Oxford International Resources

5

Science

Workbook

Second Edition

Primary

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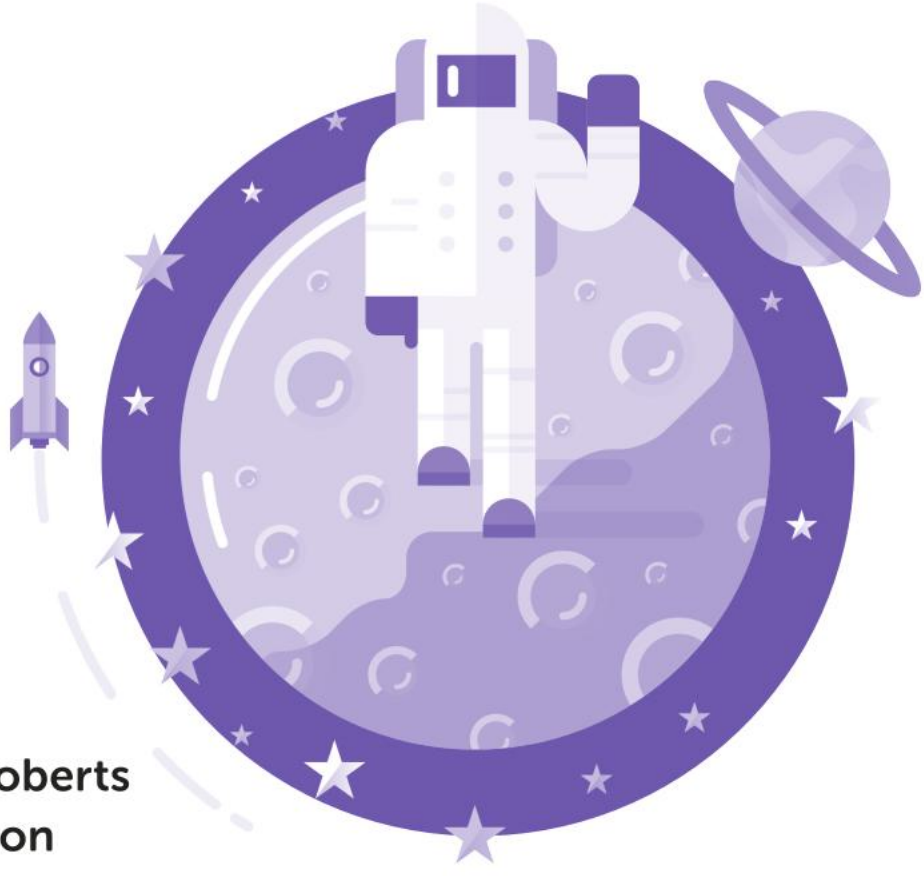
Science

Workbook



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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 Life Cycle and Growth of Flowering Plants

Unit 2 Life Cycles and Growth of Animals and Humans

Unit 3 Properties and Changes of Materials

Unit 4 Earth and Space

Unit 5 Forces in Action

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 I have 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 Life Cycle and Growth of Flowering Plants

What students will learn

This unit helps students to understand more about flowering plants. Students will observe the structure of flowering plants. They will study how pollination of flowers, and fertilisation of ovule, lead to seed production. Students will learn about the life cycle of flowering plants and explore how seeds are dispersed to allow new plants to grow and develop. They will also investigate the conditions needed for seeds to germinate and plants to grow well. Students will:

- explore how plants reproduce
- observe the structure of flowering plants
- observe how seeds can be dispersed
- observe that plants produce flowers that have male and female parts
- find out that seeds are formed when pollen from the male part fertilises the ovule in the female part
- describe the life cycle of flowering plants
- find out about the processes of pollination, fertilisation, seed production, seed dispersal and germination
- investigate the conditions seeds need to germinate
- explore the conditions plants need to grow well.

Key words

energy, fertilisation, fruit, germination, growth, life cycle, pollination, reproduction, seed dispersal, warmth, water

Scientific enquiry skills

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

Scientific enquiry skill	Page
Plan and/or carry out enquiries to answer questions	17, 19–22, 34, 37, 40–42, 44, 45, 49
Recognise and control variables	21–22, 25, 28, 34, 37, 39, 40–42, 47, 49
Make observations	17–23, 25, 26, 28, 34, 38, 41, 45, 49
Take measurements, using equipment accurately	21, 22, 37, 40–42, 44, 45, 49
Record data and results using diagrams and labels, tables, keys and graphs	16, 17, 19–21, 26, 28–30, 36–37, 39–42, 44–46, 49
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Report and present findings in a variety of ways	17, 20, 24–27, 29, 32, 36, 38, 40–41, 49
Draw conclusions and give explanations	18–19, 24–26, 28–29, 34, 40–43, 45–46, 49
Identify causal relationships	19, 22, 25, 28–29, 34, 40–41, 43, 45–46, 49

Ways to help

- Encourage students to use the key words when they study, draw and label flowering plants.
- Display a range of flowering plants in the room so students can observe them.
- Ask students questions about the flowering plants they see every day.
- Ask students to think about why it is important that plants produce seeds.
- Encourage students to reflect on when they have seen and planted seeds.
- Ask students how they would identify plants that were not growing well.

Helping with activities

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

The parts of a flowering plant
Remind students that the words they should use for the labels are all in the word box.

Local flower survey
Identify a suitable venue for the survey – such as a garden centre, flower market or local park.

Name the stages
Ask students to use their observation skills and past work on plants to arrange the life cycle into the proper order.

How do flowering plants reproduce?
Explain that students are going to plant different parts of a plant in compost to find out which results in new plant growth.

What are seeds like?
Point out that seeds may look different but they will all have a coat, a food supply and a young (embryo) plant.

Investigating how seeds grow
Demonstrate how to turn the jars so the seeds are faced with different directions to grow. Remind students to keep the paper damp in the jars, but not too wet.

Make your own seed
Test students' understanding of fair testing by asking them how the different seeds should be tested and what height they should all be dropped from.

Dispersal summary
Allow students time to study each picture and then ask them to discuss each one to identify which method of dispersal is being shown.

Compare seeds
Collect a range of different seeds to have a supply in case students cannot find any. Include burrs, seeds from juicy fruits, seeds that float and parachute or wing-type ones.

Investigating competition for space
You could ask students to read the seed packages for any information about seeds and space.

Flower survey
Remind students that the shape of a flower is a good clue about how it is pollinated.

Design a flower
Ask students to think about how their flower design would attract a bee and make it pick up pollen from the anther and leave pollen on the stigma.

Colours and insects
Remind students that their prediction should be based on science information they already know.

Presenting results
Point out to students that on their bar chart they should write the colours along the horizontal (x) axis and the numbers up the vertical (y) axis.

The parts of a flower
Explain that the names of the different parts of the flower are all found in the word box.

Flower parts and what they do
Allow students to look back at their Student Book if they cannot find some of the links. Looking up an answer is good practice and encourages independent learning.

Fertilisation
Explain that a carpel is made up of the stigma, style and ovary. A pistil can be one or more carpels joined together. Both of these words are often used to mean the same thing.

Pollen journey
Point out that self-fertilisation can be within the same flower or between different flowers on the same plant.

Do plants grow from seeds?
Make sure students plant separate parts of the fruit and check that no seeds remain on the skin, stalk or core.

Plant life cycle
Make large-sized key word cards (A4) to place onto a wall to help students become familiar with the parts of the life cycle.

Examples of plant growth
Explain that young plants will be smaller than fully-grown plants, but they will share characteristics such as leaf shape and colour.

What do seeds need to grow well?
Use this opportunity to address the common misconception that seeds need light in order to germinate. Students will see that they don't.

Survey of places where plants grow
Download or project some hot, arid and very cold places to encourage students to think about conditions that plants will find difficult to thrive in.

Water and warmth
Use this as another opportunity to ask students about fair testing. Ask them to list the independent, dependent and control variables.

How can we treat seeds to help them germinate faster?
To help students with an explanation about how scratching seeds might help germination, remind them that the seed coat is waterproof and only has a tiny hole to let water in.

Do plants need water?
You could have plants in your room and forget to water some for a long period of time, and then ask students what is wrong with the plants and how they could be made healthier.

Investigate the effect of light on plant growth
Explain that the layers of paper are a convenient way to control the amount of light each plant receives.

Plants need light to grow
Point out that this activity provides students with an opportunity to apply knowledge gained from the previous investigation.

Investigating light levels on grass growth
Set up the pots and grass seeds a few days before the investigation so students are not setting it up and then waiting before they tackle the rest of the investigation.

Does increasing the light help plants to make energy?
Remind students to leave the jar and pond weed for five minutes before counting bubbles, as this will allow the plant to get used to the new conditions.

Drawing graphs and charts
Explain that as students decided on the range of temperatures this is the independent variable and these values should go along the horizontal (x) axis.

What are variables?
Remind students that control variables are those factors in an investigation that are kept the same throughout.

2 Life Cycles and Growth of Animals and Humans

What students will learn

This unit helps students to understand more about life processes and life cycles. They will review and extend their understanding of life processes. Students will study the life cycles of a range of different animals, including frogs, butterflies, birds and mammals. They will also study the life cycle of humans from birth to old age. Students will:

- revise the life processes – movement, growth, reproduction, breathing, feeding, using senses
- explore the life cycles of mammals, amphibians, insects and birds
- describe the changes as humans grow and develop to old age.

Key words

adolescent, amphibian, baby, bird, chrysalis, feeding, growth, insect, larva, life cycle, living, mammal, movement, reproduction, tadpole

Scientific enquiry skills

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

Scientific enquiry skill	Page
Plan and/or carry out enquiries to answer questions	54, 58–59, 61, 66–67, 69
Make observations	53, 55–57, 60–62, 66– 67, 69
Take measurements, using equipment accurately	67, 69
Record data and results using diagrams and labels, tables, keys and graphs	53–55, 60, 64, 66–67, 69
Report and present findings in a variety of ways	53, 58, 60, 62, 65–67, 69
Draw conclusions and give explanations	53, 55–57, 69

Ways to help

- Encourage students to learn the key words by creating a word wall in the room.
- Ask students to discuss how they know whether or not something is alive.
- Display pictures of a range of young and fully-grown animals so students can observe them.
- Ask students questions about the animals they have studied before.
- Ask students to think about why it is important that animals are born small and then grow and develop.
- Encourage students to think about the people in their family and how they vary with age.

Helping with activities

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

Which foods do the animals eat?
Explain to students that many animals eat more than one type of food supply.

Observing animal movement
Collect some books or keys on animal identification that cover common animals in your region, or download identification keys from the internet.

How animals move
Encourage students to research different modes of movement and to link the ways that animals move to adaptations to their habitat.

Are they living or non-living?
Remind students that some things can be classified as 'once living'. This would include wood used in furniture.

How are animals and plants different?
Explain that plants and animals need similar things in order to be healthy, but there are some important differences.

The life processes of plants
Encourage students to be as creative as possible with their poems or stories, but also to draw on their science knowledge.

Your family timeline
You can create a fictitious family and group of friends in case some students are sensitive about their family background.

Find the important words
Advise students to look for the first letter of the word they are searching for and then search around for the second letter to see if they find a match.

Butterfly life cycle
Explain that the words 'pupa' and 'chrysalis' are both used. Pupa can be used for most insects, but chrysalis refers only to butterflies and moths.

Dragonfly life cycle
Explain that a nymph is a young insect that looks very like the parent.

Frog life cycle
Point out that a collection of frog's eggs is sometimes called frogspawn.

Life cycle of birds
Explain that the embryo inside the egg is the developing chicken. Point out that the eggs have a shell to keep them waterproof, otherwise they would dry out.

Comparing animal life cycles
Ask students to check back in the Student Book or their notes if they cannot complete any part of the table.

Life cycle of humans
Explain that teenagers can also be called adolescents. This is the stage when people are changing into adults.

How do humans change?
Encourage students to observe as many changes as they can, including changes in height.

Variation in humans
Download and display photographs showing the wide variations in height, skin colour, hair and body shape to show the variations in humans.

3 Properties and Changes of Materials

What students will learn

This unit helps students to understand more about materials and their properties. They will review and extend their understanding of how the properties of materials are linked to their uses. Students will study examples of reversible and irreversible changes to materials and investigate examples. Students will learn about mixing solids and what happens when solids are added to water. Students will:

- compare and group materials according to properties
- investigate the reasons for particular uses of materials
- understand the difference between a reversible and an irreversible change
- explore how solids can be mixed and how it is often possible to separate them again
- know about changes that happen when some solids are added to water
- understand how some solids that do not dissolve or react with water can be separated by filtering
- find out how some solids dissolve in water to form solutions and understand that the substance is in the solution.

Key words

dissolve, insoluble, irreversible, mixture, property, reaction, reversible, separate, soluble, solute, solution

Scientific enquiry skills

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

Scientific enquiry skill	Page
Plan and/or carry out enquiries to answer questions	72–73, 77–79, 81–82, 84–85, 87, 89–91, 93
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Take measurements, using equipment accurately	73, 79, 83, 85, 87, 89–91
Record data and results using diagrams and labels, tables, keys and graphs	72–74, 77, 79, 81–82, 84, 89–91
Make predictions	71–73, 77, 79, 81–82, 90
Report and present findings in a variety of ways	70, 73–75, 78, 88–89, 93
Draw conclusions and give explanations	71, 73, 77–79, 85, 89–91
Identify causal relationships	73

Ways to help

- Encourage students to review their prior work on materials by asking them to describe the properties of some materials around the room.
- Display a wide range of objects made from different materials around the room so students can observe them.
- Ask students questions about the objects they use and why they are made of specific materials.
- Ask students to think about some materials that would be useless for certain objects, such as rubber keys.
- Encourage students to think about when they have added substances to water and what happened.

Helping with activities

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

Classifying materials by their properties
Make sure you include varied materials – such as steel, plastic, rubber, wood and aluminium.

Investigating the conductivity of materials
Explain that the word 'thermal' relates to heat as it is based on the Greek word 'therme' which means heat.

Compare reversible and irreversible changes
Remind students that reversible changes do not result in any new chemicals and are easily undone.

Dissolving
To avoid any misconceptions, stress that substances that dissolve simply spread out until they cannot be seen – they do not disappear.

Cooking
Encourage students to share their own experiences of cooking and making both reversible and irreversible changes.

How can we investigate burning?
Emphasise that because the end products of burning cannot be put back together to make the original fuel these are irreversible changes.

Fire safety survey
Check where all of the different types of fire extinguishers and other safety features are in the school or building and download photographs of any that cannot be demonstrated.

Investigating fire extinguishers
Explain that the different ways of putting out the fires used in the investigation all link to removing oxygen.

Laboratory equipment and how we use it
Encourage students to talk about each piece of equipment and when they have used it to review prior experiences.

Can we mix oil and water?
Explain that detergents break down the oil and help to form a bridge between the oil and water.

Soluble or insoluble?
Remind students to allow time after adding substances to water before carrying out their observations. Some insoluble substances can stay in suspension and so should be allowed to settle.

Examples of soluble and insoluble substances
Explain to students that this activity will help them to review their understanding of soluble and insoluble substances.

Separating insoluble solids from mixtures
Point out that sieving and filtering are very similar processes, but sieving separates different sized solids and filtering separates solids from a liquid.

Make your own filter bed
Remind students that effective filtering will need small holes or spaces.

Mixtures and separating them
Allow students to attempt the tasks without looking at their notes and the Student Book, but then they can look things up to fill in any gaps.

Using chromatography
Explain that chromatography (or colour writing) works because some substances do not travel as far with the rising liquid.

Dissolving examples
Encourage students to use their imagination to think about a world where all solids dissolve.

Investigating the sugar content in drinks samples
If students need a clue, just write the word 'evaporate' on the board and remind them that when water evaporates it leaves any solids behind.

Food as fuel
Students may not regard food as fuel, but remind them that one reason they eat food is for energy.

What is the opposite of an exothermic reaction?
Explain that the prefix 'exo' means out and the prefix 'endo' means in. This refers to the energy in a process.

4 Earth and Space

What students will learn

This unit helps students to understand more about the Earth, the Moon and the rest of the solar system. They will review and extend their understanding of day and night. Students will explore both the rotation of the Earth on its axis and the orbiting of the Earth around the Sun. They will also learn about the movement of the planets in the solar system. Students will:

- describe the movement of the Earth and other planets in the solar system
- describe the movement of the Moon around the Earth
- explore that the Sun does not move; it appears to move because of how the Earth spins on its axis
- discover that the Earth spins on its axis once every 24 hours
- discover that the Earth takes a year to orbit the Sun, spinning as it goes
- learn that the Sun, Earth and Moon are shaped like spheres.

Key words

axis, day, Earth, Moon, night, orbit, planet, rotate, shadow, solar system, sphere, star, Sun, year

Scientific enquiry skills

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

Scientific enquiry skill	Page
Plan and/or carry out enquiries to answer questions	96, 98, 100–105, 110, 113
Recognise and control variables	100, 103–104
Make observations	97, 100–101, 103–106
Take measurements, using equipment accurately	100, 103–105
Record data and results using diagrams and labels, tables, keys and graphs	96, 99–106, 108
Make predictions	95, 100, 103–104
Report and present findings in a variety of ways	96, 98–99, 105, 109–111, 113
Draw conclusions and give explanations	97, 100–101, 103, 105–107, 111, 113
Identify causal relationships	97, 101, 103, 105

Ways to help

- Encourage students to learn the names of the planets by producing mnemonics.
- Write down the key words and display them in your room.
- Ask students to discuss their ideas about how day and night are caused.
- Display pictures of the Earth, Moon, Sun and planets to create interest.
- Download any examples of space exploration taking place.
- Ask students to talk about their own ideas about why a year is 365 days and why we have seasons.
- Always stress that the Sun only appears to move across the sky – it is the turning of the Earth that creates this apparent movement.

Helping with activities

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

Planet research project

Allocate a planet to each student so they are all covered. Make sure they have access to the internet or detailed books about the solar system.

Planets of the solar system

Explain that a mnemonic (using the first letter of each word they need to remember to form a phrase) is a very useful way of remembering lists.

Model the movement of the Earth and Moon

The person who is modelling the Sun must stay in one place. The other students then move around them.

Modelling the Earth's movements

Point out that all of the words that need to be used are to be found in the word box.

Moving Sun?

It is best that students locate the position of the Sun by standing back in the classroom and not from close by the window.

The Sun appears to move across the sky

Explain that in this investigation the student is representing the spinning Earth and objects that are not moving in the room will appear to move along the paper.

Modelling an exoplanet

Use the equipment to demonstrate where the equator and the poles are.

Investigating the Earth's tilt

Encourage students to experiment with different degrees of tilt of the Earth as this emphasises where there are shadows and where is in direct sunlight.

Measuring shadows

Encourage students to carry out each measurement three times to improve accuracy and reduce error.

Changing shadows

You can use a torch and cast a shadow of an object onto a screen to show that the higher the torch is the shorter the shadow it casts will be.

Investigating sunlight hours

Download sunset and sunrise times for your area in case students find it difficult to find them.

Sunrise and sunset

Explain to students that sunrise and sunset times can vary greatly throughout the year and from place to place. They may live in an area where the length of day and night are fairly constant, so they won't experience this.

Plotting graphs
Encourage students to place the planets along the horizontal (x) axis of their graph.

A year's changes
If you live in a region where the seasons do not vary much, allow students to look up seasons in other regions so they can see a contrast over the course of a year.

The Flat Earth Society
You can use this activity to generate a debate about how ideas change or don't change in the face of scientific evidence.

Earth drawing
You can allow students to research their ideas before they complete the task and write down their ideas.

5 Forces in Action

What students will learn

This unit helps students to understand more about forces. They will review and extend their understanding of pushes and pulls, and consider the differences between mass and weight. Students will identify the direction and strength of forces and relate forces to energy. They will investigate gravity and friction as forces. Students will study examples of simple machines such as levers and pulleys. Students will:

- explore the force of gravity acting on falling objects
- understand the difference between mass measured in kilograms and weight in newtons
- use units of force, mass and weight
- identify the direction in which forces act
- know and understand the idea of energy in movement
- understand how friction, including air resistance and water resistance, can change the speed objects move
- discover that levers, pulleys and gears allow a smaller force to have a greater effect.

Key words

air resistance, energy, force, friction, gravity, inclined plane, lever, machine, mass, multiplier, pulley, water resistance, weight

Scientific enquiry skills

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

Scientific enquiry skill	Page
Plan and/or carry out enquiries to answer questions	115–119, 121–123, 126–127, 130–135, 137, 139–140, 143
Recognise and control variables	116–117, 121, 123, 130, 132–134
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Ways to help

- Encourage students to learn the key words by creating a word wall in your room.
- Ask students to discuss examples of forces they use every day.
- Display pictures of forces being used in sports and every day, such as in play parks.
- Ask students questions about what speeds up and slows down objects.
- Download films of forces in action and include slow-motion films of objects falling.
- Show students photographs of streamlined vehicles for use on land and underwater and ask why they are the shape they are.
- Encourage students to think about how they use simple machines and why these machines are useful.

Helping with activities

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

Investigating how objects fall
Demonstrate how to calculate the rate per metre by dividing the time by three because the total fall distance is three metres.

Making craters
Explain that the greater the force that an object hits the sand with, the bigger the crater will be.

Do people understand weight and mass?
Do not encourage any misconceptions about mass and weight. Explain that mass is the amount of something and is measured in kg or grams. Weight is a force pulling objects towards Earth and is measured in newtons. A large mass will have a large weight.

Predicting measurements
Explain that a large mass will be pulled towards the Earth more than a small mass, so a large mass will have a large weight.

Drawing and using graphs
Point out that the bigger the force of gravity, the more something will weigh.

Find the mass and weight of people in your class
Demonstrate how to change mass (kilogram) measurements to weight (newtons) by multiplying kilograms by 10 to get newtons.

A home-made forcemeter
Explain that the spring will stretch further the more the force acts on it.

Measuring forces
An elastic band behaves in the same way as the spring in a spring balance and so can be used to measure forces.

Direction of forces
Stress that the arrow showing force points in the direction the force is acting – not towards the force.

Force diagrams
Point out that the force arrows are useful as they help us to imagine forces, which are invisible.

Measuring the force of magnetism
Remind students that magnetic materials such as iron, steel, cobalt and nickel will be attracted to, and attract, a magnet.

Which objects float?
Explain that, in order to float, the force pulling the object down (gravity) must be balanced by the force pushing up – upthrust from the water.

Balancing forces
Stress that with balanced forces nothing will change. If something is not moving, it will not move, and if something is moving, it will not stop or change direction.

Review your learning so far
Allow students to discuss the questions to help them review their learning so far in the unit.

Energy transfers
Explain that the words 'create' and 'destroy' are opposites in this context. 'Create' means to make. 'Destroy' means to end something. Remind students that energy cannot be created or destroyed.

Investigating balanced and unbalanced forces
Remind students that if anything changes, such as them jumping up, there must be unbalanced forces and they will move in the direction of the largest force.

Investigating friction in shoes
Ask students to talk about when they have slipped on a surface and ask them about the shoes they were wearing.

Friction
Explain that friction happens when two surfaces rub together, and the rougher the surface the greater the friction.

Investigate air resistance with paper
Help students to understand air resistance by explaining that air is thin, but it still has many tiny particles that can hit against a surface and slow it down.

Does the shape of a parachute change the speed it falls?
Encourage students to be imaginative with their parachute shapes and remind them that this is how designers arrive at new and improved designs.

Forces and parachutes
Stress that the particles in air are much further apart than the particles in water or solids, but they can still slow an object down.

Investigating water resistance
Encourage students to design four very different shapes, and have streamlined and non-streamlined shapes ready in case students do not produce these.

Using pulleys
Explain that as more pulleys are included in a system the rope has to travel a greater distance. This helps with lifting, but can be complicated to set up.

Investigating inclined planes
Help students to set up the ramps at the correct angles. The units of force used should be newtons, but if you are using student-made forcemeters, then they can record this as high, medium or low force.

Using levers
Explain that the point that the screwdriver touches the can is acting as the fulcrum of the lever. The longer the lever, the easier it should be to remove the lid.

Survey of simple machines
You may have to remind students that the missing simple machine is the screw. Show them a screwdriver placing a screw into wood.