



CAMBRIDGE
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CAMBRIDGE **Primary Science**

Learner's Book 4

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Introduction

Welcome to Stage 4 of Cambridge Primary Science. We hope this book will show you how interesting and exciting Science can be.

People have always asked questions about things they observed and looked for answers to their questions. Have you ever wondered about any of these questions?

- How do our muscles work?
- Why can we see ourselves in a mirror?
- Why do liquids freeze and solids melt?
- Why do we have day and night?
- Why do volcanoes erupt?
- Why does a lamp light up when you switch it on?

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

You will be able to practise new skills and check how you are doing and also challenge yourself to find out more. We have included a variety of different activities and exercises for you to try.

We use science in our lives every day. You will learn about some of the things that scientists in the past discovered and invented. You will also find out how some people around you use science and how using science can help or harm our environment.

We hope you enjoy thinking and working like a scientist.

Fiona Baxter and Liz Dilley



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9	1.3 Skeletons and movement		Scientific enquiry: analysis, evaluation and conclusions	
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31	2 Energy	Physics: Forces and energy	Models and representations	Describe how science is used where you live.
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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

Questions to find out what you know already

Important words to learn

A fun activity about the science you are learning

An investigation to carry out with a partner or in groups

We are going to...

- name some of the bones in our body
- point out where some of the main bones are found in our body
- make a model of a skeleton
- think about how a model is different to the real thing.

Getting started

The picture shows a **skeleton**.

- What is a skeleton?
- What is the skeleton made of?
- What type of animal do you think the skeleton comes from?
- Name the parts of the animal's body you can see in its skeleton.

Activity

Summarise the structure of the Earth

Copy the table. Some information is filled in already. Use information from the diagram and information about the structure of the Earth to complete the table.

Name of layer	Crust		
Thickness		3000 km	
Material			Iron and nickel
Temperature			5000–6000 °C
Solid or liquid?	Solid		

How am I doing?

Exchange your completed table with a partner. Check any differences with your teacher.

Think like a scientist

Make a model skeleton

A **model** helps us understand how something works or see what something looks like that we cannot see in real life. Work with a partner to make a model of a skeleton.

You will need:
drinking straws and bottle tops, modelling clay or different shapes of pasta, scissors, black construction paper or stiff card, paper glue, white paper, a pen

- Look at the picture of the human skeleton. Notice the sizes and shapes of the bones and how they are arranged.
- Plan how you will make a skeleton from drinking straws and modelling clay or different pasta shapes. Your skeleton should show these bones: skull, jaw, rib cage, spine, arm bones and leg bones.
- Arrange the parts of your model on the paper to make the skeleton.
- When you are happy with your skeleton, glue the parts onto the paper.
- Write labels for the different bones of your skeleton. Stick the labels on the paper next to the bones they name.

bones
frame
hip
jaw
model

rib cage
skeleton
skull
spine

Questions to help you think about how you learn

This is what you have learned in the topic

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

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

What did you learn about skeletons?
What did you find difficult?
What did you find fun to learn?

Look what I can do!

- I can describe the main functions of the skeleton as protecting organs, allowing movement, giving shape to the body and supporting organs during activity.
- I can understand that we grow because our skeleton grows.
- I can measure the length of bones.
- I can record data in a table.

Project: Earthworm farming

Earthworms are invertebrates. Earthworms live in the earth or soil.

People all over the world keep earthworm farms. They grow the earthworms in containers that are dark and moist inside, like the soil.

The farmers feed the worms with materials such as vegetable peels and garden waste. Earthworms leave droppings called 'castings'. The earthworms' castings form a substance called worm compost. The worm compost contain substances that help plants to grow better. The worm farmers sell the worm compost to gardeners and other farmers.

Questions

Work in pairs.

Speak to someone in your local area who farms earthworms.

These are some questions you could ask:

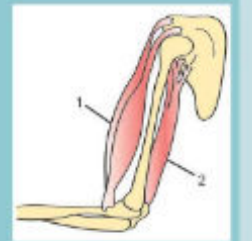
Check your progress

- Write the word that describes each of the following.
 - A frame made of bone that supports our body.
 - The bones of the head.
 - Something that shows us how another thing looks or works.
 - The parts inside our bodies.
 - Animals with no backbone.
 - The parts of the body that allow our bones to move.
 - The hard skin or shell on the outside of the body of some animals.
 - An injection that prevents disease.

- Look at the drawing and answer the questions.

- Write down the number of the muscle that bends the arm.
- Underline the correct words in the sentences to explain how the muscle makes the arm bend upwards.

The muscle contracts/relaxes. The muscles gets longer/shorter and pushes/pulls on the arm bone.



Working like a scientist

Scientists ask questions about the world around them. They then try to find answers to the questions. Scientists use different types of scientific enquiry to help them find the answers. Young scientists, like you, can do the same to find answers to scientific questions.

Research

We can speak to people, or use books and the internet, to find information to answer questions such as:

- How did vaccinations first start?
- What are earthquakes and why do they happen?



Fair testing

We carry out fair tests to find out how changing one thing in an investigation makes another thing change. The things that we change, keep the same and measure are called variables. We can use a fair test to answer questions such as:

- Does the type of material affect how well heat energy is transferred?
- Does changing the number of cells in a circuit make a lamp brighter or dimmer?

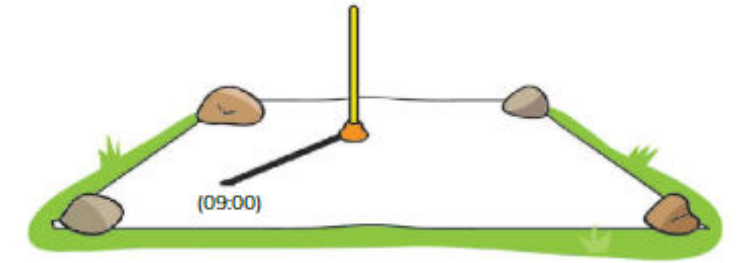
When I stir my tea with a metal teaspoon, the teaspoon gets hot. If I use a plastic teaspoon, the spoon does not get hot.



Observing over time

We sometimes need to observe living things, materials or processes over time to find out how they change. For example:

- How does ice change when we heat it?
- How do shadows change during the day?



Identifying and classifying

We make observations and measurements to help us look for similarities and differences in objects, materials and living things. This helps us to organise things into groups. For example:

- How can we group animals based on what they eat?
- Which materials conduct electricity?



Pattern seeking

In this type of scientific enquiry, we try to answer questions by identifying patterns in the measurements and observations we record. For example:

- Is there a pattern between the size and shape of a bird's beak and the food it will eat?
- Does particle size change how fast a powder solid flows?



> 1.1 Bones and skeletons

We are going to...

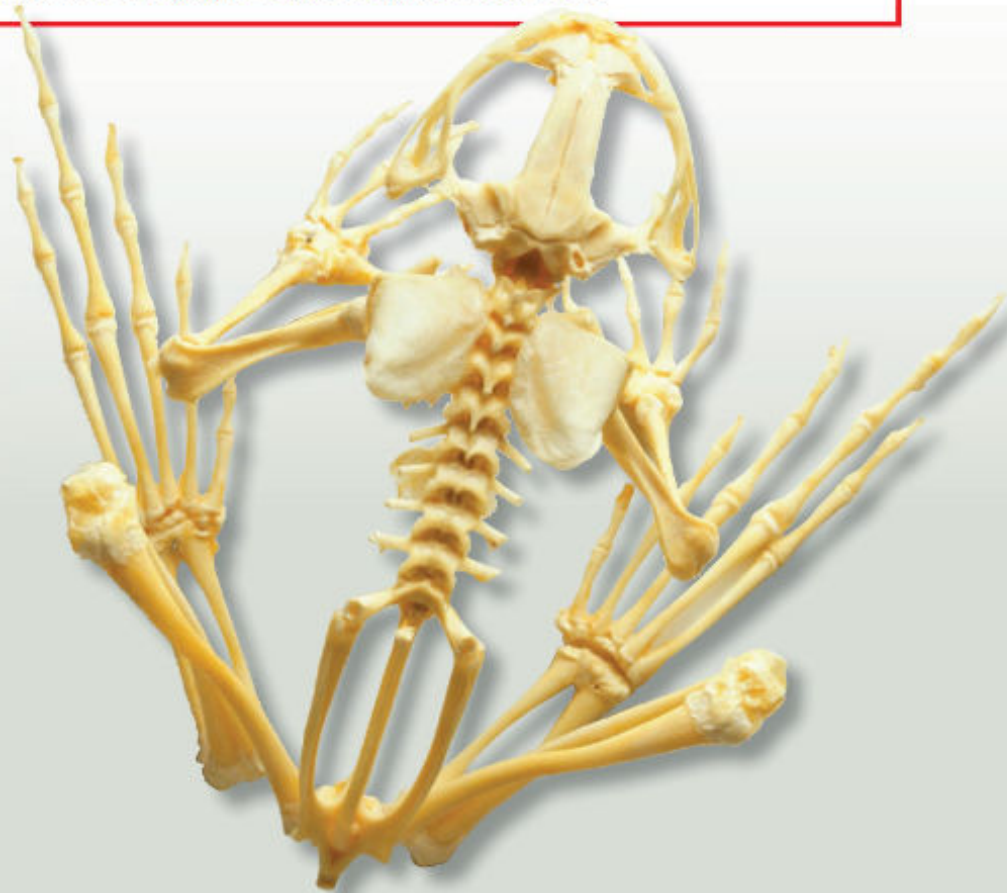
- name some of the bones in our body
- point out where some of the main bones are found in our body
- make a model of a skeleton
- think about how a model is different to the real thing.

Getting started

The picture shows a **skeleton**.

- 1 What is a skeleton?
- 2 What is the skeleton made of?
- 3 What type of animal do you think the skeleton comes from?
- 4 Name the parts of the animal's body you can see in its skeleton.

bones	rib cage
frame	skeleton
hip	skull
jaw	spine
model	



1.1 Bones and skeletons

What is a skeleton?

People and many animals have **bones** inside their bodies. These bones are joined together to form a skeleton. A skeleton is a strong **frame** that supports our body from the inside.

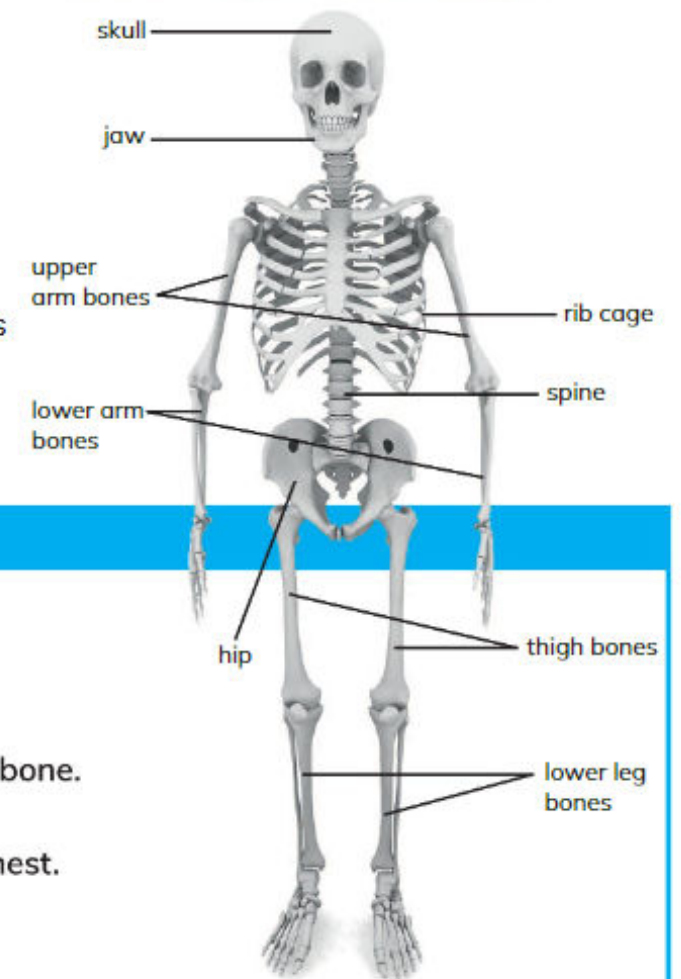
We know about animals, like dinosaurs, that lived very long ago from their skeletons.



The human skeleton

Our skeletons are made of 206 bones. These bones are different sizes and shapes.

You can feel your bones through your skin. Bones are hard and strong. How many bones in your body can you name?



Activity

Finding your bones

- Feel your head. How many **skull** bones can you feel?
- Push a finger on your chin and feel the bone. Your chin is part of your **jaw** bone.
- Hold your hands on the sides of your chest. Can you find your **rib cage**?
- How many ribs can you feel?
- Now feel your back. The bumps you can feel are the bones of your **spine**.
- Stand up and put your hands on your **hips**. Can you feel your hip bones?

Continued

- Find your arm bones. Can you feel how many there are?
- Feel your leg bones. Is the bone in your upper leg (thigh bone) the same size as the bones in your lower leg?
- Point out the bones you have found to a partner. Name the bones.

Questions

- 1 What are skeletons made of?
- 2 Why must skeletons be hard and strong?
- 3 Why do you think the bones of your skeleton are different sizes and shapes?
- 4 Bones are not very heavy. How do you think this helps animals?

Think like a scientist

Make a model skeleton

A **model** helps us understand how something works or see what something looks like that we cannot see in real life. Work with a partner to make a model of a skeleton.

You will need:

drinking straws and bottle tops, modelling clay or different shapes of pasta, scissors, black construction paper or stiff card, paper glue, white paper, a pen

- Look at the picture of the human skeleton. Notice the sizes and shapes of the bones and how they are arranged.
- Plan how you will make a skeleton from drinking straws and modelling clay or different pasta shapes. Your skeleton should show these bones: skull, jaw, rib cage, spine, arm bones and leg bones.
- Arrange the parts of your model on the paper to make the skeleton.
- When you are happy with your skeleton, glue the parts onto the paper.
- Write labels for the different bones of your skeleton. Stick the labels on the paper next to the bones they name.

Continued

Questions

- 1 How is your model of a skeleton the same as a real skeleton? How is it different?
- 2 Look at other pairs' models. Can you think of any ways you could make your model better?

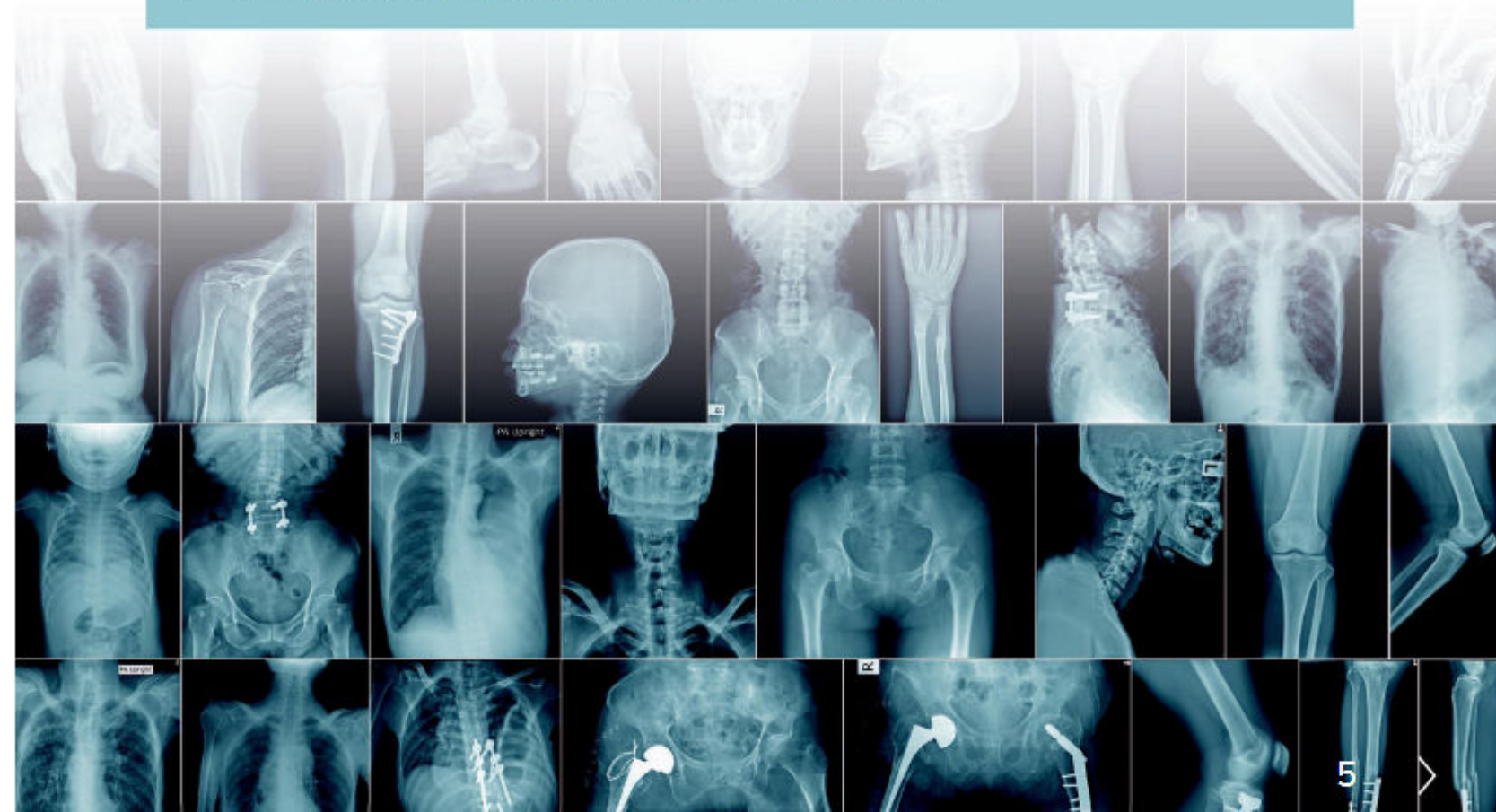
What did you learn about skeletons?

What did you find difficult?

What did you find fun to learn?

Look what I can do!

- ☐ I can identify the skull, jaw, spine, rib cage, arm bones and leg bones in my body.
- ☐ I can make a model of a skeleton.
- ☐ I can explain how a model is different to the real thing.



> 1.2 Why we need a skeleton

We are going to...

- describe the main functions of the skeleton
- measure the length of bones
- think about why it is better to measure in standard units
- record data in a table.

Getting started

- 1 What is the role of the skeleton?
- 2 Think of some reasons why we need a skeleton.
- 3 Name any of the parts inside your body that you know of.

function
length
muscles

organs
protect
support

Our skeleton has four main jobs or **functions**.

Skeletons protect

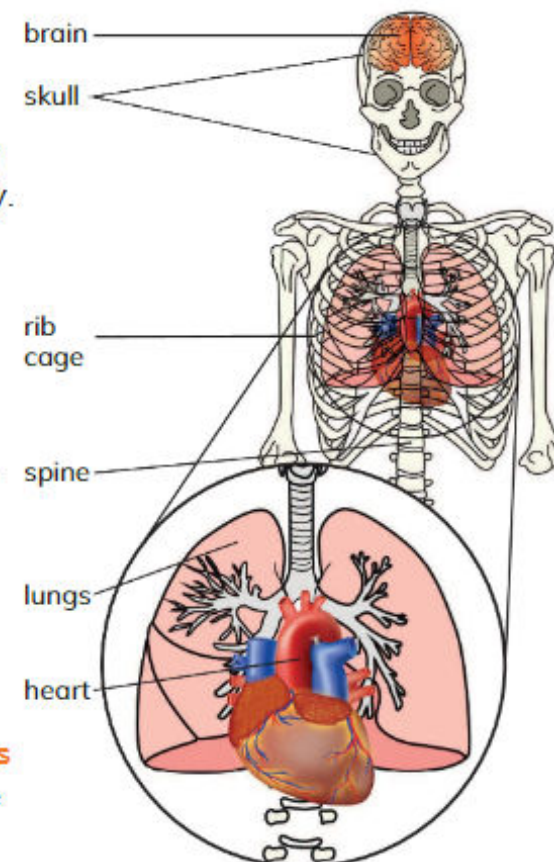
The parts inside our bodies are called **organs**. The body organs do important jobs that keep us alive and healthy. Our skeletons **protect** the main organs of our bodies.

Skeletons give shape

The bones of our skeleton are strong. The skeleton forms a frame that **supports** or holds up the rest of the body and gives the body its shape. Our skeleton makes our body firm. We cannot squash our body easily because we have skeleton.

Skeletons allow us to move

Our skeleton helps us to walk, run and move in lots of different ways. We can move because there are **muscles** joined to bones of the skeleton. Muscles are parts of the body that help us to move.

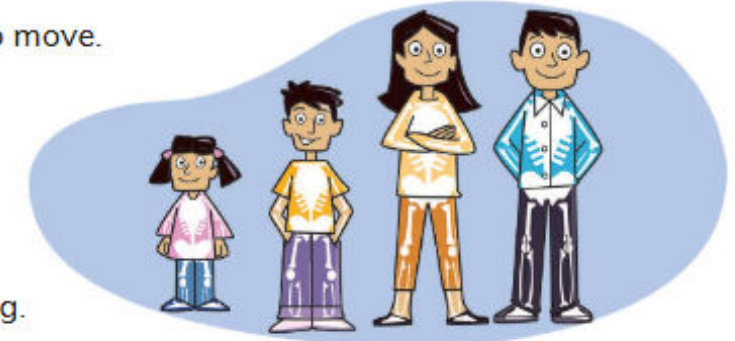


Questions

- 1 How does the skeleton protect the brain?
- 2 Which organs does the rib cage protect?
- 3 Why do we need strong bones?
- 4 Explain how our skeleton helps us to move.

Skeletons help us grow

We grow and get bigger because our skeleton grows. An adult's skeleton is much bigger than a child's skeleton. An adult's skeleton has stopped growing.



Think like a scientist

Measuring bone lengths

Work with a partner.

Use the tape measure to measure the **length**, from end to end, of each other's:

- upper arm bone
- upper leg bone
- lower leg bone.

Record the measurements in a table like the one shown here.

Bone	Length in cm	
	Me	Partner
Upper arm bone		
Lower arm bone		
Lower leg bone		

- 1 Whose bones are longer?
- 2 Predict what you think the length of a teenager's bones would be. Say why.
- 3 Marcus and Arun did not have a measuring tape to do their investigation. They counted how many hand lengths long their bones were. Is this a good method to measure bone length? Say why or why not.

You will need: a tape measure



Continued

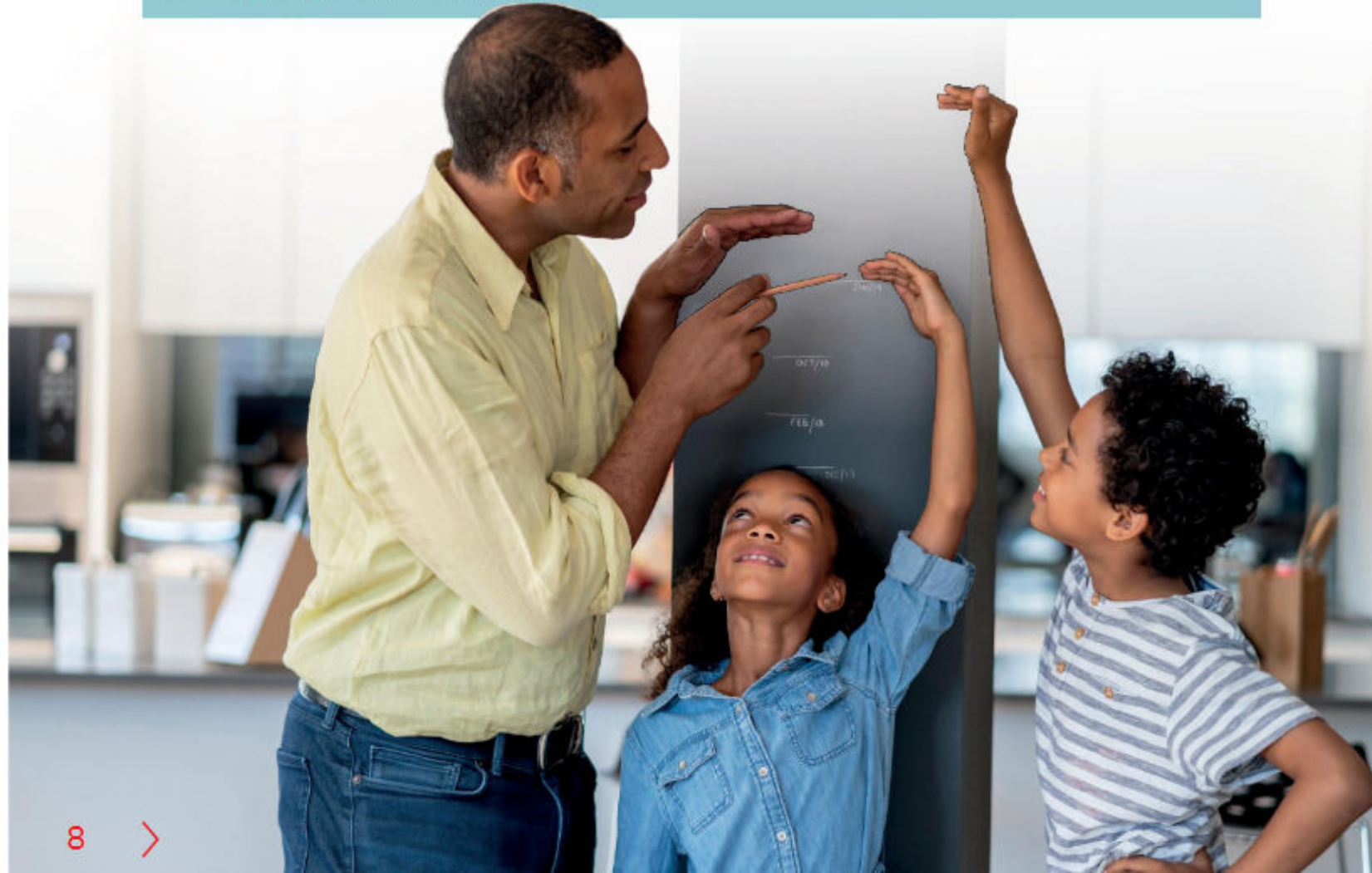
How am I doing?

Answer 'Very well', 'Quite well' or 'I need help' to these questions:

- How well can I measure the length of bones?
- How well can I record data in a table?

Look what I can do!

- ☐ I can describe the main functions of the skeleton as protecting organs, allowing movement, giving shape to the body and supporting organs during activity.
- ☐ I can understand that we grow because our skeleton grows.
- ☐ I can measure the length of bones.
- ☐ I can say why it is better to measure in standard units.
- ☐ I can record data in a table.



> 1.3 Skeletons and movement

We are going to...

- explain how muscles work to make us move
- observe how muscles change when we move
- make a model to show how muscles work in pairs
- explain how the model is the same as and different to real muscles
- find out that movement is good for our health.

Getting started

- 1 Name some of the ways in which our body can move.
- 2 How does our skeleton help our body to move?

contract relax

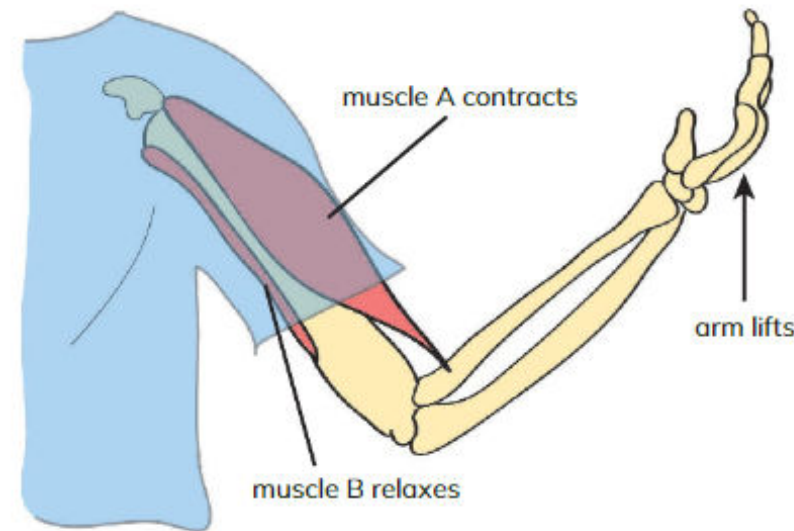


Muscles make us move

Bones are strong and hard. They cannot bend, but your body can move in many ways.

All animals with skeletons have muscles attached to the bones. Muscles are the parts of the body that allow us to sit, stand, walk, run, bend and stretch. They make it possible for us to smile, hold a pen, eat and talk.

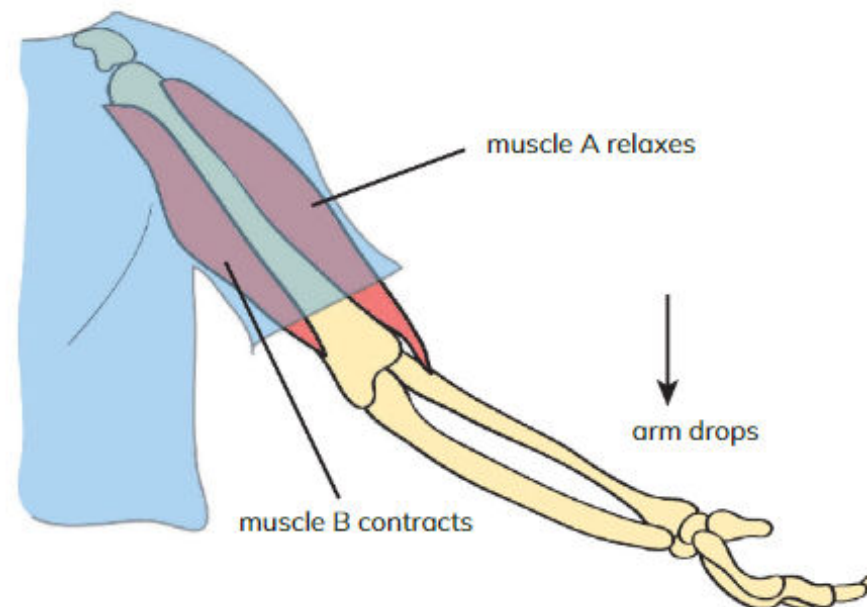
Muscles are found under the skin. They cover the skeleton and give your body the shape that you have.



How muscles work

Muscles pull on bones to make them move. Muscles work by getting shorter and longer. When muscles get shorter they pull on the bones they are joined to. We say that the muscles **contract**. The pulling movement allows you to move and do the action that you want. When muscles **relax** they get longer and let you rest.

Muscles always work in pairs. One muscle contracts and pulls on the bone it is joined to. This makes the bone move. The other muscle relaxes.



Activity

Find out how muscles work in pairs

You will need:
something heavy to lift, such as a large book.

- Look closely at the muscles in your arm. Also look at the pictures that show how the arm muscles work.
- Hold the weight in one hand and slowly lift the weight up towards you.
- Put your other hand over the front on your upper arm. Feel how the muscle changes as you lift the weight.
- How does the muscle at the back of your arm feel?
- Straighten your arm. Feel what happens to the muscle at the back of your arm.
- What happens to the muscle at the front of your arm?

Questions

- 1 When you pick up a heavy book, which muscle in your arm contracts? Which muscle in your arm relaxes? How do you know this from doing the activity?
- 2 How strong are your arm muscles? Think of a way to find out that will be a fair test.
- 3 How can we make our muscles bigger?
- 4 The heart is a special muscle that is not joined to any bones. Why do you think the heart is not joined to any bones?

