PrimaryConnections®

Australian Academy of Science

Fully aligned with the Australian Curriculum

What's it made of?

Foundation Year

Chemical sciences

About this unit What's it made of?

All around us are things made from interesting materials. Who would once have imagined things like CDs, self-adhesive notes or floppy silicone ovenware? Materials that we now take for granted are the products of imagination and exploratory science. What new materials will be part of the world of the future and how might existing materials be used in new ways? What might materials allow us to make and do?

The *What's it made of?* unit is an ideal way to link science with literacy in the classroom. Through investigations, students develop skills of observing, describing, comparing and communicating. The unit provides opportunities for students to explore, through hands-on activities, what things are made of in the school environment and the properties of the materials used to make them.

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GPO Box 783
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Email: pc@science.org.au
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Contents

Foreword

Never has there been a more important time for science in Australia. More than ever, we need a scientifically-literate community to engage in debates about issues that affect us all. We also need imaginative thinkers to discover the opportunities in our exponentially expanding knowledge base. Teachers play a vital role in nurturing the minds of our future citizens and scientists.

The Australian Academy of Science has a long, proud history of supporting science education. Our primary education program, Primary**Connections**: linking science with literacy, now has over 15 years' experience in supporting teachers to facilitate quality learning experiences in their classrooms. Regular evaluations demonstrate the significant impact the program can have on both teacher confidence and student outcomes.

PrimaryConnections has been developed with the financial support of the Australian Government and endorsed by education authorities across the country. It has been guided by its Steering Committee, with members from the Australian Government and the Australian Academy of Science, and benefitted from input by its Reference Group, with representatives from all states and territories.

Key achievements of the program include engaging over 24,000 Australian teachers in professional learning workshops, producing multi award-winning curriculum resources, and developing an Indigenous perspective framework that acknowledges the diversity of perspectives in Australian classrooms.

The Primary**Connections** teaching and learning approach combines guided inquiry, using the 5Es model, with hands-on investigations. It encourages students to explore and test their own, and others', ideas and to use evidence to support their claims. It focuses on developing the literacies of science and fosters lasting conceptual change by encouraging students to represent and re-represent their developing understandings. Students are not only engaged in science, they feel that they can do science.

This is one of 40 curriculum units developed to provide practical advice on implementing the teaching and learning approach while meeting the requirements of the Australian Curriculum: Science. Trialled in classrooms across the country and revised based on teacher feedback, and with the accuracy of the teacher background information verified by Fellows of the Academy, the experience of many brings this unit to you today.

I commend Primary**Connections** to you and wish you well in your teaching.

Professor John Shine, AC Pres AA
President (2018–2022)
Australian Academy of Science

The Primary**Connections teaching and learning approach**

Primary**Connections** units embed inquiry-based learning into a modified 5Es instructional model. The relationship between the 5Es phases, investigations, literacy products and assessment is illustrated below:

Primary**Connections 5Es teaching and learning model**

Phase	Focus	Assessment focus
ENGAGE	Engage students and elicit prior knowledge	**Diagnostic assessment**
EXPLORE	Provide hands-on experience of the phenomenon	**Formative assessment**
EXPLAIN	Develop scientific explanations for observations and represent developing conceptual understanding Consider current scientific explanations	**Formative assessment**
ELABORATE	Extend understanding to a new context or make connections to additional concepts through a student-planned investigation	**Summative assessment** of the Science Inquiry Skills
EVALUATE	Students re-represent their understanding and reflect on their learning journey, and teachers collect evidence about the achievement of outcomes	**Summative assessment** of the Science Understanding

More information on Primary**Connections** 5Es teaching and learning model can be found at:
www.primaryconnections.org.au

Reference: Bybee, R.W. (1997). *Achieving scientific literacy: from purposes to practical action*. Portsmouth, NH: Heinemann.

Developing students' scientific literacy

The Primary**Connections** program supports teachers in developing students' scientific literacy. Scientific literacy is considered the main purpose of school science education and has been described as an individual's:

- scientific knowledge and use of that knowledge to identify questions, acquire new knowledge, explain scientific phenomena and draw evidence-based conclusions about science-related issues
- understanding of the characteristic features of science as a form of human knowledge and enquiry
- awareness of how science and technology shape our material, intellectual and cultural environments
- willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen.

Reference: Programme for International Student Assessment & Organisation for Economic Co-operation and Development. (2009). *PISA 2009 assessment framework: key competencies in reading, mathematics and science*. Paris: OECD Publishing.

Linking science with literacy

Primary**Connections** has an explicit focus on developing students' knowledge, skills, understanding and capacities in science and literacy. Units employ a range of strategies to encourage students to think about and to represent science.

Primary**Connections** develops the literacies of science that students need to learn and to represent their understanding of science concepts, processes and skills. Representations in Primary**Connections** are multi-modal and include text, tables, graphs, models, drawings and embodied forms, such as gesture and role-play. Students use their everyday literacies to learn the new literacies of science. Science provides authentic contexts and meaningful purposes for literacy learning, and also provides opportunities to develop a wider range of literacies. Teaching science with literacy improves learning outcomes in both areas.

Assessment

Science is ongoing and embedded in Primary**Connections** units. Assessment is linked to the development of literacy practices and products. Relevant understandings and skills are highlighted at the beginning of each lesson. Different types of assessment are emphasised in different phases:

Diagnostic assessment occurs in the *Engage* phase. This assessment is to elicit students' prior knowledge so that the teacher can take account of this when planning how the *Explore* and *Explain* lessons will be implemented.

Formative assessment occurs in the *Explore* and *Explain* phases. This enables the teacher to monitor students' developing understanding and provide feedback that can extend and deepen students' learning.

Summative assessment of the students' achievement developed throughout the unit occurs in the *Elaborate* phase for the Science Inquiry Skills, and in the *Evaluate* phase for the Science Understanding.

Rubrics to help you make judgments against the relevant achievement standards of the Australian Curriculum are available on our website:
www.primaryconnections.org.au

Safety

Learning to use materials and equipment safely is central to working scientifically. It is important, however, for teachers to review each lesson before teaching, to identify and manage safety issues specific to a group of students. A safety icon 

is included in lessons where there is a need to pay particular attention to potential safety hazards.
The following guidelines will help minimise risks:

- Be aware of the school's policy on safety in the classroom and for excursions.
- Check students' health records for allergies or other health issues.
- Be aware of potential dangers by trying out activities before students do them.
- Caution students about potential dangers before they begin an activity.
- Clean up spills immediately as slippery floors are dangerous.
- Instruct students never to smell, taste or eat anything unless they are given permission.
- Discuss and display a list of safe practices for science activities.

Teaching to the Australian Curriculum: Science

The Australian Curriculum: Science has three interrelated strands—Science Understanding, Science as a Human Endeavour and Science Inquiry Skills—that together 'provide students with understanding, knowledge and skills through which they can develop a scientific view of the world' (ACARA 2020).

The content of these strands is described by the Australian Curriculum as:

Science Understanding	
Biological sciences	Understanding living things
Chemical sciences	Understanding the composition and behaviour of substances
Earth and space sciences	Understanding Earth's dynamic structure and its place in the cosmos
Physical sciences	Understanding the nature of forces and motion, and matter and energy
Science as a Human Endeavour	
Nature and development of science	An appreciation of the unique nature of science and scientific knowledge including how current knowledge has developed over time through the actions of many people
Use and influence of science	How science knowledge, and applications affect people's lives, including their work, and how science is influenced by society and can be used to inform decisions and actions
Science Inquiry Skills	
Questioning and predicting	Identifying and constructing questions, proposing hypotheses and suggesting possible outcomes
Planning and conducting	Making decisions about how to investigate or solve a problem and carrying out an investigation, including the collection of data
Processing and analysing data and information	Representing data in meaningful and useful ways, identifying trends, patterns and relationships in data, and using this evidence to justify conclusions
Evaluating	Considering the quality of available evidence and the merit or significance of a claim, proposition or conclusion with reference to that evidence
Communicating	Conveying information or ideas to others through appropriate representations, text types and modes

AC Above material is sourced from the Australian Curriculum: Australian Curriculum Assessment and Reporting Authority (ACARA). (2020). *Australian Curriculum: Science*. www.australiancurriculum.edu.au

Primary**Connections** units support teachers to teach each Science Understanding detailed in the Australian Curriculum: Science from Foundation to Year 6. Units also develop students' skills and knowledge of the Science as a Human Endeavour and Science Inquiry Skills sub-strands, as well as specific sub-strands within the Australian Curriculum: English, Mathematics and Design and Technologies. Detailed information about its alignment with the Australian Curriculum is provided in each unit.

Unit at a glance — *What's it made of?*

Phase	Lesson	At a glance
ENGAGE	**Lesson 1** Minds on maps ***Session 1*** A school walk ***Session 2*** Let's make a map	To capture students' interest and find out what they think they know about the things in the school environment. To elicit students' questions about what things are made of in the school environment
EXPLORE	**Lesson 2** Object observers	To provide hands-on, shared experiences of what objects are made of in the school environment
	Lesson 3 The name game	To provide hands-on, shared experiences of the properties of materials used to make objects in the classroom environment
EXPLAIN	**Lesson 4** Making sense of materials ***Session 1*** Making books ***Session 2*** Silly stories *(Optional)*	To support students to represent and explain their understanding of the observable properties of materials used to make objects in the school environment, and to introduce current scientific views about the observable properties of materials
ELABORATE	**Lesson 5** Waterproof wonders ***Session 1*** Testing things ***Session 2*** Using things	To support students to plan and conduct an investigation of materials for water resistance, and to make an outdoor object for the school environment
EVALUATE	**Lesson 6** Location, location!	To provide opportunities for students to represent what they know about objects in the school environment and the materials used to make them, and to reflect on their learning during the unit

A unit overview can be found in Appendix 5, page 57.

What's it made of?—Alignment with the Australian Curriculum

What's it made of? is written to align to the Foundation Year level of the Australian Curriculum: Science. The Science Understanding, Science Inquiry Skills, and Science as a Human Endeavour strands are interrelated and embedded throughout the unit (see page xi for further details). This unit focuses on the Chemical sciences sub-strand.

Foundation Year Science Understanding for the Chemical Sciences:	**Objects are made of materials that have observable properties (ACSSU003)**
Incorporation in *What's it made of?*	Students explore familiar objects in their school and classroom environments. They use their senses to observe, describe and draw objects using everyday language to describe shape, size, colour and feel. They compare materials from which objects are made, observe their properties and explain how these are appropriate or inappropriate for particular purposes. They test different materials for water resistance and use their growing knowledge about materials and their properties to design outdoor weather-resistant objects.

AC All the material in the first row of this table is sourced from the Australian Curriculum

Foundation Year Achievement Standard

The Australian Curriculum: Science Foundation Year achievement standard indicates the quality of learning that students should demonstrate by the end of the Foundation Year.

> **By the end of the Foundation Year, students describe the properties** and behaviour **of familiar objects.** They suggest how the environment affects them and other living things. **Students share and reflect on observations, and ask and respond to questions about familiar objects and events.**

The sections relevant to *What's it made of?* are bolded above. By the end of the unit, teachers will be able to make evidence-based judgements on whether the students are achieving below, at or above the achievement standard for the sections bolded above.

What's it made of?—Australian Curriculum Key ideas

In the Australian Curriculum: Science, there are six key ideas that represent key aspects of a scientific view of the world and bridge knowledge and understanding across the disciplines of science. The below table explains how these are represented in *What's it made of?*

Overarching idea	Incorporation in *What's it made of?*
Patterns, order and organisation	Students observe and describe a range of objects in their school and class environments. They look for patterns and order in the properties of the materials the objects are made of and compare the similarities and differences.
Form and function	Students use their senses to observe and describe the form and function of different objects made from different materials for different purposes. They test different materials for water resistance properties and relate their findings to the uses of objects made from these materials.
Stability and change	Students observe and describe what happens when materials get wet, whether they change or remain the same. They make decisions about appropriate materials for the design of an outdoor object exposed to weather.
Scale and measurement	Students observe everyday objects and use informal language to describe colour, size, feel and composition. They use drawings and maps to represent objects and their locations in the school and class environments. They compare the relative size and scale of objects and distances in real life and on a map.
Matter and energy	Using appropriate language about matter, students compare different materials, their observable properties and the objects from which they are made.
Systems	Students explore and map the systems represented by their school and class environments and identify some components of these systems in the form and location of familiar objects.

What's it made of?—Australian Curriculum: Science

What's it made of? embeds all three strands of the Australian Curriculum: Science. For ease of reference, the table below outlines the sub-strands covered in *What's it made of?*, the content descriptions for Foundation Year and the aligned lessons.

Strand	Sub-strand	Code	Foundation Year content descriptions	Lessons
Science Understanding (SU)	**Chemical sciences**	ACSSU003	Objects are made of materials that have observable properties	1–6
Science as a Human Endeavour (SHE)	**Nature and development of science**	ACSHE013	Science involves observing, asking questions about, and describing changes in, objects and events	1–6
Science Inquiry Skills (SIS)	**Questioning and predicting**	ACSIS014	Pose and respond to questions about familiar objects and events	1–6
	Planning and conducting	ACSIS011	Participate in guided investigations and make observations using the senses	1, 2, 3, 4, 5
	Processing and analysing data and information	ACSIS233	Engage in discussions about observations and represent ideas	1–6
	Communicating	ACSIS012	Share observations and ideas	1–6

AC All the material in the first four columns of this table is sourced from the Australian Curriculum.

General capabilities

The skills, behaviours and attributes that students need to succeed in life and work in the 21st century have been identified in the Australian Curriculum as general capabilities. There are seven general capabilities and they are embedded throughout the curriculum. For further information see: www.australiancurriculum.edu.au

For examples of our unit-specific general capabilities information see the next page.

What's it made of?—Australian Curriculum general capabilities

General capabilities	Australian Curriculum description	*What's it made of?* examples
Literacy	Literacy knowledge specific to the study of science develops along with scientific understanding and skills. PrimaryConnections learning activities explicitly introduce literacy focuses and provide students with the opportunity to use them as they think about, reason and represent their understanding of science.	In *What's it made of?* the literacy focuses are: • picture maps • science journals • word walls • drawings • tables.
Numeracy	Elements of numeracy are particularly evident in Science Inquiry Skills. These include practical measurement and the collection, representation and interpretation of data.	Students: • draw maps and count and place objects in position on the maps • collect, interpret and represent data through tables.
Information and communication technology (ICT) competence	ICT competence is particularly evident in Science Inquiry Skills. Students use digital technologies to investigate, create, communicate, and share ideas and results.	Students are given optional opportunities to: • use internet mapping programs to gain a bird's eye view of their school.
Critical and creative thinking	Students develop critical and creative thinking as they speculate and solve problems through investigations, make evidence-based decisions, and analyse and evaluate information sources to draw conclusions. They develop creative questions and suggest novel solutions.	Students: • formulate, pose and respond to questions • compare and analyse data from tests • develop evidence-based claims • use reasoning to solve a design problem.
Ethical behaviour	Students develop ethical behaviour as they explore ethical principles and guidelines in gathering evidence and consider the ethical implications of their investigations on others and the environment.	Students: • ask questions respecting each other's point of view.
Personal and social competence	Students develop personal and social competence as they learn to work effectively in teams, develop collaborative methods of inquiry, work safely, and use their scientific knowledge to make informed choices.	Students: • work collaboratively in teams • listen to and follow safety instructions when handling materials • participate in discussions.
Intercultural understanding	Intercultural understanding is particularly evident in Science as a Human Endeavour. Students learn about the influence of people from a variety of cultures on the development of scientific understanding.	• 'Cultural perspectives' opportunities are highlighted where relevant • Important contributions made to science by people from a range of cultures are highlighted where relevant.

AC All the material in the first two columns of this table is sourced from the Australian Curriculum.

Alignment with the Australian Curriculum: English and Mathematics

Strand	Sub-strand	Code	Foundation Year content descriptions	Lessons
English–Language	**Text structure and organisation**	ACELA1430	Understand that texts can take many forms, can be very short (for example an exit sign) or quite long (for example an information book or film) and that stories and informative texts have different purposes	4
		ACELA1431	Understand that some language in written texts is unlike everyday spoken language	5
	Expressing and developing ideas	ACELA1434	Recognise that texts are made up of words and groups of words that make meaning	1–6
		ACELA1437	Understand the use of vocabulary in familiar contexts related to everyday experiences, personal interests and topics taught at school	1–6
		ACELA1786	Explore the different contribution of words and images to meaning in stories and informative texts	1, 2
English–Literacy	**Interacting with others**	ACELY1646	Listen to and respond orally to texts and to the communication of others in informal and structured classroom situations	1–6
		ACELY1784	Use interaction skills including listening while others speak, using appropriate voice levels, articulation and body language, gestures and eye contact	1–6
	Interpreting, analysing, evaluating	ACELY1648	Identify some differences between imaginative and informative texts	4
	Creating texts	ACELY1651	Create short texts to explore, record and report ideas and events using familiar words and beginning writing knowledge	2, 3
Mathematics–Number and Algebra	**Patterns and algebra**	ACMNA005	Sort and classify familiar objects and explain the basis for these classifications. Copy, continue and create patterns with objects and drawings	2, 3
Mathematics–Measurement and Geometry	**Using units of measurement**	ACMMG006	Use direct and indirect comparisons to decide which is longer, heavier or holds more, and explain reasoning in everyday language	1
	Location and transformation	ACMMG010	Describe position and movement	1, 2, 5, 6
Mathematics–Statistics and Probability	**Data representation and interpretation**	ACMSP011	Answer yes/no questions to collect information and make simple inferences	5

AC All the material in the first four columns of this table is sourced from the Australian Curriculum.

Cross-curriculum priorities

There are three cross-curriculum priorities identified by the Australian Curriculum:

- Aboriginal and Torres Strait Islander histories and cultures
- Asia and Australia's engagement with Asia
- Sustainability.

For further information see: www.australiancurriculum.edu.au

Aboriginal and Torres Strait Islander histories and cultures

The Primary**Connections** Indigenous perspectives framework supports teachers' implementation of Aboriginal and Torres Strait Islander histories and cultures in science. The framework can be accessed at: www.primaryconnections.org.au

What's it made of? focuses on the Western science way of making evidence-based claims about familiar objects and the materials they are made of, the properties of which make them suitable for particular uses.

Aboriginal and Torres Strait Islander Peoples might have other explanations for the observed phenomenon of materials, their properties and uses.

Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website.

Sustainability

The *What's it made of?* unit provides opportunities for students to investigate the properties of materials and relate them to how they are used for a particular purpose. This has direct application in understanding that all objects used in everyday life are made from either natural or processed materials with particular properties. Through their investigations students become aware of the importance of conservation of resources by choosing materials with properties suitable for a particular purpose. This enables students to develop the knowledge, skills and values for making decisions about individual and community actions that contribute to sustainable patterns of use of the Earth's natural resources.

Teacher background information

Introduction to materials

Scientists use the word 'material' to refer to all matter in the universe; this means all solids, liquids and gases (and plasmas) that exist. It includes all the objects and animals we see everyday, the water in rivers, lakes and oceans as well as the air we breathe.

All of the objects encountered and used in daily life are made from materials. Materials take up space and have mass. In this unit the following differentiation is made:

- an object is made of material(s)
- a material is composed of substance(s)
- a substance is composed of (contains) one or more element(s) (in combination).

This unit of work focuses on the properties of materials and objects that can be observed using the senses. Observation of other properties might require the use of complicated equipment that is not appropriate at Foundation Year level.

Many students might be unaware that the properties of a material determine how useful it is for particular purposes. For instance, they might just accept that bricks are a common construction material without considering the properties of bricks which make them suitable for constructing buildings, including sound and heat resistance, high durability and high compressive strength.

Students' conceptions

Taking account of students' existing ideas is important in planning effective teaching approaches that help students learn science. Students develop their own ideas during their experiences in everyday life and might hold more than one idea about an event or phenomenon.

The word 'material' is often used in everyday situations to refer to fabric or cloth. In this unit, what an object is made of is called a 'material', for example, wood, glass, paper, metal or fabric. To support students to make this distinction, it is recommended that fabrics be referred to as fabrics and anything used to make objects be referred to as a material during this unit.

Students might have their own personal meaning for words, such as 'strong' or 'weak'. Young students often link these terms to living things. They might also associate 'strong' with 'thick', 'hard' or 'heavy', and 'weak' with 'light' or 'soft'. Research shows that providing students with scientific terms without first-hand experience does not lead to understanding of how scientists use the words. Students need numerous first-hand experiences of materials and their properties to enable them to use the terms in the context of the *What's it made of?* unit.

In this unit, students are encouraged to develop their vocabulary through the use of descriptive words. Properties, such as hardness, flexibility or transparency, can be described by saying things such as, 'You can't scratch it', 'You can't bend it' or 'You can see through it'. Students can make comparisons through observations, for example, 'This ball is softer than that one'.

The skill of observing

From an early age students use their senses to explore the diverse nature of the world around them. They do so mainly through observation, a skill that is fundamental to science.

Observation involves the use of the five senses: touch, taste, hearing, sight and smell. Each sense provides different information about the properties of an object. Properties are the physical characteristics or attributes of objects and materials. They include colour, shape, size, weight, texture, hardness, elasticity, transparency, viscosity, absorbency and flexibility.

Learning to observe scientifically also involves learning to communicate observations to others, by representation or description. This is an important skill; without accurate descriptions, no-one could replicate an investigation or build an identical structure.

By observing properties and communicating ideas about their observations, students extend their awareness and understanding of their surroundings.

To access more in-depth science information in the form of text, diagrams and animations, refer to the Primary**Connections** Science Background Resource available on the Primary**Connections** website (www.primaryconnections.org.au).

Note: This background information is intended for the teacher only.

Lesson 1 Minds on maps

AT A GLANCE

To capture students' interest and find out what they think they know about the things in the school environment.

To elicit students' questions about what things are made of in the school environment.

Session 1 A school walk

Students:

- predict what things they might see in the school environment
- walk around the school area and identify, describe and discuss the objects in the school environment.

Session 2 Let's make a map

Students:

- contribute to a class picture map of the school environment
- use sequencing to draw individual picture maps of the school environment.

Lesson focus

The focus of the *Engage* phase is to spark students' interest, stimulate their curiosity, raise questions for inquiry and elicit their existing beliefs about the topic. These existing ideas can then be taken account of in future lessons.

Assessment focus

Diagnostic assessment is an important aspect of the *Engage* phase. In this lesson you will elicit what students already know and understand about:

- objects they find in their classroom and school environments, the materials they are made of and the observable properties of the materials, and how science involves observing the environment using their senses. You will also monitor their developing science inquiry skills (see page xi).

Key lesson outcomes

Science

Students will be able to represent their current understanding as they:

- make predictions about objects in the school environment
- observe and describe some objects in the school environment.

Literacy

Students will be able to:

- use talk to inquire and report on observations of objects in the school environment
- contribute ideas to a class picture map and science journal
- describe objects in the school environment.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Teacher background information

All objects are made of materials. Some objects are made from a single material, for example, a steel sewing needle or a wooden plank. Others are made from a combination of materials, for example, toys can be made by combining plastic and fabric. Metal saucepans often have heat-resistant plastic handles. The properties of an object are determined by the materials that are used to make it and how those materials are put together.

Materials can be classified in a variety of ways which include:

- *by origin*, such as natural or processed/manufactured
- *by type*, such as metal, glass, fabric, ceramic or plastic
- *by properties*, such as porosity or absorbency
- *by uses*, for example, as construction materials.

Session 1 A school walk

Equipment

FOR THE CLASS

- class science journal
- word wall
- map (see 'Preparation')
- *optional*: digital camera

Preparation

- Read 'How to use a science journal' (Appendix 2).
- Read 'How to use a word wall' (Appendix 3).
- Select a map that is familiar to students for the class to observe. This will be an example to support students when making a class picture map in Session 2.

Lesson steps

1 Introduce a map to the class and ask questions, such as:

- What is a map?
- When have you used a map or seen one being used?
- What sort of things are on a map?

2 Explain how the class is going to walk around the school and make a map of what they see. Explain that the class will develop a picture map. Discuss the purpose and features of a picture map.

Literacy focus

Why do we use a picture map?

We use a **picture map** to show where things are and how far apart they are.

What does a picture map include?

A **picture map** includes a title, pictures to show each thing and labels. A line or arrow connects the label to the object or place.

3 Ask the students to predict what things they might see in the school environment by closing their eyes and visualising what they would see. Ask students to provide reasons for why they think they might see certain things. Record predictions and reasons in the class science journal including students' initials against their suggestions to assist with diagnostic assessment.

Literacy focus

Why do we use a science journal?

We use a **science journal** to record what we see, hear, feel and think so that we can look at it later.

What does a science journal include?

A **science journal** includes dates and times. It might include written text, drawings, measurements, labelled diagrams, photographs, tables and graphs.

Note: If the school environment is too large or unfamiliar for Foundation Year students to observe, use the classroom environment as an alternative.

4 Walk around the school, stopping briefly to identify things and ask students to discuss what they are used for. For example, 'Here are the benches. We sit here to eat our lunch.'

Optional: Take a photo of each object for the next session.

5 Ask students to describe what they see and feel, for example, a wall that is bumpy, a slide that is smooth. This is an opportunity for diagnostic assessment of what students think they know about objects, the materials they are made of and their observable properties.

6 Return to the classroom and review the predictions and reasons in the class science journal and tick the things that students saw on their walk. In another colour, add other things that students saw on their walk. This list can be used to help select items for representation on the map in Session 2.

7 Discuss what students now know that they didn't know before the walk.

8 Introduce the word wall and discuss its purpose and features. Review the descriptive words that students used on the walk. Record students' descriptive words on the word wall.

Literacy focus

Why do we use a word wall?

We use a **word wall** to record words we know or learn about a topic. We display the word wall in the classroom so that we can look up words we are learning about and see how they are spelled.

What does a word wall include?

A **word wall** includes a topic title or picture and words that we have seen or heard about the topic.

Note: For Foundation Year students it is important to include images on the word wall to support learning and the acquisition of new vocabulary.

Session 2 Let's make a map

Equipment

FOR THE CLASS

- class science journal
- word wall
- 1 large piece of cardboard (see 'Preparation')
- *optional*: digital camera
- *optional*: computer with printer
- *optional*: interactive whiteboard

FOR EACH STUDENT

- student science journal

ENGAGE

Preparation

- Prepare the framework for a class picture map on a large piece of cardboard. Use the title 'Our school walk' and draw an outline of school buildings.

Lesson steps

1 Review the word wall and the class science journal entry from Session 1.

2 Review the school walk and the things students observed and described. Ask students to discuss where they started, what they saw and where they finished. Ask students, individually or in pairs, to stand in a line and one at a time add to the sequence of things they saw on the school walk.

3 Ask students to think of words to describe each thing. Ask questions, such as 'What did it feel like?, Look like? Smell like? Sound like?'.

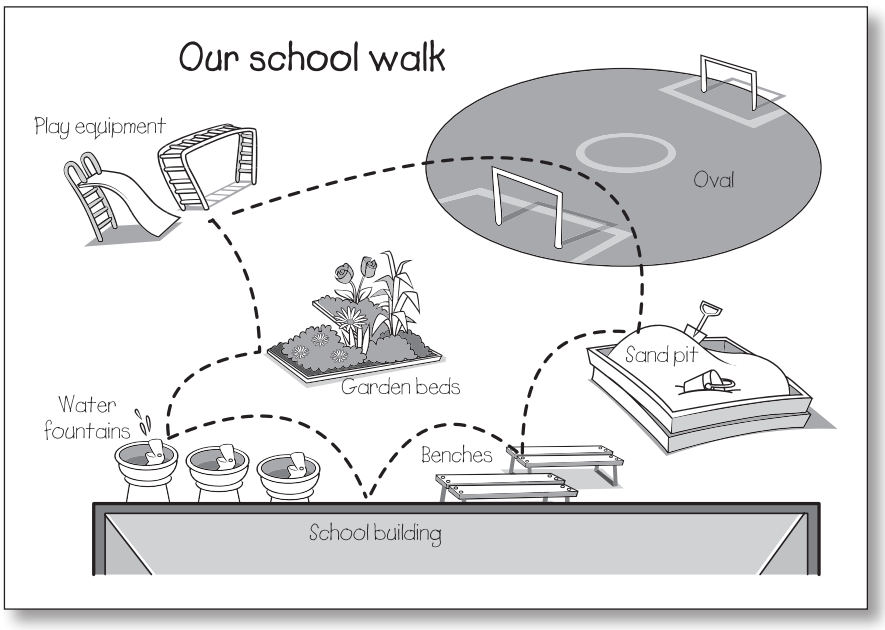
4 Explain that students are going to help make a class picture map of their school walk (see 'Preparation'). Use a dotted line to represent the walking line and ask students to add a picture of each thing they observed on the school walk. Ask students to recall the name of each thing and label it on the map.

Optional: Use digital photos of things in the school environment to add to the picture map.

Optional: Use an interactive whiteboard to create the class picture map. Encourage each student to add their own picture and label.

5 Explain that students will draw their own picture map in their science journal including three things and the sequence in which they saw them. Encourage students to share their picture map with the class, describing the things they recorded.

6 Update the word wall with words and images.



Sample of a class picture map

Curriculum links

English

- Read stories about pirates and treasure maps. Examine the text structure, vocabulary and grammar of narratives and create an oral pirate story.
- While working on the word wall, discuss different communication systems of different languages.

Mathematics

- Use informal measurements, for example, footsteps, to measure the distance between things in the school environment.
- Explore comparative language and language of position and direction.

Information and communication technology

- Use internet mapping programs to show a bird's eye view of your school.

Indigenous perspectives

- For thousands of years Indigenous people have used natural materials for a variety of purposes including making tools, clothing, containers and adhesives. Materials used include stones, shells, wood, bark, sap, bones, animal skins and plant fibres. The items made reflect the geographical location of the Indigenous group.
- Watch the videoclip, 'The Right Tree'.
  See **https://aso.gov.au/titles/documentaries/crook-hat-and-camphoo/clip1/**
- For further information, see:
  https://www.anbg.gov.au/gardens/plantinfo/Aboriginal-plant-use.html
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 2 Object observers

AT A GLANCE

To provide hands-on, shared experiences of what objects are made of in the school environment.

Students:

- describe an object and the material(s) that it is made of
- use the class picture map to locate and observe an object in the school environment
- use descriptive language to share observations about objects and what they are made of.

Lesson focus

The *Explore* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records, such as science journal entries. The *Explore* phase ensures all students have a shared experience that can be discussed and explained in the *Explain* phase.

Assessment focus

Formative assessment is an ongoing aspect of the *Explore* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the observable properties of the materials that objects in the school environment are made of, and how science involves observing the environment using their senses. You will also monitor their developing science inquiry skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- predict what material(s) an object is made of
- describe the properties of materials
- use senses to observe objects in the school environment
- identify some materials that objects in the school environment are made of.

Literacy

Students will be able to:

- use the class picture map to locate an object to observe
- use written language and drawings to record observations of objects and the materials they are made of
- use talk to share observations with the class.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Teacher background information

Materials can be classified as natural or processed.

Natural materials are materials produced by natural processes and changes. Rocks, water and air are natural materials. Sand and soil are natural materials that are produced by natural processes. Cotton fibres, wool fibres, vegetable oils, waxes and wood (timber) have had some processing, but are still natural materials.

Processed or manufactured materials, also called synthetic materials, are made by transforming raw natural materials into new substances, usually involving chemical changes. Making glass from sand, refining metals from ores, making paper from wood pulp and firing ceramics from clay are examples of how natural materials can be used to make processed materials.

Some common types of processed materials include:

- metals, which generally need to be refined from ores
- ceramics, which are mixtures of sand, gravel, water and a binding agent
- glass, which is made from melting several minerals (including silica found in sand)
- plastics, which are made from byproducts of the oil industry.

Student conceptions

Students might not understand the origin of materials. For example, they might not know that cotton used to make towels or jeans comes from plants. Students might also confuse words used to describe materials, for example, they might confuse 'hardness' with 'strength' or 'elasticity' with 'flexibility'. When scientists use these words they have more defined meanings and the property is able to be tested.

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- class picture map
- 1 object made of only one material (see 'Preparation')
- 1 enlarged copy of 'Tell me about it' (Resource sheet 1)
- *optional*: digital camera
- *optional*: computer with printer

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- 1 copy of 'Tell me about it' (Resource sheet 1)
- 1 A4 copy of class picture map (see 'Preparation')

Preparation

- Read 'How to organise collaborative learning teams (F–Year 2)' (Appendix 1). Display an enlarged copy of the team skills chart and the team roles chart in the classroom. Prepare role wristbands or badges and the equipment table.

  Note: For Foundation Year students, using pegs with role badges attached is an easy alternative to pins or string.
- Collect an object made from only one material, such as a wooden block, a plastic ball, a glass bottle or a paper plane, not an object made from a combination of materials, for example, scissors made of plastic and metal.
- Photocopy an A4 copy (or print a digital photograph) of the class picture map for each team.
- Prepare a copy of 'Tell me about it' (Resource sheet 1) for each team and attach the A4 copy of the class picture map.

Lesson steps

1 Review the word wall and the class picture map made in Lesson 1.

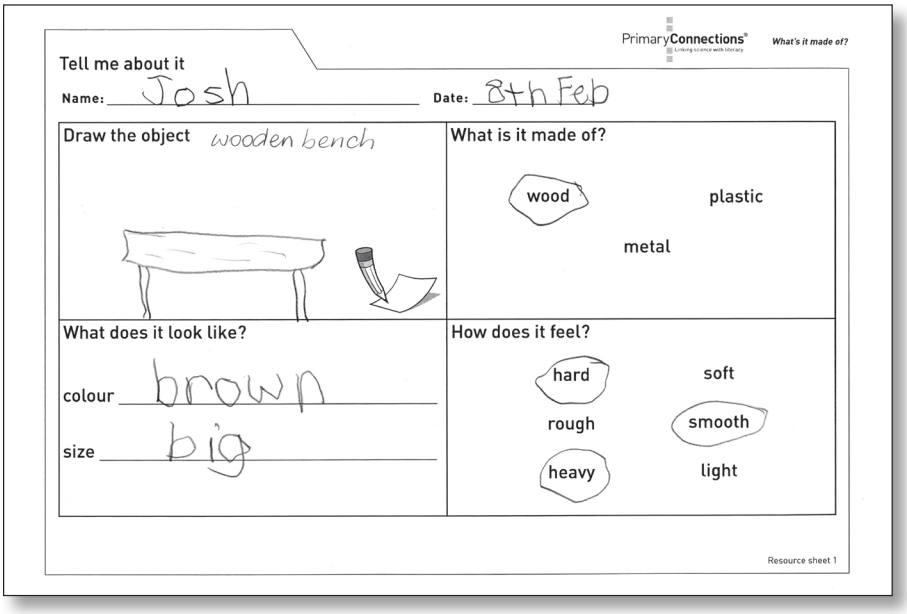
2 Ask students to recall the names of the things they observed on their school walk. Introduce the term 'object' to students and explain that scientists sometimes use this word instead of using the word 'thing'. Record the term 'object' on the word wall and invite students to suggest images or samples of different objects to display on the word wall.

3 Explain that students will go for another walk around the school to explore the object they observed and the materials it is made of. Explain that students will first look at objects in their classroom to help them observe and describe objects and the materials that they are made of. Using one everyday object, model this process by asking students questions, such as:

- What is the object? For example, a wooden block.
- What is the object made of? For example, wood.
- Can you describe the object? For example, brown and small.
- Can you describe the material that the object is made of? For example, hard, smooth and heavy.
- Can you find something made of the same type of material? For example, another wooden object.
- What parts of our bodies do we use to find out about objects and materials? For example, our eyes, our hands.

4 Introduce an enlarged copy of 'Tell me about it' (Resource sheet 1) and use students' responses to model how to draw the object and record answers on the resource sheet.

5 Explain that students will be working in collaborative learning teams to find out what one object on the class picture map is made from.



Student work sample of 'Tell me about it' (Resource sheet 1)

6 If students are using collaborative learning teams for the first time, introduce and explain the team skills chart and the team roles chart. Model and discuss how a good team would interact, for example, they would take turns to speak and listen to each other. Emphasise that each team member contributes to the team investigations. Explain that students will wear role wristbands or badges to help them (and you) know which role each team member is doing.

7 Form teams and allocate roles. Ask Managers to collect the role wristbands or badges, a copy of the class picture map and a 'Tell me about it' (Resource sheet 1).

8 Ask each team to nominate which object on the class picture map they would like to observe. Encourage students to use the class picture map to guide them to their nominated object. Ask students to draw the object and to observe and describe what it is made of on the team 'Tell me about it' (Resource sheet 1).

Optional: Ask older students or adults to scribe for each team.

9 Invite teams to share their findings with the class and display team sheets in the classroom.

10 Use each team's findings to label the class picture map with the materials that each object is made of.

11 Update the word wall with words and images.

Curriculum links

Mathematics

- Explore position and direction, for example, hide a 'treasure' in the playground and give the students verbal directions to find it (walk forward, go under the slide, the treasure is beside the sand pit).

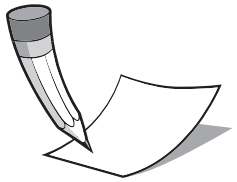
Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Tell me about it

Team members' names: _____ **Date:** _____

Draw the object



What is it made of?

wood plastic

metal

What does it look like?

colour _____

size _____

How does it feel?

hard soft

rough smooth

heavy light

Lesson 3 The name game

AT A GLANCE

To provide students with hands-on, shared experiences of the properties of materials used to make objects in the classroom environment.

Students:

- predict what material an unseen object might be made of
- use senses to explore and describe unseen objects
- compare objects that are the same but made of different materials
- use observations to sort objects according to the material that they are made of
- match a group of objects with a label describing what they are made of.

Lesson focus

The *Explore* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records, such as science journal entries. The *Explore* phase ensures all students have a shared experience that can be discussed and explained in the *Explain* phase.

Assessment focus

Formative assessment is an ongoing aspect of the *Explore* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the different materials objects are made of, and how the properties of those materials are the same or different; and how science involves observing the environment using their senses. You will also monitor their developing science inquiry skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- observe and describe what objects in the classroom are made of
- identify some everyday materials
- sort objects according to the materials they are made of.

Literacy

Students will be able to:

- use talk to predict, describe, make comparisons between materials and report observations to the class
- label some materials in the classroom.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Equipment

FOR THE CLASS

- class science journal
- word wall
- class picture map
- a 'Feely box' (see 'Preparation')
- a range of objects made of different materials (see 'Preparation')

Preparation

- Collect an empty box or bag that will allow a variety of objects to be concealed during the 'Feely box' activity.
- Collect a range of objects that are made of different materials that have different properties, for example, strength, flexibility, hardness, such as:
  - rubber (ball, rubber glove and deflated balloon)
  - plastic (bottle, cup, spoon, bag and cling wrap)
  - glass (jar, marble, bottle and drinking glass)
  - wood (spoon, wooden block, popstick and ruler)
  - paper (book, plate, newspaper and exercise pad)
  - metal (spoon, scissors, aluminium foil and paper clip).

  Note: Wooden, plastic and metal spoons are needed for Lesson step 7.

Lesson steps

1. Review the previous lesson using the class science journal and the class picture map. Recall which senses students used to observe an object in the school environment. Refer to the word wall and review the descriptive language that has been used to describe objects and the materials they are made of.
2. Introduce the 'Feely box' and explain that there is a hidden object inside which students will feel and describe to the class.

Explain that it might be unsafe to touch unseen objects but that, for this activity, you have selected the objects for the box that are safe for them to touch.

3 Take a familiar object, for example, a pencil, and ask students what they might say if they felt the pencil when it was inside the box. Ask questions, such as:

- How does this object feel?
- What shape is this object?
- How are the ends of this object the same or different?
- What do you think this object is made of?
- What is the object's name?

4 Place your hand inside the 'Feely box' and model describing an object, how it feels and what it might be made of. Use descriptive language to encourage the students to think about the properties of materials. For example, 'The object is hard and doesn't bend easily. It's heavy and it feels smooth.' Ask students to predict what material the object is made of and the name of the object.

5 Reveal the object and ask students to decide if their predictions matched the object. Discuss other observations and descriptions that can be made about the object. For example, 'We can't see through it'.

6 Provide time for each student to describe an object that has been placed inside the 'Feely box'. It might take several sessions or days to allow each student to have a turn.

Note: Foundation Year students might have a limited vocabulary when describing objects and the materials they are made of. To assist students in describing objects and materials, model descriptive language and use questioning to scaffold their learning. For example, 'Is the object hard or soft? Does the object feel smooth or rough? Is the object heavy or light?'.

7 Display the contents of the 'Feely box' and discuss how objects can also be made of more than one material, for example, spoons can be made from metal, plastic or wood. Ask students to suggest reasons why the same object would be made from different materials.

Optional: Discuss objects that are made from a combination of materials. For example, scissors can be made from metal and plastic because the metal is useful for cutting things and the plastic is light and easy to hold.

8 Ask students to identify, compare and sort the objects from the 'Feely box' according to the materials that they are made of.

9 Ask students to label each group and display them in the classroom.

Optional: Allow students to play with the 'Feely box' in free choice activity time.

10 Discuss the words used during the lesson and ask students questions, such as:

- What words did we use to describe the objects and materials?
- Which words didn't we know the meaning of?
- Are there any words that we need to add to our word wall?

11 Update the word wall with words and images.

Curriculum links

Mathematics

- Sort blocks according to their attributes.

Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 4 Making sense of materials

AT A GLANCE

To support students to represent and explain their understanding of the observable properties of materials used to make objects in the school environment, and to introduce current scientific views about the observable properties of materials.

Session 1 Making books

Students:

- review the class science journal, word wall and class picture map
- represent observations and descriptions of materials
- discuss why people select materials for different purposes.

Session 2 Silly stories *(optional)*

Students:

- suggest why some materials are more suitable than others to make particular objects
- draw a picture of an object made of an unsuitable and a suitable material.

Lesson focus

In the *Explain* phase students develop a literacy product to represent their developing understanding. They discuss and identify patterns and relationships within their observations. Students consider the current views of scientists and deepen their own understanding.

Assessment focus

Formative assessment is an ongoing aspect of the *Explain* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. In this lesson you will monitor students' developing understanding of:

- the observable properties of the materials that are used for objects in the school environment and the suitability of those materials, and how science involves using the senses to observe. You will also monitor their developing science inquiry skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- identify and describe the observable properties of materials
- compare the observable properties of materials
- discuss why people select materials for particular purposes.

Literacy

Students will be able to:

- use written language or drawings to describe materials
- participate in a discussion and share ideas about selecting materials for particular purposes
- use talk to describe a drawing to the class.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Teacher background information

As materials are made of different kinds and combinations of substances, they have different properties that can make them suitable for different uses. For example, steel is hard and can be made into many different forms, such as cables and pipes. Wool is useful for insulation in clothing because it traps heat well. Feathers are useful in pillows because they are soft to lie on.

The properties of an object can include the size, shape and colour of the object. The properties of an object can also rely on the materials that it is made of, for example, water resistance and transparency. Properties of materials do not rely on the properties of the object. For example, a plastic doll with one arm missing is a different object but it is still made of plastic. The properties of the material have stayed the same but the properties of the object have changed.

Properties of materials include:

- density—is it heavy or light for its size?
- texture—is it rough or smooth?
- flexibility—is it bendy or stiff?
- hardness—is it hard or soft to scratch or dent?
- reflectivity—is it shiny or dull?
- elasticity—will it return to its original shape after being stretched or bent?
- strength—is it hard or easy to break?
- compressibility—can it be pressed into a smaller shape?
- transparency—does it let light through?
- opacity—is it hard to see through?

Students' conceptions

Young students might have very limited understanding of plastic and how it can be used. For example, they might not associate plastic with clothing.

Session 1 Making books

Equipment

FOR THE CLASS

- class science journal
- word wall
- a sample object (eg, popstick, plastic tag, paper clip) (see 'Preparation')
- 1 set of 'Material labels' (Resource sheet 2) (see 'Preparation')
- 1 enlarged copy of 'What's it made of?' (Resource sheet 3)
- self-adhesive tape or glue
- class book cover entitled 'What's it made of?' (see Lesson step 3)

FOR EACH STUDENT

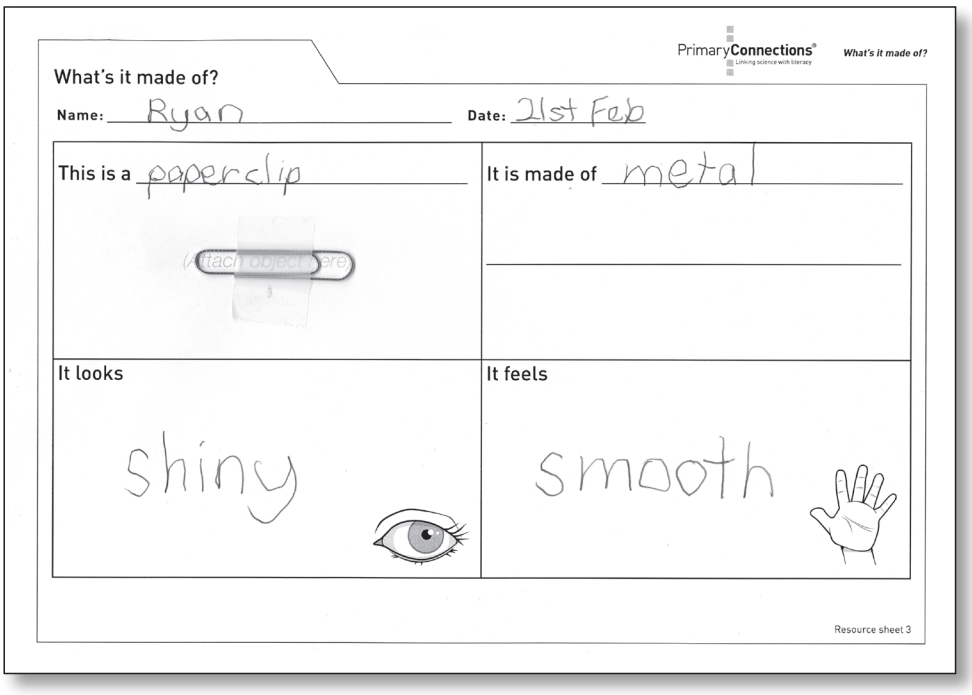
- 1 copy of 'What's it made of?' (Resource sheet 3)
- self-adhesive tape or glue
- 1 small object (see 'Preparation')

Preparation

- Using 'Material labels' (Resource sheet 2), copy and cut the labels into individual cards, providing at least one label for each member of the class.
- Collect a range of small objects, such as small cardboard boxes (matchbox), popsticks, toothpicks, small piece of plastic (bread tags, a length of drinking straw), paper clips, cotton wool balls, hair pins, small self-adhesive notes, buttons.

Lesson steps

1. Review the class science journal and word wall. Discuss what students have learned about objects and the materials they are made of.
2. Explain that students are going to use labels to identify different materials that objects are made of in the classroom (see 'Preparation'). Ask students to collect a label and attach it to an object made of that material. Encourage students to suggest reasons why that material might have been selected to make the object. For example, the table is made of wood because it is hard and strong.
3. Explain that students are going to share what they have learned about materials and objects by making a class book.
4. Introduce an enlarged copy of 'What's it made of?' (Resource sheet 3) and model how to fix a sample object onto the page using self-adhesive tape or glue, name the object and the material it is made of and use drawings and words to describe how the material looks and feels.
5. Ask each student to complete 'What's it made of?' (Resource sheet 3).



Student work sample of 'What's it made of' (Resource sheet 3)

6 Encourage each student to share their representation with the class and then compile all resource sheets to make a class book.

7 *Optional*: Display the class book in the library for everyone to share or create a roster for students to take the class book home to share with their families.

Material labels

paper	paper
paper	paper
paper	paper

Material labels

wood	wood
wood	wood
wood	wood

Material labels

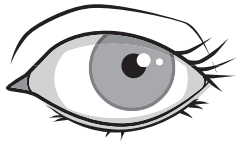
glass	glass
glass	glass
glass	glass

Material labels

plastic	plastic
plastic	plastic
plastic	plastic

What's it made of?

Name: _____ **Date:** _____

This is a _____ *(Attach object here)*	It is made of _____ _____
It looks 	It feels 

Session 2 Silly stories *(optional)*

Equipment

FOR THE CLASS

- class science journal
- word wall
- 'What's it made of?' class book

FOR EACH STUDENT

- student science journal

Preparation

- Prepare some 'Silly stories' for the class. These can be adapted from a familiar story or created using familiar objects made out of 'silly' materials and recorded in the class science journal, for example:
  - 'Yesterday, I went home in my car which is made of marshmallows and sat on my chocolate chair to read my favourite book, which is made of glass.'
  - 'On your birthday everyone gives you presents. The toys are made of strawberries and water and the birthday cake is metal.'

Lesson steps

1. Review the 'What's it made of?' class book and the word wall from the previous lesson.
2. Introduce the class to the 'Silly stories' written in the class science journal. Read the silly stories to the class and encourage students to think of the objects and materials mentioned in each story.
3. Re-read each story and ask students to highlight or underline each object and the 'silly' material that it is made of. Ask students to suggest reasons why people don't make the object using the 'silly' material.
4. Discuss why people need to think carefully about choosing the most suitable materials when making objects. For example, when people need something strong or hard, they might use metal or wood. When people need something to see through, they might use glass or clear plastic.
5. Ask students to draw a picture in their science journal of an object made out of a 'silly' material and another picture with the same object made out of a more suitable material.

Literacy focus

Why do we use a drawing?

We use a **drawing** to illustrate an idea or an object.

What does a drawing include?

A **drawing** includes lines to represent a likeness, image, plan or design, usually using a pen, pencil or crayon.

6 Ask students to share their drawings with the class, explaining why the material used in the second drawing is more suitable for the object.

Curriculum links

Technology

- Design, make and appraise objects of different materials, such as popsticks, plasticine and straws.

Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 5 Waterproof wonders

AT A GLANCE

To support students to plan and conduct an investigation of materials for water resistance, and to make an outdoor object for the school environment.

Session 1 Testing things

Students:

- discuss types of materials used for different purposes
- test materials for water resistance.

Session 2 Using things

Students:

- provide reasons for selecting materials for a particular purpose
- plan and make an object for the school environment.

Lesson focus

In the *Elaborate* phase students plan and conduct an open investigation to apply and extend their new conceptual understanding in a new context. It is designed to challenge and extend students' science understanding and science inquiry skills.

Assessment focus

Summative assessment of the Science Inquiry Skills is an important focus of the *Elaborate* phase (see page xi). Rubrics are available on the website to help you monitor students' inquiry skills.

Key lesson outcomes

Science

Students will be able to:

- investigate what happens to materials when they get wet
- observe and describe the effect of water on different materials
- compare the water resistance of different materials
- select materials based on water resistance to design an outdoor object.

Literacy

Students will be able to:

- participate in discussion and compare ideas about water resistance
- describe observations of materials before and after being wet
- use talk to identify and describe the materials used in an object.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Teacher background information

Many everyday materials contain small spaces (pores) that can hold air or liquids. These types of materials are described as being 'porous'. Paper, cloth, sponges, cork and most woods are all examples of porous materials. All of these materials, to varying degrees, have the property of absorbency: when in contact with a liquid they will absorb it or soak it up. If wet absorbent materials are twisted or squeezed, the liquid might be released and some of the spaces are ready to be filled with liquid again, for example, using a sponge to wipe up water.

To be waterproof, a material is unaffected by water and will not allow water to penetrate its surface. Something that is water resistant is not affected by small amounts of water but is not waterproof. A porous material can be made waterproof by being coated (fill in the spaces) with another material that doesn't attract water but repels it (for example, wax). The leaves of plants have a coating of wax on their upper side and when it rains the water runs off or pools into droplets. Materials, such as plastic and rubber, are everyday examples of waterproof materials.

Session 1 Testing things

Equipment

FOR THE CLASS

- class science journal
- word wall
- class picture map

FOR EACH TEAM

- role wristbands or badges for Manager and Speaker
- 4 small trays or containers (eg, meat tray, small ice-cream container)
- 1 piece of wood (eg, half a popstick)
- 6 cm x 6 cm piece of white crepe paper
- 6 cm x 6 cm piece of writing paper
- 6 cm x 6 cm piece of plastic (eg, plastic bag, ice-cream container)
- 1 cup of cold water

Preparation

- Prepare the equipment table for teams with the materials for testing.

  Note: Crepe paper will quickly show the effect of adding water while writing paper will need to soak for a few minutes. Use white crepe paper as the dye in coloured crepe paper could run and stain the students' clothes.

- Prepare a table in the class science journal with the title 'What happens to different materials when they get wet?' The table will need to have a column for each material tested, and space for observations to be recorded of the dry and wet materials

What happens to different materials when they get wet?

Material	Dry	Wet

ELABORATE

Lesson steps

1 Review the class discussion from the previous lesson about why people need to think carefully about which materials they select for objects.

2 Review the class picture map and ask the students to recall what the objects in the school environment were made of, for example, metal, wood, concrete, brick or plastic. Ask students to suggest why these were used. For example, they are strong and easy to build with and they are waterproof.

3 Discuss students' experiences of what objects outside the classroom are made of and ask 'What happens to different materials when they get wet?'. Discuss different ways that materials can get wet outside (rain, school sprinklers, dew, students spilling drinks).

4 Ask students to suggest how they could investigate the question and record ideas in the class science journal. Lead a discussion about the idea that students could wet different things and observe what happens to them.

5 Explain that students will be working in collaborative learning teams to investigate what happens to materials when they get wet.

6 Introduce the selection of materials the students will test (popsticks, white crepe paper, writing paper and plastic). Put a sample, a label and a description of each material in the class science journal.

7 Explain and model how students will first observe (by looking and touching) and describe the materials when they are dry. Discuss why all of the materials have been cut to the same size. Ask students if it would be 'fair' to use different-sized materials?

8 Place the materials in a small tray and ask students to pour water over the materials until they are just covered with the water. Model how to observe the materials after they have been wet and describe them again.

Materials being made wet for investigation

9 Form teams and allocate roles. Ask Managers to collect role wristbands or badges and team equipment from the equipment table.

10 Ask teams to test their materials.

11 After the investigation, invite students to discuss their findings. Encourage students to provide reasons for each result. Record these results on a table in the class science journal (see 'Preparation'). Discuss the purpose and features of a table.

Literacy focus

Why do we use a table?

We use a **table** to organise information so that we can understand it more easily.

What does a table include?

A **table** includes a title, columns with headings and information organised under each heading.

12 Review the results recorded on the table in the class science journal and encourage students to compare what happened to each material after being wet. Ask students to suggest reasons why some materials were more water resistant than others.

13 Update the word wall with words and images.

Session 2 Using things

Equipment

FOR THE CLASS

- class picture map
- a range of materials for making an object (see 'Preparation')
- a range of joining materials (eg, self-adhesive tape, glue, string and pegs) (see 'Preparation')
- *optional*: digital camera
- *optional*: computer with printer

FOR EACH STUDENT

- *optional*: student science journal

Preparation

- Students will be asked to make an object that can be placed outside, such as a sculpture for a school garden, a wind chime, a safety sign or a dream-catcher ornament. Either nominate what object all students will be making or allow time for students to individually decide on their object.
- Collect materials for the students to make an outdoor object, such as paper, card, cellophane, foil, popsticks, yoghurt containers, rubber gloves, plastic bags (thick), tape, string, staples, wire, coat hangers, thin garden stakes, corks, screw bottle-top lids, plastic pegs and coloured contact.

  Note: It is important to collect a range of waterproof and non-waterproof materials to provide the opportunity to assess students' selection of materials for their outdoor object.
- Provide students with a variety of ways of joining materials together, such as self-adhesive tape, string, pegs, staples and glue.
- *Optional*: Organise older students or adults to help students construct their objects.

Lesson steps

1 Review the previous session and students' investigation of what happened to different materials when they got wet. Discuss why it might be important to know what happens to things when they get wet, for example, when the objects are going to be used outside.

2 Refer to the class picture map and ask what would happen if the play equipment was made of crepe paper and got wet when it rained.

3 Explain that students will make an object for the school environment that will be placed outside and will need to be water resistant.

4 Provide time for students to collect materials and to construct their object.

5 Ask students to share their objects with the class. Encourage students to describe their objects, what they are made of and why they selected those materials.

6 *Optional*: Take a photo of each student's construction. When photographs have been glued into students' science journals, encourage students to caption their photo with the name of their object and the materials they used to make it.

Curriculum links

Health and Physical Education

- Make signs for bike tracks requiring students to consider the same issues about water resistance and the purpose for the signs.

The Arts

- Explore sculptures in the local environment including the purpose of a sculpture in artistic terms, and the idea that artists usually have a message that they want their art to convey.
- Explore waterproofing paper by using wax to draw a picture on writing paper. Paint a coloured wash over the paper to create a batik effect.

Indigenous perspectives

- Include kangaroo or possum skins in the investigation of materials for water resistance. Discuss how some Indigenous people wore possum-skin and/or kangaroo-skin cloaks to help keep them dry and warm. The cloaks might be used today for ceremonial purposes.
- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Lesson 6 Location, location!

AT A GLANCE

To provide opportunities for students to represent what they know about objects in the school environment and the materials used to make them, and to reflect on their learning during the unit.

Students:

- share and compare their ideas about the observable properties of materials
- reflect on their learning during the unit.

Lesson focus

In the *Evaluate* phase students reflect on their learning journey and create a literacy product to re-represent their conceptual understanding.

Assessment focus

Summative assessment of the Science Understanding descriptions is an important aspect of the *Evaluate* phase (see page xi). In this lesson you will be looking for evidence of the extent to which students understand that:

- objects are made of materials that have observable properties, and that these properties help to determine the suitability of materials for particular purposes.

Literacy products in this lesson provide useful work samples for assessment using the rubrics provided on the Primary**Connections** website.

Key lesson outcomes

Science

Students will be able to:

- identify and describe the observable properties of materials used in their outdoor object
- explain why they selected the materials for their outdoor object

Literacy

Students will be able to:

- use talk to describe the location of their object on the class picture map, providing reasons for positioning it in that area
- reflect on their learning about objects, materials and their observable properties and uses.

This lesson also provides opportunities to monitor the development of students' general capabilities (highlighted through icons, see page xii).

Equipment

FOR THE CLASS

- class science journal
- class picture map

FOR EACH STUDENT

- 1 coloured self-adhesive dot

Lesson steps

1 Review the class picture map and recall the objects in the school environment.

2 Review the types of objects that students constructed in the previous lesson and discuss where these objects might be placed in the school environment, based on the materials they are made of.

3 Ask students to represent what they have learned about objects and materials by locating a place on the class picture map to position their object. Encourage students to think about the materials their object is made of when nominating a position for their object.

4 Ask students to share with the class the place they have chosen and why they chose that place, and to represent the position of their object by placing a coloured self-adhesive dot on the class picture map. Label each dot with each student's initials to assist with summative assessment.

5 To elicit what students' understand about objects, materials and the use of materials for particular purposes, ask students questions, such as:

- What is your object?
- What material is your object made of?
- What can you tell us about the materials you used?
- Why did you use that material for the object and not another material? For example, using plastic and not paper.

Optional: Invite students to go outside and place their object in the location they nominated on the map.

6 Review the *What's it made of?* unit with the class, asking questions, such as:

- What activity did you enjoy doing? Why?
- What new things have you learned?
- What are you still wondering about?
- What did you learn about working in a team?

Record students' responses in the class science journal.

Curriculum links

The Arts

- Ask students to draw and describe their outdoor object.

Indigenous perspectives

- Primary**Connections** recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to these are provided on the Primary**Connections** website (www.primaryconnections.org.au).

Appendix 1
How to organise collaborative learning teams (Foundation–Year 2)

Introduction

Students working in collaborative teams is a key feature of the Primary**Connections** inquiry-based program. By working in collaborative teams students are able to:

- communicate and compare their ideas with one another
- build on one another's ideas
- discuss and debate these ideas
- revise and rethink their reasoning
- present their final team understanding through multi-modal representations.

Opportunities for working in collaborative learning teams are highlighted throughout the unit.

Students need to be taught how to work collaboratively. They need to work together regularly to develop effective group learning skills.

The development of these collaborative skills aligns to descriptions in the Australian Curriculum: English. See page xiii.

Team structure

The first step towards teaching students to work collaboratively is to organise the team composition, roles and skills. Use the following ideas when planning collaborative learning with your class:

- Assign students to teams rather than allowing them to choose partners.
- Vary the composition of each team. Give students opportunities to work with others who might be of a different ability level, gender or cultural background.
- Keep teams together for two or more lessons so that students have enough time to learn to work together successfully.
- If you cannot divide the students in your class into teams of three, form two teams of two students rather than one team of four. It is difficult for students to work together effectively in larger groups.
- Keep a record of the students who have worked together as a team so that by the end of the year each student has worked with as many others as possible.

Team roles

Students are assigned roles within their team (see below). Each team member has a specific role but all members share leadership responsibilities. Each member is accountable for the performance of the team and should be able to explain how the team obtained its results. Students must therefore be concerned with the performance of all team members. It is important to rotate team jobs each time a team works together so that all students have an opportunity to perform different roles.

For Foundation–Year 2, teams consist of two students—Manager and Speaker. (For Year 3–Year 6, the teams consist of three students—Director, Manager and Speaker).

Each member of the team should wear something that identifies them as belonging to that role, such as a colour-coded wristband or badge. This makes it easier for you to identify which role each student is doing and it is easier for the students to remember what they and their team mates should be doing.

Manager

The Manager is responsible for collecting and returning the team's equipment. The Manager also tells the teacher if any equipment is damaged or broken. All team members are responsible for clearing up after an activity and getting the equipment ready to return to the equipment table.

Speaker

The Speaker is responsible for asking the teacher or another team's Speaker for help. If the team cannot resolve a question or decide how to follow a procedure, the Speaker is the only person who may leave the team and seek help. The Speaker shares any information they obtain with team members. The teacher may speak to all team members, not just to the Speaker. The Speaker is not the only person who reports to the class; each team member should be able to report on the team's results.

Director (Year 3–6)

The Director is responsible for making sure that the team understands the team investigation and helps team members focus on each step. The Director is also responsible for offering encouragement and support. When the team has finished, the director helps team members check that they have accomplished the investigation successfully. The Director provides guidance but is not the team leader.

Team skills

Primary**Connections** focuses on social skills that will help students work in collaborative teams and communicate more effectively.

Students will practise the following team skills throughout the year:

- Move into your teams quickly and quietly
- Stay with your team
- Take turns

To help reinforce these skills, display enlarged copies of the team skills chart (see the end of this Appendix) in a prominent place in the classroom.

Supporting equity

In science lessons, there can be a tendency for boys to manipulate materials and girls to record results. Primary**Connections** tries to avoid traditional social stereotyping by encouraging all students, irrespective of their gender, to maximise their learning potential. Collaborative learning encourages each student to participate in all aspects of team activities, including handling the equipment and taking intellectual risks.

Observe students when they are working in their collaborative teams and ensure that both girls and boys are participating in the hands-on activities.

TEAM ROLES

Manager

Collects and returns all materials the team needs

Speaker

Asks the teacher and other team speakers for help

TEAM SKILLS

1 Move into your teams quickly and quietly

2 Stay with your team

3 Take turns

Appendix 2
How to use a science journal

Introduction

A science journal is a record of observations, experiences and reflections. It contains a series of dated, chronological entries. It can include written text, drawings, labelled diagrams, photographs, tables and graphs.

Using a science journal provides an opportunity for students to be engaged in a real science situation as they keep a record of their observations, ideas and thoughts about science activities. Students can use their science journals as a useful self-assessment tool as they reflect on their learning and how their ideas have changed and developed during a unit.

Monitoring students' journals allows you to identify students' alternative conceptions, find evidence of students' learning and plan future learning activities in science and literacy

Keeping a science journal aligns to descriptions in the Australian Curriculum: Science and English. See pages xi and xiii.

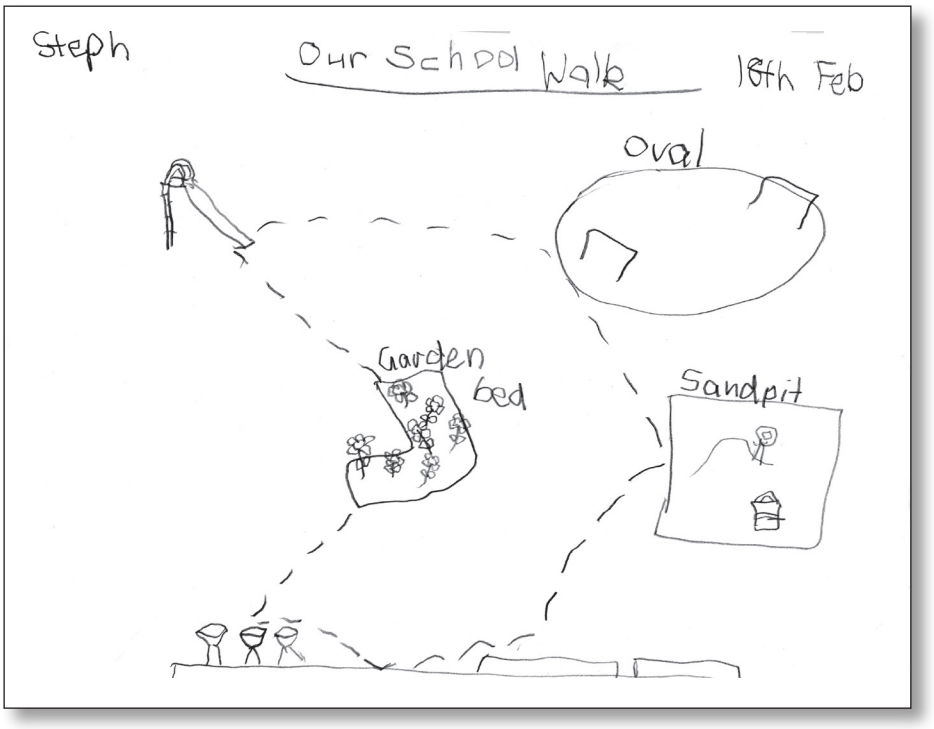
Using a science journal

1. At the start of the year, or before starting a science unit, provide each student with a notebook or exercise book for their science journal or use an electronic format. Tailor the type of journal to fit the needs of your classroom. Explain to students that they will use their journals to keep a record of their observations, ideas and thoughts about science activities. Emphasise the importance of including pictorial representations as well as written entries.
2. Use a large project book or A3 paper to make a class science journal. This can be used at all Year Levels to model journal entries. With younger students, the class science journal can be used more frequently than individual journals and can take the place of individual journals.
3. Make time to use the science journal. Provide opportunities for students to plan procedures and record predictions, and their reasons for predictions, before an activity. Use the journal to record observations during an activity and reflect afterwards, including comparing ideas and findings with initial predictions and reasons. It is important to encourage students to provide evidence that supports their ideas, reasons and reflections.
4. Provide guidelines in the form of questions and headings and facilitate discussion about recording strategies, such as note-making, lists, tables and concept maps. Use the class science journal to show students how they can modify and improve their recording strategies.
5. Science journal entries can include narrative, poetry and prose as students represent their ideas in a range of styles and forms.
6. In science journal work, you can refer students to display charts, pictures, diagrams, word walls and phrases about the topic displayed around the classroom. Revisit and revise this material during the unit. Explore the vocabulary, visual texts and ideas that have developed from the science unit, and encourage students to use them in their science journals.

7 Combine the use of resource sheets with journal entries. After students have pasted their completed resource sheets in their journal, they might like to add their own drawings and reflections.

8 Use the science journal to assess student learning in both science and literacy. For example, during the *Engage* phase, use journal entries for diagnostic assessment as you determine students' prior knowledge.

9 Discuss the importance of entries in the science journal during the *Explain* and *Evaluate* phases. Demonstrate how the information in the journal will help students develop literacy products, such as posters, brochures, letters and oral or written presentations.



***What's it made of?* science journal entry**

Appendix 3
How to use a word wall

Introduction

A word wall is an organised collection of words and images displayed in the classroom. It supports the development of vocabulary related to a particular topic and provides a reference for students. The content of the word wall can be words that students see, hear and use in their reading, writing, speaking, listening and viewing.

Creating a class word wall, including words from regional dialects and other languages, aligns to descriptions in the Australian Curriculum: English. See page xiii.

Goals in using a word wall

A word wall can be used to:

- support science and literacy experiences of reading, viewing, writing and speaking
- provide support for students during literacy activities across all key learning areas
- promote independence in students as they develop their literacy skills
- provide a visual representation to help students see patterns in words and decode them
- develop a growing bank of words that students can spell, read and/or use in writing tasks
- provide ongoing support for the various levels of academic ability in the class
- teach the strategy of using word sources as a real-life strategy.

Organisation

Position the word wall so that students have easy access to the words. They need to be able to see, remove and return word cards to the wall. A classroom could have one main word wall and two or three smaller ones, each with a different focus, for example, high-frequency words.

Choose robust material for the word cards. Write or type words on cardboard and perhaps laminate them. Consider covering the wall with felt-type material and backing each word card with self-fastening tape to make it easy for students to remove and replace word cards.

Word walls do not need to be confined to a wall. Use a portable wall, display screen, shower curtain or window curtain. Consider a cardboard shape that fits with the unit, for example, an apple for a needs unit.

The purpose is for students to be exposed to a print-rich environment that supports their science and literacy experiences.

Organise the words on the wall in a variety of ways. Place them alphabetically, or put them in word groups or groups suggested by the unit topic, for example, words for a *What's it made of?* unit might be organised using headings, such as 'Objects', 'Materials', 'Properties' and 'Uses'.

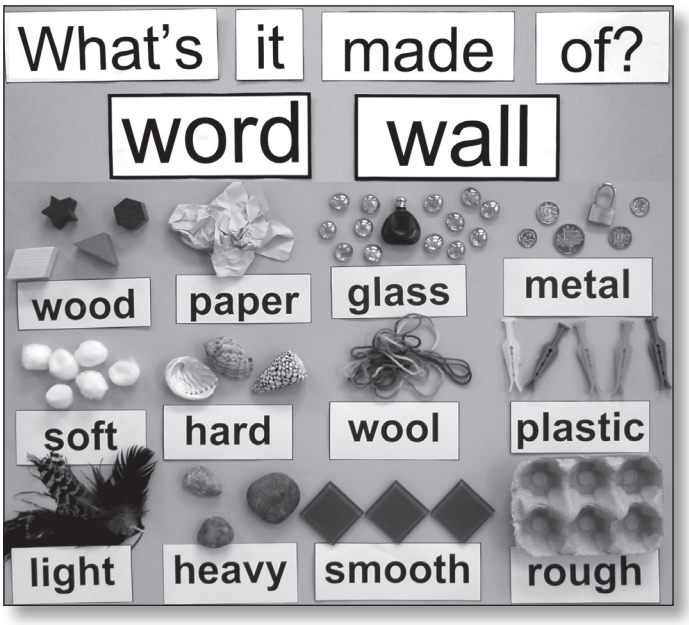
Invite students to contribute words from different languages to the word wall. Group words about the same thing, for example, different names of the same property, on the word wall so that students can make the connections. Identify the different languages used, for example, by using different-coloured cards or pens to record the words.

***Water works* word wall**

***Schoolyard safari* word wall**

Using a word wall

1. Limit the number of words to those needed to support the science and literacy experiences in the classroom.
2. Add words gradually, and include images where possible, such as drawings, diagrams or photographs. Build up the number of words on the word wall as students are introduced to the scientific vocabulary of the unit.
3. Encourage students to interact with the word wall. Practise using the words with students by reading them and playing word games. Refer to the words during science and literacy experiences and direct students to the wall when they need a word for writing. Encourage students to use the word wall to spell words correctly.
4. Use the word wall with the whole class, small groups and individual students during literacy experiences. Organise multi-level activities to cater for the individual needs of students.



***What's it made of?* word wall**

Appendix 4
What's it made of? equipment list

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	2	3	4	4	5	5	6
		SESSION	1	2			1	2	1	2	
Equipment and materials											
box or bag ('Feely box')	1 per class					●					
cardboard, large	1 piece per class			●							
class book, 'What's it made of?' (made in Lesson 4, Session 1) *optional*	1 per class							●			
class book cover entitled 'What's it made of?'	1 per class						●				
class picture map	1 per class				●	●			●	●	●
class picture map, A4 copy	1 per team				●						
joining materials (eg, self-adhesive tape, glue, string and pegs)	collection per class						●			●	
map	1 per class		●								
materials											
– crepe paper, white, 6 cm x 6 cm	1 piece per team								●		
– object made of one material	1 per class				●						
– object, small (eg, popstick, plastic tag, paper clip)	1 per student						●				
– plastic (eg, plastic bag, ice-cream container), 6 cm x 6 cm	1 piece per team								●		
– range of materials for making an object	collection per class									●	
– range of objects made of different materials	collection per class					●					
– wood (eg, half a popstick)	1 piece per team								●		
– writing paper, 6 cm x 6 cm	1 piece per team								●		
self-adhesive dot, coloured	1 per student										●
tray or container, small (eg, meat tray, small ice-cream container)	4 per team								●		
water, cold	1 cup per team								●		

EQUIPMENT ITEM	QUANTITIES	LESSON	1	1	2	3	4	4	5	5	6
		SESSION	1	2			1	2	1	2	
Resource sheets											
'Tell me about it' (RS1)	1 per team				●						
'Tell me about it' (RS1), enlarged	1 per class				●						
'Material labels' (RS2)	1 set per class						●				
'What's it made of?' (RS3)	1 per student						●				
'What's it made of?' (RS3), enlarged	1 per class						●				
Teaching tools											
class science journal	1 per class		●	●	●	●	●	●	●		●
role wristbands or badges for Manager and Speaker	1 set per team				●				●		
team roles chart	1 per class				●						
team skills chart	1 per class				●						
student science journal	1 per student			●				●		●	
word wall	1 per class		●	●	●	●	●	●	●		
Multimedia											
computer with printer *optional*	1 per class			●	●					●	
digital camera *optional*	1 per class		●	●	●					●	
interactive whiteboard *optional*	1 per class			●							

Appendix 5

What's it made of? unit overview

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to represent their current understandings as they:	Students will be able to:	Students:	
ENGAGE	**Lesson 1** Minds on maps ***Session 1*** A school walk ***Session 2*** Let's make a map	• make predictions about objects in the school environment • observe and describe some objects in the school environment.	• use talk to inquire and report on observations of objects in the school environment • contribute ideas to a class picture map and science journal • describe objects in the school environment.	***Session 1*** **A school walk** • predict what objects they might see in the school environment • walk around the school area and identify, describe and discuss the objects in the school environment. ***Session 2*** **Let's make a map** • contribute to a class picture map of the school environment • use sequencing to draw individual picture maps of the school environment.	**Diagnostic assessment** • Picture map contributions • Science journal entries • Through discussion, share ideas and questions about objects • Observation records • Word wall contributions

* These lesson outcomes are aligned to relevant descriptions of the Australian Curriculum. See page xi for Science and page xiii for English and Mathematics.

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to represent their current understandings as they:	Students will be able to:	Students:	
EXPLORE	**Lesson 2** Object observers	• predict what material(s) an object is made of • describe the properties of materials • use senses to observe objects in the school environment • identify some materials that objects in the school environment are made of.	• use the class picture map to locate an object to observe • use written language and drawings to record observations of objects and the materials they are made of • use talk to share observations with the class.	• describe an object and the material(s) that it is made of • use the class picture map to locate and observe an object in the school environment • use descriptive language to share observations about objects and what they are made of.	**Formative assessment** • Word wall contributions • Class discussions • Picture map contributions • 'Tell me about it' (Resource sheet 1) • Science journal entries

* These lesson outcomes are aligned to relevant descriptions of the Australian Curriculum. See page xi for Science and page xiii for English and Mathematics.

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLORE	**Lesson 3** The name game	• observe and describe what objects in the classroom are made of • identify some everyday materials • sort objects according to the materials they are made of.	• use talk to predict, describe, make comparisons between materials and report observations to the class • label some materials in the classroom.	• predict what material an unseen object might be made of • use senses to explore and describe unseen objects • compare objects that are the same but made of different materials • use observations to sort objects according to the material that they are made of • match a group of objects with a label describing what they are made of.	**Formative assessment** • Science journal entries • 'Feely box' verbal descriptions • Word wall contributions

* These lesson outcomes are aligned to relevant descriptions of the Australian Curriculum. See page xi for Science and page xiii for English and Mathematics.

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
EXPLAIN	**Lesson 4** Making sense of materials ***Session 1*** Making books ***Session 2*** Silly stories (optional)	• identify and describe the observable properties of materials • compare the observable properties of materials • discuss why people select materials for particular purposes.	• use written language or drawings to describe materials • participate in a discussion and share ideas about selecting materials for particular purposes • use talk to describe a drawing to the class.	***Session 1*** **Making books** • review the class science journal, word wall and class picture map • represent observations and descriptions of materials • discuss why people select materials for different purposes. ***Session 2*** **Silly stories (optional)** • suggest why some materials are more suitable than others to make particular objects • draw a picture of an object made from an unsuitable and a suitable material.	**Formative assessment** • Class discussions • Labelling objects • 'Material labels' (Resource sheet 2) • Science journal entries, drawings • What's it made of?' (Resource sheet 3) • Identifying objects and materials • Word wall contributions • Student 'silly' and 'suitable' drawings

* These lesson outcomes are aligned to relevant descriptions of the Australian Curriculum. See page xi for Science and page xiii for English and Mathematics.

		SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
		Students will be able to:	Students will be able to:	Students:	
ELABORATE	**Lesson 5** Waterproof wonders ***Session 1*** Testing things ***Session 2*** Using things	• investigate what happens to materials when they get wet • observe and describe the effect of water on different materials • compare the water resistance of different materials • select materials based on water resistance to design an outdoor object.	• participate in discussion and compare ideas about water resistance • describe observations of materials before and after being wet • use talk to identify and describe the materials used in an object.	***Session 1*** **Testing things** • discuss types of materials used for different purposes • test materials for water resistance. ***Session 2*** **Using things** • provide reasons for selecting materials for a particular purpose • plan and make an object for the school environment.	**Summative assessment** of Science Inquiry Skills • Class discussions • Class science journal entries • Constructed objects.
EVALUATE	**Lesson 6** Location, location!	• identify and describe the properties of materials used in their outdoor object • explain why they selected the materials for their outdoor object.	• use talk to describe the location of their object on the class picture map, providing reasons for positioning it in that area • reflect on their learning about objects, materials and their properties and uses.	• share and compare their ideas about the properties of materials • reflect on their learning during the unit.	**Summative assessment** of Science Understanding • Discussion about objects and properties of materials • Placement of labelled self-adhesive dots

* These lesson outcomes are aligned to relevant descriptions of the Australian Curriculum. See page xi for Science and page xiii for English and Mathematics.

PrimaryConnections®
Linking science with literacy

PrimaryConnections Units

Year	Biological sciences	Chemical sciences	Earth and space sciences	Physical sciences
F	*Staying alive*	*That's my hat!*	*Weather in my world*	*On the move*
	Growing well	*What's it made of?*		
1	*Schoolyard safari*	*Spot the difference*	*Changes all around*	*Look! Listen!*
	Dinosaurs and more	*Bend it! Stretch it!*	*Up, down and all around*	
2	*Watch it grow!*	*All mixed up*	*Water works*	*Machine makers*
				Push-pull
3	*Feathers, fur or leaves?*	*Melting moments*	*Night and day*	*Heating up*
4	*Plants in action*	*Material world*	*Beneath our feet*	*Magnetic moves*
	Friends or foes?			
	Among the gum trees	*Package it better*		*Smooth moves*
5	*Desert survivors*	*What's the matter?*	*Earth's place in space*	*Light shows*
6	*Marvellous micro-organisms*	*Change detectives*	*Creators and destroyers*	*Circuits and switches*
	Rising salt		*Earthquake explorers*	*Essential energy*