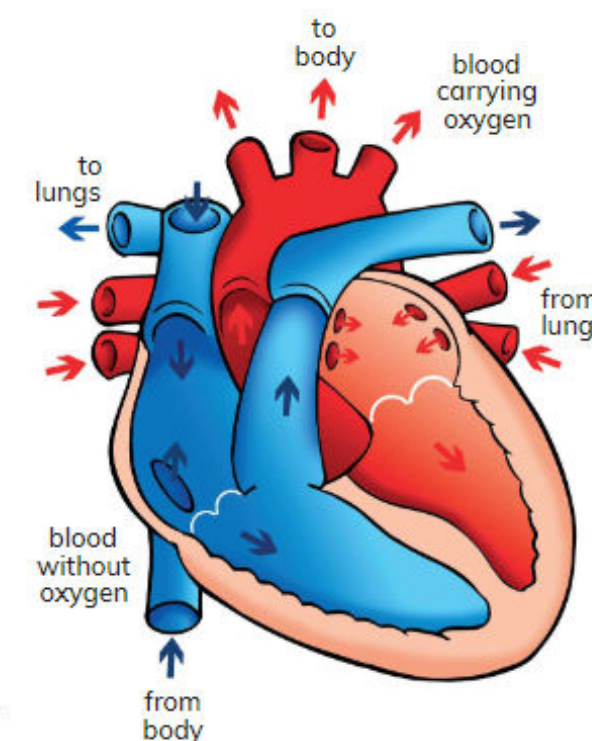
- the heart
- blood vessels
- blood.

## The heart

Put your hand on your chest. Can you feel your **heart** beating? Why does your heart beat?

Make a fist with your hand. That's how big your heart is. Your heart is found inside your chest, slightly to the left. It is protected by the ribs.

Your heart is a special muscle. Its function is to pump blood through your body. This process is called **circulation**. Every time the heart muscle contracts to pump blood, you can feel a heartbeat. It takes less than a minute to pump blood to every part of your body. The heart does this all the time and never stops.





The heart has two sides. The left side pumps blood that contains oxygen all around the body. The right side pumps blood without oxygen to the lungs only. The drawing of the heart near the beginning of this section shows the flow of blood in the heart. Remember that the left side of the drawing shows the right side of the heart and the right side of the drawing shows the left side of the heart.

Why must the heart pump blood around the body?



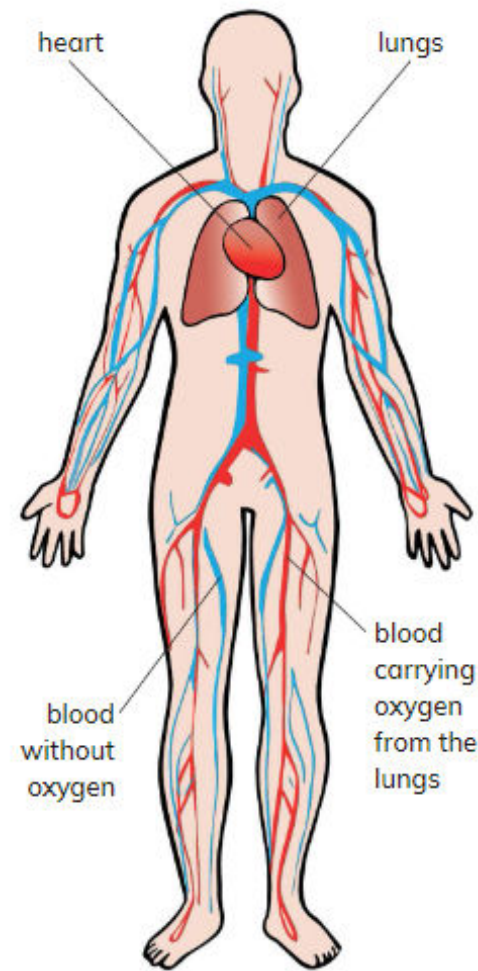
## Blood vessels and blood

**Blood** is a red liquid that flows around the body. The blood carries food particles and oxygen to all parts of the body. It also picks up waste products, such as **carbon dioxide**, from the body and carries them to organs which can get rid of them. Carbon dioxide is a waste gas that the body must get rid of. The kidneys and lungs are body organs that also help the body get rid of waste products.

Blood moves through the body in the **blood vessels**. Look at the inside of your wrist. Sometimes you can see the blood vessels through your skin.

There are three kinds of blood vessels:

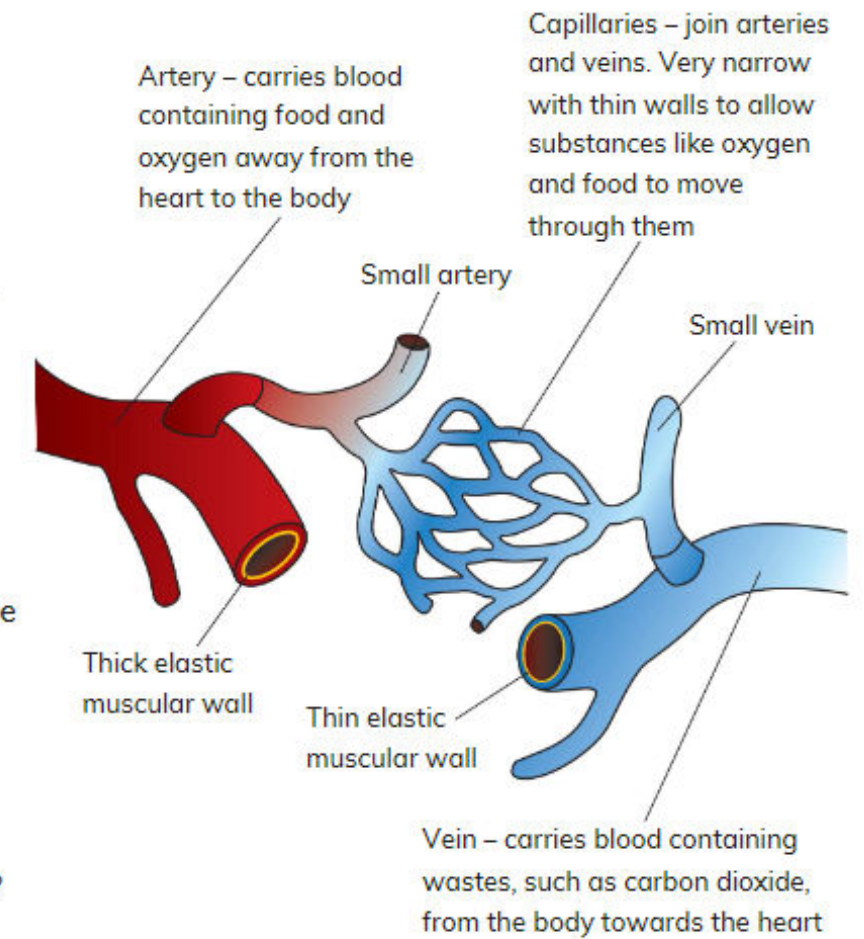
- arteries
- veins
- capillaries.



Each kind of blood vessel has a different structure and function in the body.

The blood vessels run from the heart to the lungs, around the body and back to the heart. Blood always moves along the same pathway in the blood vessels.

- The heart pumps blood in arteries to the lungs to pick up oxygen.
- The oxygen-rich blood travels back in veins from the lungs to the heart. These are the only veins that carry blood with oxygen.
- The heart pumps the oxygen-rich blood in other arteries to the rest of the body.
- The blood from the rest of the body, which is now low in oxygen, travels back to the heart in veins.



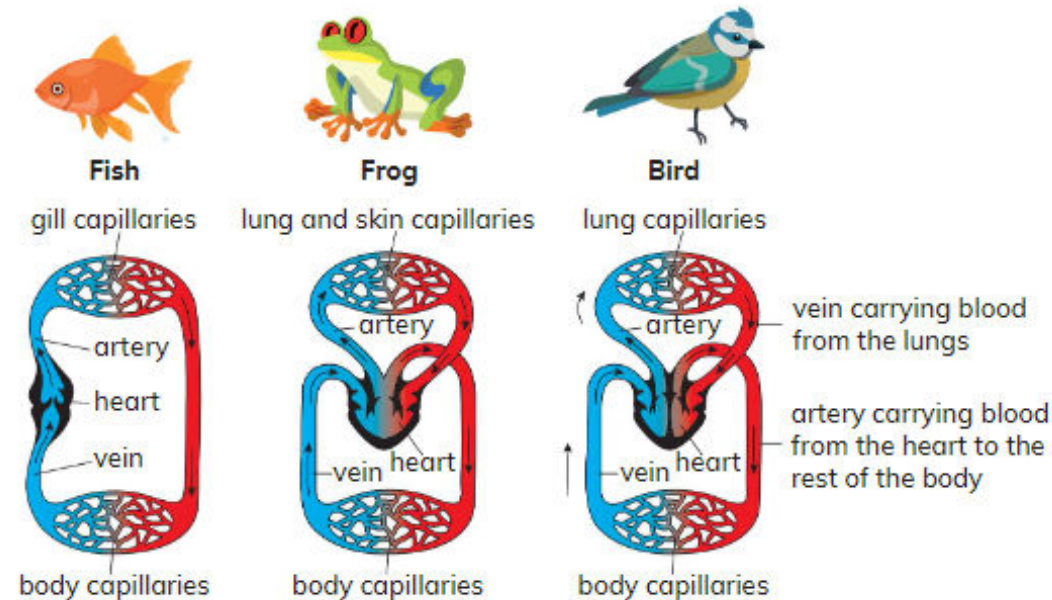
## Questions

- 1 a What does the heart do?  
b Why does it do this?
- 2 What is a heartbeat?
- 3 Why does the heart pump blood to the lungs before it pumps blood to the rest of the body?
- 4 Why do we need three different types of blood vessels?
- 5 Describe to your partner the pathway of blood around the body. Make a cycle diagram to show this pathway.



## Circulatory systems of other animals

Many vertebrates have a similar circulatory system to ours. The pictures show the circulatory systems of a fish, a frog and a bird.



### Activity 1

#### Compare circulatory systems of some vertebrates

Work with a partner. Look at the drawings of the circulatory systems of different vertebrate animals, then discuss the questions.

- 1 Which parts of the animal circulatory systems are the same as the human circulatory system?
- 2 How are the animal circulatory systems different to the human circulatory system? Explain this to a partner.

#### How am I doing?

Answer 'well', 'okay' or 'I need help' to each of the questions below.

How well can I:

- identify the parts of the circulatory system in humans and other vertebrates?
- explain how the animal circulatory systems are different to the human circulatory system?

## Heartbeat and pulse

Your heart beats about 90 times a minute. When you are grown up it will beat about 70 times a minute. When you run around, your body needs a lot more food and oxygen. The more active you are, the more often your heart needs to beat to supply enough food particles and oxygen from the blood.

You can count your heartbeats by feeling your **pulse**. Your pulse is caused by the **pressure** of the blood as the heart pumps it to the rest of the body.

Two good places to find your pulse are on the side of your neck and the inside of your wrist. When you find your pulse you will feel a small beat under your skin. Each beat is caused by the contraction of your heart muscle.

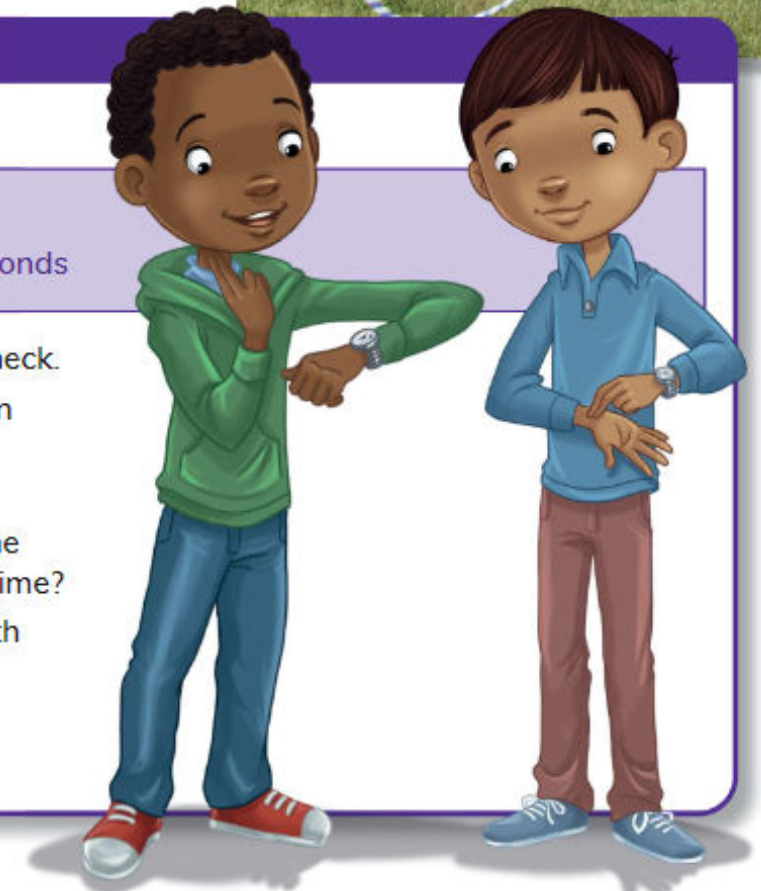


### Think like a scientist 1

#### Measuring pulse rate

**You will need:**  
a watch or timer that can time seconds

- 1 Find your pulse on your wrist or neck.
- 2 Count how many beats you feel in one minute. Repeat this three times.
- 3 Record the results in a table. Is the number of beats the same each time?
- 4 Compare your measurements with others in your class.





## Continued

## Questions


- 1 What is the difference between heartbeat and pulse?
- 2 Did everyone in your group have the same pulse rate? Why do you think this is?
- 3 Work out your average pulse rate from the measurements you made.
- 4 Which type of scientific enquiry did you use in the investigation?


## How am I doing?


Choose a card to answer the questions.

How well can I:

- measure pulse rate?
- explain the difference between heartbeat and pulse?

 I get it! I can even explain to others.

 I need a little more help.

 I don't understand it. I need a lot of help.

I could feel my heart beating faster after I ran to catch the school bus this morning.



## Think like a scientist 2

## How does exercise affect pulse rate?

Plan a fair test investigation to find out how doing exercise affects your pulse rate.

- 1 a Make a prediction to answer the question you are going to investigate. Say why you made this prediction.  
b How will you test your prediction?
- 2 Identify the variables in your investigation that you will:
  - measure
  - change
  - keep the same.
- 3 Identify the equipment you will need.
- 4 Decide how you will record and present your results.
- 5 Carry out your investigation and present your results.

## Questions

- 1 Was your prediction correct?
- 2 Describe any pattern you see in the results.
- 3 What conclusion could you make from your results?
- 4 Which two types of scientific enquiry did you use in the investigation? Explain your answer.

## How are we doing?

As a group, choose one of the faces as your answer to each of the questions.



- Could we make a prediction with reasons?
- Could we identify the different variables in the investigation?
- Could we choose suitable materials and equipment to use?
- Could we say how to record and present our results?
- Did we work together to plan and carry out the investigation?