



Oxford
International
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4

Science

Workbook

Second Edition



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International
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Science

Workbook



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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:

<http://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 Solids, Liquids and Gases

Unit 2 Habitats

Unit 3 Digestion and Food Chains

Unit 4 Electricity

Unit 5 Sounds

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 banks. 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 Solids, Liquids and Gases

What students will learn

This unit helps students to understand more about solids, liquids and gases. They will identify a range of solids, liquids and gases and explore how materials change between these states due to temperature changes. Students will also learn about the roles of evaporation and condensation in the water cycle and investigate the link between the rate of evaporation and temperature. Students will:

- compare and group materials together, according to whether they are solids, liquids or gases
- observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Key words

condensation, evaporation, freezing, gas, liquid, melting, solid, temperature, water cycle

Scientific enquiry skills

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

Scientific enquiry skill	Page
Ask questions	20, 22, 25, 28, 37
Use equipment	20, 21, 22, 23, 24, 25, 26, 27, 28, 31, 33, 37
Observe	14, 15, 17, 18, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 33, 37
Measure	20, 22, 25, 28
Compare	16, 17, 18, 20, 22, 24, 25, 28, 30, 31
Notice patterns	16, 17, 22, 24, 25
Record	15, 16, 17, 18, 20, 22, 24, 25, 28, 30, 35, 37
Carry out tests	20, 21, 22, 24, 25, 28, 31, 33
Group/classify	17, 18, 24, 30
Use secondary sources	26, 27, 32, 34
Communicate findings	25, 29, 31, 32

Ways to help

- Encourage students to use the key words when they refer to the states of matter.
- Display a range of solids and liquids in the room so students can observe them.
- Ask students questions about the solids, liquids and gases they use every day.
- Ask students to think about why it is important that not all materials are solid.
- Encourage students to reflect on when they have seen ice being formed or melting.

Helping with activities

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

What are solids, liquids and gases like?

Explain that the table is based on the one in the Student Book so students could look back at this if they have problems.

Identifying solids, liquids and gases

Have some examples available for students to look at and handle.

Examples of different states

Stress that students can draw all of the particles the same – only the space between the particles changes with solids, liquids and gases.

How are the particles arranged?

Tap a solid such as wood and pass your hand through the air to show that solids have closely packed particles and gases have particles that are far apart.

Investigate different shaped containers

Encourage students to measure the volume of the water carefully each time and to make sure all of the water is poured from the containers into the measuring jug.

Making a lava lamp

Point out that, although water and oil are both liquids, they behave differently and they do not mix.

Does air have weight?

Allow students to carry out the investigation a number of times, as it addresses a key misconception and shows that air does have weight.

Adding more particles

Ensure that the straw is sealed into the bag, so an airtight seal allows the bag to be inflated.

Investigate melting

Have some hot water available in a heatproof bowl and remind students not to touch the water.

Why salt the paths and roads?

Remind students to check their water in the freezer regularly. After time, even the water with the salt will freeze.

Evaporating and boiling

Explain that students can use words they have already learned in the unit. Point out the word box.

Particles and changes of state

Allow students to look back at their Student Book and earlier Workbook tasks if they need support in filling in the particle diagrams.

Keep ice cubes cool

Explain that this activity helps students to plan and carry out their investigation. Stress that they should fill in each section.

The damaged notebook

Point out the word box. Remind students to use these words to fill in the gaps.

Melting and freezing at home

Ask students to think about any examples of changes of state they have seen at home. Give a hint: remind them of ice cubes in drinks.

Ice displays

Have a collection of small models, toys and other objects that fit into a yoghurt carton.

Problems with steam

Once students have selected their topic, allow them access to research it to bring information to share with the group.

Using evaporation and condensation

Select a very sunny place for the solar stills. Remind students not to drink any of the water they collect.

Changes of state and the weather

Encourage students to look back at the water cycle in the Student Book if they need extra support.

Summary of changes of state

Point out the word box. It lists all words students need for the activities.

- observe and group living things
- investigate how different animals and plants live in different habitats
- learn how animals and plants are adapted to their habitats
- learn how to use identification keys to identify living things
- find out how human activity can change the environment and how this can put living things in danger.

Key words

environment, habitat, flowering plant, identification key, invertebrate, natural disaster, non-flowering plant, pollution, vertebrate

Scientific enquiry skills

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

Scientific enquiry skill	Page
Ask questions	40, 41, 44, 46, 49, 50, 52, 53, 57
Use equipment	40, 41, 42, 43, 47, 48, 50, 52, 53, 56, 57, 60, 61
Observe	40, 41, 42, 43, 44, 47, 48, 50, 52, 53, 54, 56, 57, 60, 61
Measure	41, 44, 50, 52, 53, 60
Compare	39, 41, 44, 46, 47, 48, 50, 52, 53, 54, 55, 56, 57, 60
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Use secondary sources	39, 42, 45, 47, 48, 49, 51, 57, 59
Communicate findings	40, 41, 42, 43, 45, 47, 50, 51, 52, 57, 59, 61

2 Habitats

What students will learn

This unit helps students to understand more about animals and plants and to explore how they are adapted to their habitats. They will study how identification keys can be used to name specific animals and plants. Students will also consider how humans can change habitats and endanger living things. Students will:

Ways to help

- Encourage students to highlight or underline key words when they write them.
- Download and print out photographs of living things to display in the room.
- Ask students questions about the animals and plants they see locally.

- Ask students to think about why living things need to be adapted to their habitats.
- Encourage students to think about adaptations by placing pictures of living things in unusual places – such as a polar bear on a coral reef.
- Display examples of identification keys and have a small library of identification books.
- Make a scrapbook of examples of earthquakes and volcanoes and use online films to show examples.

Helping with activities

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

Mini-quadrats

Explain that a quadrat is a way of sampling at random to make a survey a fair test.

Investigate a habitat in the local environment

Identify some local habitats where students will see a range of plants and animals. Set up a part of the school grounds if possible by letting grass grow longer.

Making sense of data

Encourage students to place the dependent variable (what is being measured in an investigation) up the y-axis of a graph or chart. The animals go along the bottom (x-axis) and the numbers go up the side (y-axis) in this case.

Design your own animal

Show students some examples of animals adapted to cold climates to give them some clues about fat layers and body coverings.

Keeping cool

Ask students to think about where they would sit around the school or home to keep cool. Give hints about shade and breezes.

Adaptations to the environment

Have examples of photographs of local animals on the wall. Take students out to observe some in the wild.

Design a key

Point out that the type of key that students are designing only works with questions that have only two possible answers – e.g. ‘yes’ or ‘no’, or ‘six legs’ or ‘eight legs’.

Survey of vertebrates

Take students to a variety of areas to see a range of vertebrates, such as woodlands, parks, ponds, the coastline or even a zoo.

Choosing a cactus for a friend

Allow students to have access to the internet or guidebooks about plants so they can research the cacti.

Florist survey

Invite a local florist, gardener or farmer in to talk about plants and how they identify them.

Cleaning up an oil spill

Remind students that oil will float on water. They should use this fact when planning their investigation.

Researching oil spills

Show films of examples of oil spills from online sources such as YouTube. Give students internet access so they can research their own examples.

Making an air pollution detector

Explain that only heavy particles in the air will settle and be trapped by their detectors. Other forms of pollution will not be measured.

Surface pollution survey

Point out that the sticky tape detector is actually used by scientists to measure surface pollution, but they will examine it using a microscope.

What impact do activities have on rivers?

Encourage students to discuss each of the photographs and think about how each impacts on rivers and the habitats.

Water survey

Talk students through the 1–5 scoring system for the level of pollution they will see.

Making waves

Demonstrate how to move the small piece of wood up and down to make small and large waves.

Protecting coastlines from tsunamis

Display examples of mangrove swamps – such as in the Caribbean, Kenya, South America and many countries in Asia such as Indonesia, Malaysia and Bangladesh – to show how closely packed the trees are.

Ash from volcanoes

Allow students to look back at their Student Book if they need support in labelling the volcano.

Advantages and disadvantages of volcanoes

Read through the advantages and disadvantages of volcanoes with students. Ask if any have seen any examples of these.

Earthquake-proof buildings

Pass around a 100-gram object so students can feel how strong their building must be. Hint that a wide base will be more stable than a narrow one.

Earthquake safety

Encourage students to imagine what people would do and feel if an earthquake happened.

3 Digestion and Food Chains

What students will learn

This unit helps students to understand how food is consumed and broken down to provide energy and nutrients to help humans live. Students will study the digestive system, including teeth and taste. They will also consider how feeding relationships can be represented by food chains and food webs. Students will:

- explore the digestive system in humans
- identify types of teeth and their functions
- explore the sense of taste
- find out how food chains can be used to show feeding relationships
- learn about the words 'producer', 'consumer', 'predator' and 'prey'
- explore and construct food chains for different habitats.

Key words

carnivore, consumer, digestive system, food chain, herbivore, omnivore, predator, prey, producer, taste, teeth

Scientific enquiry skills

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

Scientific enquiry skill	Page
Ask questions	71, 72, 73, 76, 78, 84, 93
Use equipment	66, 69, 71, 72, 74, 79, 80, 81, 93
Observe	65, 69, 71, 72, 74, 78, 79, 80, 81, 82, 83, 85, 87, 90, 91, 93
Measure	76, 79, 86, 93
Compare	65, 66, 70, 71, 72, 73, 74, 75, 76, 78, 79, 80, 85, 91, 93
Notice patterns	66, 70, 71, 78, 79, 85, 87, 93
Record	66, 67, 68, 71, 72, 73, 76, 79, 81, 84, 86, 87, 89, 93
Carry out tests	69, 71, 72, 73, 74, 76, 79, 93
Group/classify	70, 71, 72, 75, 79, 90, 93
Use secondary sources	66, 68, 77, 81, 82, 90
Communicate findings	69, 71, 72, 73, 77, 79, 80, 81, 82, 84, 90

Ways to help

- Encourage students to use the key words for the digestive system when they talk about digestion.
- Download pictures of different food groups. Display them around the room.
- Obtain models of teeth and skulls to show the various types.
- Ask students to think about what they eat and why they need to eat it.
- Download pictures of plants and animals so that students can arrange them into different food chains.
- Make cards with producer, consumer, predator and prey. Students can add these to their food chains and food webs.

Helping with activities

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

Energy in food

Remind students that the energy change can be calculated by subtracting the initial temperature from the final temperature.

Label the digestive system

Encourage students to look back at the picture and notes in their Student Book if they need support.

More about absorption

Remind students that if the surface area of the small intestine is increased, there is more room for nutrients to pass through.

Make a model digestive system

Tell students that the picture of the model is to give them inspiration. They should not just copy it.

Matching the teeth to their function

Point out the example of how to draw the lines to link the picture of the tooth with its name and function.

Modelling teeth

Help students to see the link between the shape of a tool (such as sharp, chisel like or flat) and the shape of teeth (such as incisors or molars).

Taste and colour

Explain that the senses of sight and taste can work together. What something looks like can influence how we taste it and how it is packaged.

Taste survey

Stress that there is no right and wrong in this investigation. Everyone will taste things slightly differently and have different preferences.

Why should we chew our food?

Explain that chewing food has two functions – making food particles smaller and wetter to allow swallowing, and mixing the food with enzymes to start the chemical breakdown of starch to sugars.

Food groups

Point out that the foods that we eat usually contain more than one food group (such as protein and fat in chicken). Foods tend to be richer in one food group than others.

Favourite foods

Point out that sometimes the foods we like to eat are not the healthiest choices. They may have a lot of sugar that makes them taste sweet.

How to design a leaflet

Demonstrate how to fold a piece of A4 paper or card into the various leaflet options. Stress that leaflets give many sections for pictures and text.

Our teeth

Remind students that different teeth have adapted to have different shapes, which carry out different jobs.

Do some drinks damage your teeth?

Explain that pieces of rock are being used because it isn't easy to collect examples of human teeth. The rock is modelling teeth.

Paper plate food chain

Point out that the Sun does not usually have to appear in a food chain. It is added to make the display more visual and to remind people where green plants obtain their energy.

Feeding relationships

Remind students that energy and raw materials are passed along a food chain. The arrows should run from the producer up through the various consumers.

Food webs

Explain that food webs are made by combining different food chains. It is rare that an animal will only eat one type of food source.

Desert food web

Point out the word box. This provides the labels students need to add to the food web.

Make a food web

Encourage students to make up their individual food chains before they start to combine them together into a larger web.

Plants and light

Point out that the labels students need to add to the food web are all included in the word box.

Energy in food chains

Explain that energy is lost along a food chain. Not every bit of energy can be passed along as each animal and plant uses some of the energy up itself. Not all of the eaten food can be digested.

Giraffes and energy

Explain that if a lion only ate one giraffe, then it would be hungry again in days, and would need to eat giraffes throughout its life.

Protecting food webs

Remind students that plants are called producers because they can produce their own food using a process that uses energy from sunlight. Animals are called consumers, as they cannot produce their own food.

How you eat the Sun's energy

Explain that the more stages there are in a food chain, the more energy waste there is before the final consumer is reached.

Protection against predation

Allow students access to the internet and wildlife books and magazines so they can research the methods used to avoid predation.

Adaptations

Point out that adaptations can be physical (e.g. fur colour, teeth or length of legs) and behavioural (e.g. hunting at night, flocking or herding together, hibernation or migration).

4 Electricity

What students will learn

This unit helps students to understand more about electricity and the appliances and devices they use every day. They will learn about the components of electrical circuits and how to identify faults in circuits using batteries. Students will design and use switches, and consider which materials are good conductors and which are poor conductors or insulators. They will also learn about the vital issue of safety and electricity. Students will:

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including batteries, wires, bulbs, switches and buzzers
- identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery

- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

Key words

appliance, battery, bulb, buzzer, circuit, component, conductor, electricity, insulator, switch, wire

Scientific enquiry skills

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

Scientific enquiry skill	Page
Ask questions	99, 101, 102, 108, 109
Use equipment	99, 101, 105, 108, 109, 111, 115
Observe	95, 96, 97, 99, 100, 101, 102, 103, 104, 105, 108, 109, 111, 113, 115
Measure	115
Compare	99, 101, 103, 104, 105, 106, 108, 109, 111, 113, 115
Notice patterns	99, 101, 103, 104, 105, 106, 108, 109, 111, 115
Record	95, 96, 97, 98, 99, 100, 101, 104, 105, 106, 108, 109, 110, 111, 115
Carry out tests	96, 97, 99, 100, 101, 105, 108, 109, 111, 115
Group/classify	96, 97, 104, 108, 110, 111
Use secondary sources	102, 106, 113
Communicate findings	100, 101, 108, 110, 111, 113, 115

Ways to help

- Print off large component pictures and their names. Display these in the room.
- Set out a range of components so students can handle them.
- Ask students questions about the appliances and devices they use every day.
- Display large safety posters about mains electricity and cover sockets in the room to prevent experimentation.
- Arrange many broken battery circuits to allow students to practise fault finding.

Helping with activities

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

Batteries

Arrange a display of battery-powered devices in the room.

Mains electricity

Plan a route around the school or home to allow students to see the many devices and appliances powered by mains electricity.

Wires and circuits

Give students a clue about the mixed-up sentences. Remind them that a sentence will start with a word that has a capital/upper-case letter.

Investigating different materials

Explain that very poor conductors of electricity are called insulators.

Modelling circuits

You could ask each student to draw the component they are modelling onto a large piece of paper and fix it on their front. Then ask them to stand in a circuit to make a circuit diagram.

Components

Remind students that the word 'component' means an object that is part of something else.

Electric music

Explain that a switch is a way of breaking and then making a complete circuit safely.

Make a game

Point out that the 'hand steady' game depends on any touching between the hoop and the folded wire track making a complete circuit.

Open and close switches

Allow students to test their predictions by building and testing the circuits.

Circuits

Advise students to follow a circuit drawing or diagram with their finger to help them detect any gaps. If a circuit has no gaps but is not working, then they should then test each component.

Exploring circuits

Encourage students to look back at their Student Book if they need support in identifying the parts of the circuits.

Drawing circuits

Remind students to include all the listed components in their circuit and check that there are no gaps in their drawing.

Designing circuits

Allow students to move from circuit to circuit to predict if they will work and then test them.

Designing more circuits

Have a pre-made example of the switch so students can pass it round to help them.

Why are insulators important?

Plan a route around the school so that students can re-visit the appliances they found earlier. This time, concentrate on the role of insulators.

Which material is the best for a screwdriver handle?

Explain that the best material for an electrician's screwdriver handle will be an insulator. It will also need to be hard and strong.

Electrical safety

Ask students to share their rules with the class. Ask them to point to electrical devices or sockets in the room as they talk about them to put each rule in context.

Danger!

Allow students to move around the room to place their safety symbols. Then ask students which symbols stand out.

5 Sounds

What students will learn

This unit helps students to understand more about sounds, and how they are produced. They will study the link between vibrations and sound, as well as pitch and volume. Students will also investigate the relationship between the volume of a sound and the distance away from the sound source. Students will:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get quieter as the distance from the sound source increases.

Key words

decibel, loud, pattern, pitch, quiet, sound, travel, vibrate, volume

Scientific enquiry skills

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

Scientific enquiry skill	Page
Ask questions	118, 119, 124, 126, 127, 137
Use equipment	118, 119, 120, 124, 125, 126, 127, 128, 130, 133, 134, 135, 137
Observe	116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 130, 131, 137
Measure	118, 124, 125, 126, 134, 135, 137
Compare	118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 135
Notice patterns	118, 119, 121, 122, 123, 124, 125, 126, 130, 131, 135
Record	118, 119, 121, 122, 123, 126, 129, 132, 135
Carry out tests	118, 119, 122, 123, 124, 125, 126, 128, 135, 137
Group/classify	121, 123, 124, 126, 132
Use secondary sources	119, 121, 130, 131
Communicate findings	119, 120, 121, 124, 127, 132, 133, 134, 137

Ways to help

- Encourage students to learn the key words by speaking loudly and softly. Ask students to tell you which you are doing.
- Set out a range of musical instruments so students can play them.
- Ask students questions about the sounds they hear every day.
- Allow students to act out sound waves by gently pushing each other in line so the wave passes along to the other side of the room.
- Ask students to sit quietly and tell you which sounds are being produced near to them and which are a long way off.