Oxford International Resources

3

Science

Workbook

Second Edition

Primary

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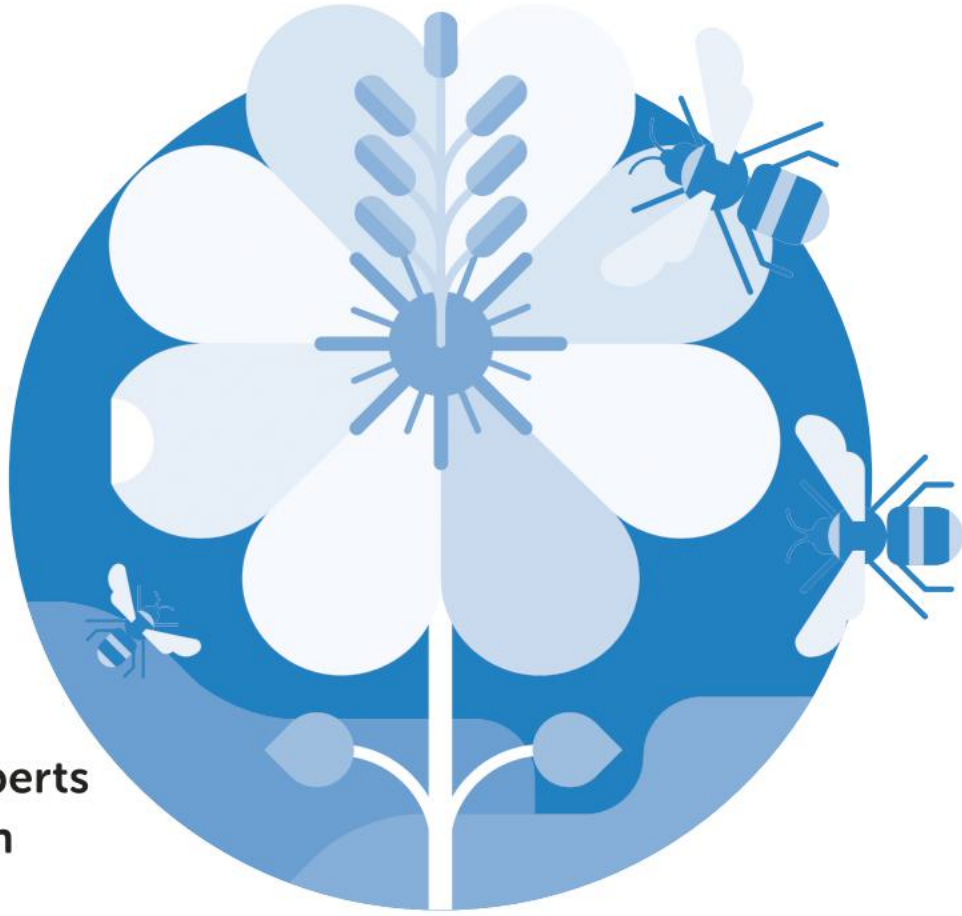
Workbook



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OXFORD
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Great Clarendon Street, Oxford, OX2 6DP, United Kingdom

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First published in 2016

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British Library Cataloguing in Publication Data

Data available

ISBN 978-1-382006620

1 3 5 7 9 10 8 6 4 2

Paper used in the production of this book is a natural, recyclable product made from wood grown in sustainable forests. The manufacturing process conforms to the environmental regulations of the country of origin.

Printed in Great Britain by Bell and Bain Ltd. Glasgow.

Acknowledgements

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Contents

How to Use this Book

The Workbook for *Oxford International Primary Science* supports the Student Book that children are using in their science lessons for this year.

The Student Book includes some pair, group and whole-class activities, hands-on tasks and write-in tasks to test students' understanding and help them learn. It is important to extend these tasks. This Workbook enables students to build on what they have learned in the Student Book to develop a secure understanding of scientific concepts.

Encouraging students to think about and apply their growing skills and knowledge helps them consolidate their understanding and work scientifically. This helps with confidence. Students also have opportunities to see that science is relevant all around them – both inside and outside the classroom.

Students may find it useful to complete an investigation planning form. This sets out all the stages of the investigation. A proforma is provided in the Teacher's Guide. Find out more at:

www.oxfordprimary.com/international-science

Structure of the book

This Workbook is divided into five units plus a Support for Teachers and Parents section and a Quiz:

Support for Teachers and Parents

Unit 1 Light and Dark

Unit 2 Looking at Rocks and Soil

Unit 3 Flowering Plants

Unit 4 Introducing Forces and Magnets

Unit 5 Exploring Health, Skeletons and Muscles

Quiz Yourself

What you will find in each unit

There are four types of lessons:

Key words and introduction lessons encourage students to read, spell and use the scientific vocabulary in the unit.

Activities build on the work in the Student Book. These help with developing language skills, developing scientific enquiry skills, applying mathematical knowledge, and securing understanding rather than just recall. The Support for Teachers and Parents notes on pages 6–13 give you advice on how to help students with each activity.

What have I learned encourages students to talk about what they have learned, reflect on what went well and revisit any areas they need to check. This encourages a growth mindset.

Investigate like a scientist enables students to apply what they have learned in practical contexts.

What you will find in the lessons

Icons show the nature of each task:

 **Discuss**: Students are encouraged to discuss and communicate scientific ideas and approaches. They can work in pairs or small groups for discussion tasks.

 **Investigate**: Students are encouraged to plan, ask questions and record results for each investigation. They are asked to observe closely, make predictions and compare their results with others. Sometimes you will use different equipment, which is available in school. You may also ask students to carry out a test in a different way, to make sure they are safe.

 **Language support**: This icon highlights activities that provide language support through writing frames or word boxes. Students are encouraged to write, read and record short answers.

 **Hints and tips**: Students are encouraged to think about tips to make investigations safer or more effective.

Stretch zone: Students are encouraged to extend their understanding.

 **Mindful moments**: Students are encouraged to think about and reflect on what they have learned. This supports students' well-being.

 **What went well:** Students are encouraged to talk about what went well in each module to secure their understanding.

Student Book

Throughout the Workbook, you will find links to the Student Book. Students can refer to information in the Student Book to help them complete activities.

Teacher's Guide

The Teacher's Guide that accompanies this book provides lesson notes and answers for each page.

Support for Teachers and Parents

1 Light and Dark

What students will learn

This unit helps students to understand more about light and dark. They explore sources of light and look at what happens when light shines on materials. Students learn about reflection and objects that either block light or let light through. They then investigate shadows. Students will:

- find out about different light sources
- discover that darkness is when there is no light
- notice that light is reflected from some surfaces
- understand how to protect eyes from the Sun
- find out how shadows are made
- explore and find patterns in shadows.

Key words

dark, light, pattern, protect, reflect, shadow, Sun, torch

Scientific enquiry skills

This unit helps students to develop and practise the following scientific enquiry skills.

Scientific enquiry skill	Page
Use a range of equipment	17, 18, 19, 21, 27
Make careful observations	14, 16, 18, 21, 27
Take accurate measurements	25
Identify differences, similarities or change	21, 22, 27
Record data in a variety of ways	19, 24, 25, 27
Plan and carry out fair tests	24, 25
Group/classify	24, 27
Use secondary sources of evidence to support ideas	23
Communicate findings and conclusions in a range of ways	16, 18, 21, 23, 27

Ways to help

- Encourage students to use the key words and display them in the room.
- Set out a range of objects that are opaque or transparent so students can explore them.
- Ask students questions about their experiences of being in the light and the dark.
- Ask students to think about when they have seen and used shadows.
- Play games by asking students to suggest when they have seen large and small shadows.
- Arrange to be able to darken a room so students can compare light and dark.

Helping with activities

The following guidance gives you advice on how to help students with each activity.

Sources of light
Arrange a display of different sources of light, such as torches, lamps and candles.

The Sun
Pre-cut the holes in the envelopes and make sure the mirrors fit easily into them.

Does a mirror reflect light?
Arrange some dull and shiny objects around the room so that students can find a range of reflective and non-reflective materials.

Reflecting light
Darken the room as much as possible so the reflections from the torch are more dramatic.

Investigating darkness
Make sure everyone in the room is very quiet when someone is blindfolded so they can hear outside noise they might otherwise not notice.

Make a dark box
Include a lit torch in the list of objects so students see that some things give out (emit) light and others do not.

Light sources
Encourage students to imagine what their life would be like if there were no light sources after the Sun had gone down.

Light to see
Ensure that students understand that natural objects or sources exist in nature and have not been made by people.

Does light travel through all objects?
Darken the room slightly so that any shadows cast are more visible and include transparent and opaque objects.

How do shadows change?
Help students to stick a long ruler or tape measure to the table so they have a fixed measuring point.

2 Looking at Rocks and Soil

What students will learn

This unit helps students to understand more about rocks and fossils. They will investigate some common rocks, including soil, and discuss their uses. Students will learn about the properties of rocks that make them useful. They will then explore how fossils are formed. Students will:

- name some types of rock
- compare and group rocks by what they look like and their properties
- learn how fossils are formed
- investigate different types of soil.

Key words

crystal, fossil, grain, group, property, rock, sand, soil, stone

Scientific enquiry skills

This unit helps students to develop and practise the following scientific enquiry skills.

Scientific enquiry skill	Page
Use a range of equipment	32, 35, 39, 41, 43
Make careful observations	28, 29, 30, 32, 33, 36, 37, 38, 39, 41, 43, 45
Take accurate measurements	43, 45
Identify differences, similarities or change	30, 31, 34, 37, 41, 45
Record data in a variety of ways	30, 31, 32, 34, 36, 37, 39, 43, 45
Plan and carry out fair tests	39, 41, 43, 45
Group/classify	31, 32, 33, 34, 41, 42
Use secondary sources of evidence to support ideas	29, 30, 36
Communicate findings and conclusions in a range of ways	29, 30, 34, 35, 36, 37, 39, 41, 45

Ways to help

- Set out a display of different rocks and fossils so students can handle them.
- Encourage students to observe rocks on their way to and from school.
- Ask students questions about the rocks they have seen and used.
- Ask students to write the key words onto pieces of card and display them in your room.
- Allow students to identify rocks and fossils in books and on the internet, and download pictures.
- Ensure that students always link what a rock is used for with its properties.

Helping with activities

The following guidance gives you advice on how to help students with each activity.

Finding rocks

Point out that not all rocks are solid and hard. Sand and mud are examples of rocks.

Make a model Earth

Explain the difference between the inner core, outer core, mantle and crust.

Identifying rocks

Explain that an identification key works by asking one question after another to narrow down on the rock type.

Label the rock cycle

Explain what igneous, sedimentary and metamorphic rocks look like. Show students some visual examples.

Fossil field trip

Remind students that any evidence of living things in the past is a called a fossil – including footprints.

Fossil hunt

Demonstrate how to lay the string across the trays and fix them in place with tape. Students will need four lengths of string across the tray and four lengths down the tray.

Building materials

Download or project some examples of famous buildings around the world to show different building materials.

Building materials survey

Explain how to take a tally instead of using numbers. Count out three pencils one after the other and write I then II and then III.

Using rocks

Help students to see the link between properties and uses by asking why a soft rock would be useless for steps into a building.

Testing rock hardness

Ensure students can test a range of rocks from soft to hard – and point out that any pieces that break away may be small so they will need to look carefully.

What is in soil?
Explain that the soil is separated into its different parts because heavy parts will sink and lighter parts will float.

Investigating different soils
Ask students to look back at the diagram on the previous activity page for clues as to what they may observe.

Different types of soil
Display the names of the different soil types on a wall so students become familiar with the terms. Loam is best for growing and students could remember this from the acronym **L**ots **O**f **A**mazing **M**aterials.

Soil investigation
Encourage students to look carefully at the soils to note colour and how much sand or clay is present before making their predictions.

3 Flowering Plants

What students will learn

This unit helps students to understand more about plants. They will study the structure of plants and investigate what is needed for healthy plant growth. Students will consider water, light, air and nutrients from soil and place the stages of plant growth into a life cycle. Students will:

- explore plant roots, leaves, stems, trunks and flowers
- find out that plants need water, light, air, nutrients from soil, and space to grow
- investigate how water is taken in and moves through plants
- explore how temperature changes the way plants grow
- identify and describe parts of flowering plants
- find out how flowers are involved in the life cycle of flowering plants.

Key words

dispersal, flower, growth, leaf, nutrient, pollen, pollination, reproduce, root, seed, stem, transport, trunk, water

Scientific enquiry skills

This unit helps students to develop and practise the following scientific enquiry skills.

Scientific enquiry skill	Page
Use a range of equipment	48, 52, 53, 56, 58, 59, 62, 64, 65, 69
Make careful observations	49, 51, 52, 53, 54, 56, 58, 60, 61, 62, 64, 69
Take accurate measurements	53, 54, 56, 58, 62, 64
Identify differences, similarities or change	49, 52, 53, 56, 58, 59, 60, 61, 62, 63, 64
Record data in a variety of ways	48, 49, 52, 53, 54, 56, 58, 61, 62, 63, 64, 67
Plan and carry out fair tests	52, 53, 54, 56, 58, 64, 69
Group/classify	60, 62
Use secondary sources of evidence to support ideas	49, 59, 62
Communicate findings and conclusions in a range of ways	48, 49, 51, 52, 53, 54, 56, 58, 62, 63, 67, 69, 71

Ways to help

- Encourage students to use the key words and display them in your room.
- Allow students to plant seeds before the start of the topic so they have a range of small plants to investigate.
- Identify a local garden or park where students can carry out visits to observe plants.
- Ask students questions about the plants they have seen and used locally.
- Ask students to think about when they have seen unhealthy plants and ask them where this was and why.
- Have numerous different potted plants in the room so students can compare a range of flowering plants.

Helping with activities

The following guidance gives you advice on how to help students with each activity.

Make a model of a plant
Choose a very wide range of materials so students have a good choice when building their model. Explain that function means the job something does.

Flowering plant exhibition
Make sure students remove any labels pointing to the parts of a flower before asking visitors to identify them.

Flowering plant wordsearch
Remind students that words can be written upwards, downwards, across and diagonally in a wordsearch.

Plant rescue
Remind students that unhealthy plants will not be able to grow large green leaves and strong stems.

Do plants need water to grow?
Remind students to make their investigation a fair test by changing only one thing.

Measuring plants
Ask students to look carefully at the ruler or tape measure to ensure their measurements are accurate and to repeat them three times.

Plants and light investigation
Encourage students to use their observation skills carefully and record details such as colour and number of leaves.

Photosynthesis competition
Explain that only letters from the word 'photosynthesis' can be used to make words in the competition.

Grow a bean seed
Remind students to keep the bean seed damp so it does not dry out during the investigation.

How water moves through plants
Emphasise that water moves up the plant from the roots, and make sure students do not think that water enters through the leaves and 'falls' down inside the plant.

Do leaves affect how a plant transports water?
Explain that plants lose water through holes in the leaves. The more leaves there are, the more water will be drawn up the plant.

Stems for support
Help students to fix heavy pieces of clay to represent leaves so the single strand of spaghetti or straw bends and breaks.

The power of roots
Explain that, given enough time, roots can push through brickwork and even tiny gaps in concrete.

Plant expert's report
Explain that roots need to spread out in soil to take in enough water, and if they are in a small pot this cannot happen.

Tree survey
Remind students that the circumference of a tree is the distance around the trunk. Point out the word is similar to circle.

Unfair competition
Encourage students to use all of their prior knowledge about plant growth to help with their prediction.

Seedling investigation
Make sure students understand that seeds do not need light to germinate but seedlings do need light.

Make your own greenhouse
Download some pictures of model greenhouses, such as ones made from plastic bottles, to give students some clues if they cannot think of a design.

The parts of a flower
Make, or allow students to make, large poster-sized labelled diagrams of flowers so they are constantly in view to help learning and recall.

Identify the parts of the flower
Explain that this activity draws together learning from the investigation in the Student Book and students' prior knowledge of the functions of the parts of the flower.

Fertilisation
Emphasise that fertilisation only refers to the moment the pollen joins with the ovule. The rest of the process is there to help this to happen.

Investigating seed dispersal
Remind students that the independent variable is the variable they decide to change. The dependent variable is what they will be observing or measuring.

4 Introducing Forces and Magnets

What students will learn

This unit helps students to understand more about forces. They will explore a range of different pushes and pulls and learn about the ways in which forces can make objects move faster or slower, or change direction. Students will study friction as a force that slows objects. They will then explore magnetism and learn that magnets can attract and repel each other. Students will:

- revise that pushes and pulls are examples of forces
- explore how forces can make objects start or stop moving

- explore how forces including friction can make objects move faster or slower or change direction
- understand that some forces need contact between two objects but magnetic forces act at a distance
- find out that magnets can attract and repel each other
- find out that magnets attract some materials, but not others
- explore the two poles of a magnet.

Key words

attract, contact force, force, friction, magnet, non-contact force, pole, pull, push, repel

Scientific enquiry skills

This unit helps students to develop and practise the following scientific enquiry skills.

Scientific enquiry skill	Page
Use a range of equipment	76, 77, 78, 79, 80, 81, 82, 83, 85, 88, 89, 90, 92, 93, 95, 96, 97, 98, 99, 101
Make careful observations	74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 85, 88, 89, 92, 95, 96, 98, 99, 101
Take accurate measurements	76, 77, 80, 81, 82, 83, 85, 86, 98, 99, 101
Identify differences, similarities or change	76, 78, 79, 80, 81, 83, 85, 88, 96, 98, 99, 101
Record data in a variety of ways	76, 77, 78, 80, 81, 82, 83, 85, 86, 88, 92, 95, 98, 99, 101
Plan and carry out fair tests	76, 80, 81, 82, 83, 85, 95, 98, 99, 101
Group/classify	76, 79, 85, 88, 96
Communicate findings and conclusions in a range of ways	72, 74, 75, 76, 77, 81, 82, 83, 85, 93, 95, 97, 98, 99, 101

Ways to help

- Create push and pull labels and fix them to objects that are pushed or pulled.
- Encourage students to say the words 'push' and 'pull' when they open or close doors.
- Allow students to play with objects such as toys and balls to explore forces in everyday contexts.
- Ask students questions about the forces they use every day.
- Ask students to think about what would happen if objects didn't move or couldn't slow down if they were moving.
- Arrange a display of magnets and show some of their everyday uses – such as fridge magnets.

Helping with activities

The following guidance gives you advice on how to help students with each activity.

Find the forces

Allow students time to spot all of the everyday examples of forces and then encourage them to talk about how they have used forces in this way.

Showing the direction of a force

Explain that arrows are often used to show the direction of forces and that they should be shown starting from where the force starts.

Make a forcemeter

Explain that a large force will stretch the forcemeter further than a smaller force.

Using a forcemeter

Explain that forces are measured in units called Newtons and that this can be written as N. At this stage, students just need to know that a force of 10N is twice as much as a force of 5N.

Make your own play dough

Encourage students to shape the dough in as many ways as they can. Some may forget to twist and stretch the dough, for example.

Using forces to change the shape of modelling clay

Emphasise the measuring and comparison skills being used as students explore the shapes of the clay.

Bouncing ball investigation

Encourage students to link the force they apply to the ball with its speed to the wall and its return after bouncing.

Measuring distance

Display a range of distance measuring devices such as a 30-cm ruler, a metre stick, and various lengths and styles of tape measures.

Vehicles travel further on some surfaces

Explain that this is a planning activity to help students to predict and control an investigation to make it a fair test.

Surface investigation
Allow students to use forcemeters if possible but, if not, they can use their own based on elastic bands. Encourage them to measure the lengths of the elastic band to estimate the strengths of the forces.

Which shoe to use?
Remind students that when there is a lot of friction between surfaces the surfaces will not slide past each other very well.

Which shoe has the best grip?
Explain that the larger the force of friction the more force will be needed to move the shoe along the surface.

Rolling a ball
Encourage students to think about the link between the amount of force applied to an object and how quickly or slowly it moves.

Forces and moving objects
Ask students to read the sentences out loud and say the words in the box before they try to fill in the gaps.

Which objects are magnetic?
Make sure you have a range of different steel objects around the room to act as magnetic materials for students to test.

How can we identify the poles of magnets?
Remind students that the North-seeking pole of a magnet will repel the North-seeking pole of another magnet but will attract a South-seeking pole.

Make a compass
Allow students to see and use some navigation compasses so they can see how magnets are used to find direction.

All about magnets
Allow students to look back through their books if they cannot find a correct word. This is a useful skill to develop.

Buried treasure
Point out that magnets can detect and attract magnetic materials through other substances if the layers are not too thick.

Design a recycling plant
Allow students to test their magnets on some of the cleaned waste objects – especially aluminium and steel cans.

Why does the Earth have a North Pole and a South Pole?
Encourage students to fill in as many of the diagram labels as they can from memory and only check with the Student Book if they are definitely stuck.

How do magnets react together?
Encourage students to discuss the investigation and how they will approach it, as this will help to develop their enquiry and investigative skills.

Magic magnets
Demonstrate how you can make a paperclip look as if it is moving on its own by moving it with a hidden magnet.

Floating paperclips
Explain that a floating magnet shows that magnetic force acts at a distance – the magnet and paperclip do not need to be touching.

Making and testing an electromagnet
Demonstrate how to coil the wires around the nail so the coils are compact and neat.

More about electromagnets
Show students how to make the electromagnet with an air coil by coiling wire around a nail first and then removing the nail.

5 Exploring Health, Skeletons and Muscles

What students will learn

This unit helps students to understand more about health, skeletons and muscles. They will explore a range of different life processes. They will learn about the similarities between skeletons and muscles in humans and animals. They will also explore how medicines are used. Students will:

- review the life processes of nutrition, movement, growth and reproduction
- find out that animals and humans need to get their nutrition from what they eat
- find out that humans and some animals have bony skeletons
- discover that animals with skeletons have muscles attached to the bones
- understand how we use medicines.

Key words

bone, diet, exercise, food, healthy, infectious disease, medicine, movement, muscle, nutrition, reproduce, skeleton, vaccination

Scientific enquiry skills

This unit helps students to develop and practise the following scientific enquiry skills.

Scientific enquiry skill	Page
Use a range of equipment	110, 111, 115, 116, 120, 125, 129, 135
Make careful observations	105, 110, 111, 115, 117, 118, 119, 120, 124, 125, 127, 128
Take accurate measurements	110, 111, 115, 120
Identify differences, similarities or change	106, 115, 120, 125
Record data in a variety of ways	110, 115, 120, 121, 125, 131
Plan and carry out fair tests	110, 111, 115, 120
Group/classify	106, 113, 125
Use secondary sources of evidence to support ideas	104, 106, 108, 113, 114, 125
Communicate findings and conclusions in a range of ways	104, 107, 109, 115, 116, 120, 125, 129, 132, 135

Ways to help

- Ask students to share their ideas about life processes to find out what they already understand.
- Allow students to look up x-ray photographs in books and on the internet.
- Display photographs of healthy and unhealthy meals to encourage discussion.
- Ask students to think about what they eat and why they need to eat it.
- Display some health leaflets from a local medical centre.

Helping with activities

The following guidance gives you advice on how to help students with each activity.

Designing a poster

Have some exemplar posters in your room to show students what eye-catching posters look like.

Identifying life processes

Encourage students to tick off each word in the box as they use it.

How much should we eat?

Explain that the figures in the table are averages for males and females, and that some females will use more energy than some males.

Healthy eating

Remind students that advice from health experts is that people should eat only a small amount of fats and sugars.

Signs and symptoms

Students could act out some of the symptoms to help understanding (e.g. sneezing, chills, stomach pain).

Lifestyle diseases

Explain to students that food labels list amounts of vitamins and minerals contained. Make sure they understand the units of measurements used on the food labels.

Looking after water

Help students to set a tap dripping by demonstrating so they see one drop hit the sink just as another drip starts falling from the tap.

Filtering water

Remind students of other filters they have seen, such as coffee filters, tea bags and air filters in vacuum cleaners.

Food for a long walk

Ask students to review the different nutrients found in food and to identify those that provide the most energy.

Different people need different diets

Encourage students to think about how tired they would be if they did each activity for a few hours; this will help them to realise which need the most energy.

Energy and exercise

Explain that muscles need energy to help them to work and this energy needs to be provided by eating foods rich in energy.

Heart rates

Finding a pulse is not always easy. Demonstrate how to feel the pulse in the wrist and remind students to use their finger and never the thumb, which has its own small pulse.

Make a skeleton

Explain that students need to make their own copy of the bones but much larger, otherwise their puppet will be far too small.

Label the skeleton

Allow students to look back at the labelled picture in the Student Book, but only after they have tried to remember each label first.