

Fully aligned
with the Australian
Curriculum

That's my hat!

Foundation Year

Chemical sciences



About this unit That's my hat!

Imagine if our clothes were made of glass, our houses were made of cotton wool and our cars were made out of paper. We are surrounded by thousands of objects made out of many different materials. So why then are our clothes made out of fabric and not glass? And why are our houses made out of bricks and wood and not cotton wool? It is the properties of the materials that make the difference. When we design objects we make choices based on those properties to suit the users. No-one would want a hat lined with sandpaper!

The *That's my hat!* unit is an ideal way to link science with literacy in the classroom. Through hands-on activities students sort and test the observable properties of a variety of different materials. They then design and make their own party hat, taking into account the weather it might be worn in.

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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, **PrimaryConnections**: 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 **PrimaryConnections** 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 **PrimaryConnections** to you and wish you well in your teaching.

Professor John Shine, AC Pres AA

President (2018–2022)

Australian Academy of Science

The PrimaryConnections teaching and learning approach

PrimaryConnections 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:

PrimaryConnections 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 PrimaryConnections 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 PrimaryConnections 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

PrimaryConnections 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.

PrimaryConnections develops the literacies of science that students need to learn and to represent their understanding of science concepts, processes and skills. Representations in PrimaryConnections 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 PrimaryConnections 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 2018).

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

 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

That's my hat!

Phase	Lesson	At a glance
ENGAGE	Lesson 1 Daring decorators Session 1 A funny feeling Session 2 My favourite decoration (<i>Optional</i>)	To capture students' interest and find out what they think they know about how objects are made of materials that have observable properties. To elicit students' questions about objects, materials and their properties.
	Lesson 2 Simple sorting	To provide students with hands-on, shared experiences of sorting objects according to the properties of their materials.
	Lesson 3 What if it is wet?	To provide students with hands-on, shared experiences of the water resistance of objects made from different materials.
EXPLORE	Lesson 4 Sun safety	To provide students with hands-on, shared experiences of the transparency of different materials.
	Lesson 5 Sorting it out Session 1 Testing three hats Session 2 The scientist's suitcase (<i>Optional</i>)	To support students to represent and explain their understanding of how objects are made of materials that have observable properties. To introduce current scientific views about objects, materials and their properties.
	Lesson 6 My marvellous hat	To support students to design and make a party hat decorated with objects made from materials with different properties.
EVALUATE	Lesson 7 About my hat	To provide opportunities for students to represent what they know about how objects are made of materials that have observable properties, and to reflect on their learning during the unit.

A unit overview can be found in Appendix 6, page 55.

That's my hat!—Alignment with the Australian Curriculum

That's my hat! 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)
Guiding questions that inform the inquiry in <i>That's my hat!</i> :	<ul style="list-style-type: none"> • What shall I decorate my hat with? What objects made of different materials could I use? • What describing words can I use to talk about the decorations? • What do the decorations look like? What do they feel like? • What happens to the decorations if I take my hat outside in the rain? • Will my hat protect my face from the Sun?

 All the material in the first row of this table is sourced from the Australian Curriculum v8.3.

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 *That's my hat!* 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.

***That's my hat!*—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 *That's my hat!*.

Key idea	Representation in <i>That's my hat!</i>
Patterns, order and organisation	Students identify similarities and differences in materials and objects and sort them according to their properties.
Form and function	Students observe and make simple inferences about how the properties of materials affect the function of an object, for example, a 'Rainy days' hat needs to be made of waterproof materials. They explore how form is important, for example, the shape of a hat can determine whether it casts a shadow to protect the user's face from sunlight.
Stability and change	Students investigate and describe how materials change, or do not change, when subjected to rainy weather.
Scale and measurement	Students observe and describe properties of objects, including size and mass.
Matter and energy	Students identify that objects are made up of materials.
Systems	Students observe that the materials that make up an object have properties that affect the properties of the object as a whole.

Incorporating the key ideas

According to the Australian Curriculum: Science 'from Foundation to Year 2, students learn that observations can be organised to reveal patterns, and that these patterns can be used to make predictions about phenomena'.

In Foundation Year, students observe and describe the behaviours and properties of everyday objects, materials and living things. They explore change in the world around them, including changes that have an impact on them, such as the weather, and changes they can effect, such as making things move or change shape. They learn that seeking answers to questions they pose and making observations is a core part of science and use their senses to gather different types of information.

In *That's my hat!* students observe the properties of materials of everyday objects. They explore the effect of changing the type of materials used on the observable properties of an object, such as changing the materials used for the brim of a hat to make the hat more or less sun safe. Students investigate the effect of rainy weather on various materials and use this information to help select appropriate materials for making waterproof hats.

Students observe properties of materials using their senses. They describe how materials look and feel and sort them accordingly. Students work collaboratively to seek answers and make observations through guided investigations.

That's my hat!—Australian Curriculum: Science

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

Strand	Sub-strand	Code	Foundation Year content descriptions	Lessons
Science Understanding	Chemical sciences	ACSSU003	Objects are made of materials that have observable properties	1–7
Science as a Human Endeavour	Nature and development of science	ACSHE013	Science involves observing, asking questions about, and describing changes in, objects and events	1–7
Science Inquiry Skills	Questioning and predicting	AC SIS014	Pose and respond to questions about familiar objects and events	1–7
	Planning and conducting	AC SIS011	Participate in guided investigations and make observations using the senses	1–6
	Processing and analysing data and information	AC SIS233	Engage in discussions about observations and represent ideas	1–7
	Communicating	AC SIS012	Share observations and ideas	1–7

 All the material in the first four columns of this table is sourced from the Australian Curriculum v8.3.

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.

***That's my hat!*—Australian Curriculum: General capabilities**

General capabilities	Australian Curriculum description	<i>That's my hat!</i> examples
Literacy	<p>Students develop a broader literacy capability as they explore and investigate their world.</p> <p>By learning the literacy of science, students understand that language varies according to context and they increase their ability to use language flexibly.</p>	<p>In <i>That's my hat!</i> the literacy focuses are:</p> <ul style="list-style-type: none"> • word walls • science journals • drawings • sorting diagrams • T-charts • tables • annotated drawings.
Numeracy 	<p>Many elements of numeracy are particularly evident in Science Inquiry Skills. These include practical measurement and the collection, representation and interpretation of data from investigations.</p>	<p>Students:</p> <ul style="list-style-type: none"> • count up to 20 drops of water onto each material for testing water resistance • sort and classify familiar objects and explain the basis for these classifications • answer yes/no questions to collect information and make simple inferences.
Information and Communication Technology (ICT) capability	<p>Students develop ICT capability when they research science concepts and applications, investigate scientific phenomena and communicate their scientific understandings. In particular, they use their ICT capability to access information; collect, analyse and represent data; model and interpret concepts and relationships; and communicate science ideas, processes and information.</p>	<p>Students are given optional opportunities to:</p> <ul style="list-style-type: none"> • take photos of their hat creations • create a class book to represent their understanding.
Critical and creative thinking 	<p>Students develop capability in critical and creative thinking as they learn to generate and evaluate knowledge, ideas and possibilities, and use them when seeking new pathways or solutions.</p>	<p>Students:</p> <ul style="list-style-type: none"> • ask and answer questions, describe and explain their ideas, make suggestions and join in discussions.
Personal and social capability 	<p>Students develop personal and social capability as they engage in science inquiry, learn how scientific knowledge informs and is applied in their daily lives, and explore how scientific debate provides a means of contributing to their communities.</p>	<p>Students:</p> <ul style="list-style-type: none"> • participate in discussions • work collaboratively in teams • listen to and follow instructions to safely complete investigations.
Ethical understanding	<p>Students develop the capacity to form and make ethical judgements in relation to experimental science, codes of practice, and the use of scientific information and science applications.</p>	<p>Students:</p> <ul style="list-style-type: none"> • ask questions of others, respecting each other's point of view.
Intercultural understanding 	<p>Students learn to appreciate the contribution that diverse cultural perspectives have made to the development, breadth and diversity of science knowledge and applications.</p>	<ul style="list-style-type: none"> • Important contributions made to science by people from a range of cultures are highlighted where relevant.

That's my hat!—Australian Curriculum: English

In the Foundation Year, students communicate with peers, teachers, known adults and students from other classes.

Students engage with a variety of texts for enjoyment. They listen to, read and view spoken, written and multimodal texts in which the primary purpose is to entertain, as well as some texts designed to inform. These include traditional oral texts, picture books, various types of stories, rhyming verse, poetry, non-fiction, film, multimodal texts and dramatic performances. They participate in shared reading, viewing and storytelling using a range of literary texts, and recognise the entertaining nature of literature.

Strand	Sub-strand	Code	Foundation Year content descriptions	Lessons
Language	Language for interaction	ACELA1429	Understand that language can be used to explore ways of expressing needs, likes and dislikes	1–7
	Expressing and developing ideas	ACELA1437	Understand the use of vocabulary in familiar contexts related to everyday experiences, personal interests and topics taught at school	1–7
Literacy	Interacting with others	ACELY1646	Listen to and respond orally to texts and to the communication of others in informal and structured classroom situations	1–7
		ACELY1784	Use interaction skills including listening while others speak, using appropriate voice levels, articulation and body language, gestures and eye contact	1–7
		ACELY1647	Deliver short oral presentations to peers	2–4, 6

 All the material in the first four columns of this table is sourced from the Australian Curriculum v8.3.


That's my hat!—Australian Curriculum: Mathematics

Strand	Sub-strand	Code	Foundation Year content descriptions	Lessons
Number and Algebra	Number and place value	ACMNA001	Establish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point	3
	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, 5

 All the material in the first four columns of this table is sourced from the Australian Curriculum v8.3.

That's my hat!—Australian Curriculum: Design and Technologies

Strand	Code	Foundation Year content descriptions	Lessons
Knowledge and Understanding	ACTDEK004	Explore the characteristics and properties of materials and components that are used to produce designed solutions	2–6
Processes and Production Skills	ACTDEP005	Explore needs or opportunities for designing, and the technologies needed to realise designed solutions	3, 4, 6
	ACTDEP006	Generate, develop and record design ideas through describing, drawing and modelling	6
	ACTDEP007	Use materials, components, tools, equipment and techniques to safely make designed solutions	6
	ACTDEP008	Use personal preferences to evaluate the success of design ideas, processes and solutions including their care for environment	7
	ACTDEP009	Sequence steps for making designed solutions and working collaboratively	6

 All the material in the first three columns of this table is sourced from the Australian Curriculum v8.3.

***That's my hat!*—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.

Two of these are embedded within *That's my hat!*, as described below.



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

That's my hat! focuses on the Western science method 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.

Asia and Australia's engagement with Asia

The *That's my hat!* unit provides opportunities for students to develop understandings about Asia and its diversity. Through observing traditional headwear and learning about the cultural uses for it, students recognise cultures that are diverse and different from their own.

By focusing on the materials used and their properties, students will gain insight to the diverse environments of the Asian region that provide natural materials used in traditional headwear. Students appreciate that study of materials and designs of headwear from other cultures can inform their own choices when designing and selecting materials for their own hats.

Teacher background information

This information is intended as teacher information only. It provides teachers with information relevant to the science concept so they can feel more confident and competent to teach each lesson. The content and vocabulary of this information is at a more detailed and advanced level than what is required for students.

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 every day; the water in rivers, lakes and oceans; and 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 made up of substance(s)
- properties are the physical characteristics or attributes of objects (for example, size or shape) or materials (for example, texture or flexibility).

Objects and materials can be described according to their properties. Properties are the physical characteristics or attributes of objects and materials, including colour, hardness, flexibility, density, shape and size. Some of the properties of an object depend on the materials it is made of, such as density and flexibility, while others are specific to the object itself. A cap and a broad-brimmed hat can both be made of the same fabric and therefore have properties in common, but the objects have different properties, such as size and shape. Both the design of a hat and the properties of the materials it is made of play an important role in whether the object (the hat) is considered ‘sun smart’ or not.

This unit 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 in Foundation Year.

The properties of a material can determine how useful it is for a particular purpose. For example, the water resistance, flexibility and high strength-to-weight ratio of sheet plastic make it an ideal material for raincoats.

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 ‘material’, such as 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 ‘material’ during this unit.

Many students might be unaware that the properties of a material determine how useful it is for particular purposes. For instance, they might accept that wool is a common winter

clothing material without considering the properties of wool that make it suitable for winter clothing, such as low thermal conductivity, which makes it a good insulator.

Students might have their own 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 '*That's my hat!*' 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 like, '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 material 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 and technology.

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, as 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.

Lesson 1 Daring decorators

AT A GLANCE

To capture students' interest and find out what they think they know about how objects are made of materials that have observable properties.

To elicit students' questions about objects, materials and their properties.

Session 1 A funny feeling

Students:

- discuss a story about decorating a hat
- choose and describe different materials from a 'feely bag'.

Session 2 My favourite decoration (*Optional*)

Students:

- select and describe a decoration.

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 how:

- objects are made of materials that have observable properties.

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:

- describe the properties of different materials that objects are made from using the senses of touch and sight.

Literacy

Students will be able to:

- represent their ideas about the properties of materials using drawings and oral language.

This lesson also provides opportunities to monitor the development of students' general capabilities (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, including:

- 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, construction materials.

In this unit, students will be focusing on sorting objects based on the properties of their materials.

Students' conceptions

Students might not be able to differentiate between meanings of different words, such as 'hard' or 'strong'. Students might also associate 'weak' with 'light' and 'heavy' with 'strong'. As students' language is context specific, it is important that students develop appropriate language to describe and compare the properties of materials. Most students are able to distinguish between an object and the material from which it is made. They might, however, have difficulty distinguishing between the properties of the object, such as size, shape and weight, and the properties of the materials used to make the object, such as durability and flexibility.

Session 1 A funny feeling

Equipment

FOR THE CLASS

- class science journal
- word wall (see 'Preparation')
- 1 text about decorating a hat (see 'Preparation')
- 1 collection box (see 'Preparation')
- 1 'feely bag' (see 'Preparation')
- 1 stapler or self-adhesive tape
- *optional*: enlarged copy of 'Information note for families' (Resource sheet 1)

FOR EACH STUDENT

- science journal
- *optional*: 'Information note for families' (Resource sheet 1)

Preparation

- Read 'How to use a science journal' (Appendix 2).
- Read 'How to use a word wall' (Appendix 3).
- Make a large hat shape for the word wall. This will be where words and images or objects will be added to during the course of the unit.
- Source a book about a hat being decorated, such as, *Jennie's hat* by Ezra Jack Keats. ISBN: 9780142500354 or *Mrs Honey's hat* by Pam Adams ISBN 9781846431265.
- Make a collection box filled with a large range of objects made from different materials and textures. Objects might include straws, cotton wool, feathers, scraps of aluminium foil, pipe cleaners, bottle tops, lengths of string or yarn, scraps of crêpe paper, vinyl cut-offs and pre-cut cardboard shapes such as stars. Ensure you have a range of waterproof and non-waterproof objects for use in Lesson 3.

Note: Consider accessing recycled material centres in your state. For example:

- Community Reuse Centres:
<http://recyclingnearyou.com.au/community-recycling-initiatives>
- NSW: <https://reversegarbage.org.au/>
- VIC: <http://www.reversearttruck.com/>
- Prepare a 'feely bag'. Find a large bag (or box) with an opening just big enough for a hand to go through. Place a variety of objects from the collection box inside the 'feely bag', enough for one for each student plus three more (so that the last student to choose from the bag still has a choice of an object).
- Prepare a page in the class science journal with the heading 'Our questions about decorating our hat'.

Lesson steps

- 1 Read a story about a hat that is decorated (see 'Preparation'). Discuss what the hat was decorated with and how it looked.
- 2 Introduce the word wall and discuss its purpose and features.

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.

- 3 Introduce the large hat shape for the word wall (see 'Preparation'). Explain that the class is going to work together to decorate the hat.
- 4 Introduce the 'feely bag' and explain it has decorations for the hat inside it. Explain that students will take turns to put their hand into the bag and choose an object.



- 5 Ask students to think of one word to describe the object that they have pulled out of the bag. Explain that if they cannot think of a word straight away they will have time to think about it and say it later.

Note: In the *Engage* phase, do not provide any formal definitions or correct students' answers as the purpose is to elicit students' prior knowledge and possible alternative conceptions.

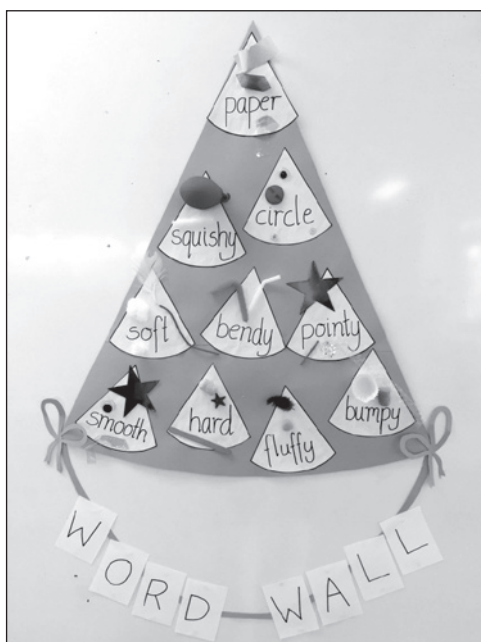


- 6 Once all students have an object from the 'feely bag', play matching/sorting activities such as:

- Find a partner and tell them one word to describe what your object looks like.
- Find a partner and tell them one word to describe what your object feels like.
- Find a partner who has an object that is a little bit like yours. For example, it is soft like your object, bendy like your object or shiny like your object. Ask partners to share why their objects are similar.



- 7 Choose one student, ask them to stand up and say one word to describe their object. Ask other students to stand up if that word also describes their object. For example, if the student says their object is shiny then ask other students to stand up if they think that their object is also shiny.
- 8 Write the describing word on the hat shape and tape or staple one (or more) of the decorations next to it.
- 9 Continue with steps 7 and 8 until the students cannot think of any more describing words.



Work sample of class word wall

- 10 Explain that students will be decorating their own party hat after they have learned more about the decorations that they can add to their hat.
- 11 Introduce the class science journal and discuss its purpose and features.

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.

- 12 Show students the 'Our questions' page in the class science journal (see 'Preparation'). Explain that students' questions about decorating hats will be recorded here.

Note: At this level, students' questions will more commonly occur incidentally during the lessons rather than being asked upfront if they have any questions. Listen for these 'in the moment' questions and record them on this page as they arise.

- 13 *Optional:* Introduce the 'Information note for families' (Resource sheet 1). Read through and discuss.

Information note for families

Name: _____ Date: _____

Introducing the 'That's my hat!' project

This term our class is exploring the observable properties of different materials as part of the science unit, *That's my hat!*.

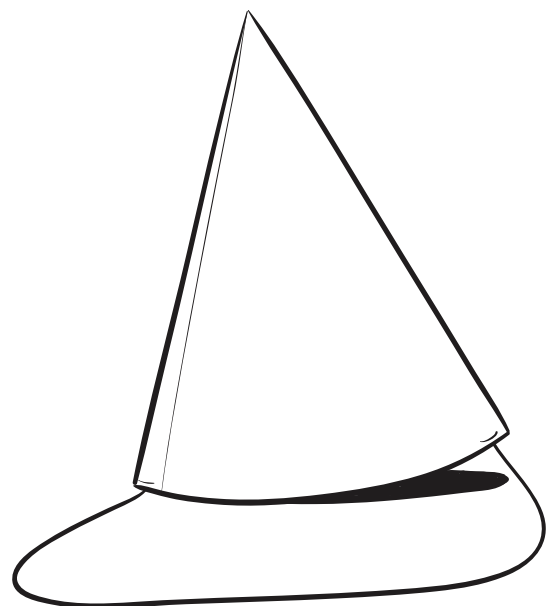
Students will be exploring many types of objects made from different materials that they can use to decorate a party hat.

Students are asked to bring a few objects from home to add to our collection to help ensure a large of variety of materials are explored. Objects might include:

- paper towelling
- crêpe paper
- wrapping paper
- feathers
- fabric pieces
- cardboard shapes
- bubble wrap
- yarn
- string
- straws
- cotton wool
- popsticks
- bottle tops
- pegs
- aluminium foil

Students are asked to bring their objects to school by:

Class teacher



Session 2 My favourite decoration (*Optional*)

Equipment

FOR THE CLASS

- class science journal
- word wall
- collection box (see 'Preparation')
- 1 enlarged copy of 'My hat decoration' (Resource sheet 2)

FOR EACH STUDENT

- science journal
- glue or self-adhesive tape
- 1 copy of 'My hat decoration' (Resource sheet 2)

Preparation

- Place a selection of objects that are different from the objects on the word wall where groups of students can access them, for example, in the middle of a group of desks.

Lesson steps

- 1 Review the previous session using the word wall.
- 2 Introduce the enlarged copy of 'My hat decoration' (Resource sheet 2).
- 3 Show students the selection of objects (see 'Preparation'). Explain that students are going to choose their favourite hat decoration from the objects and will draw, paste or tape the decoration onto the hat.
- 4 Discuss the purpose and features of a drawing. Explain that students will complete the picture by drawing their face in the circle below the hat.

Literacy focus

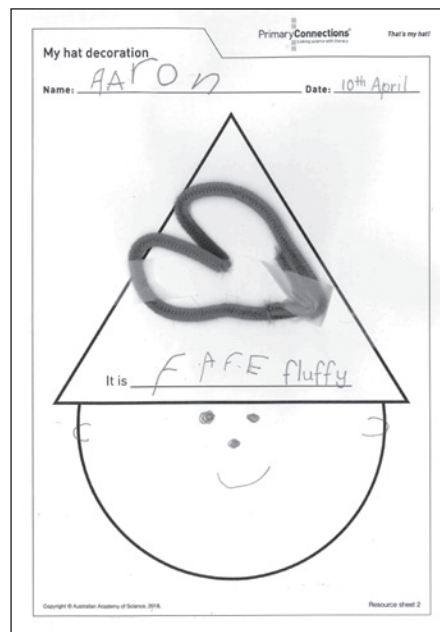
Why do we use a drawing?

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.

- 5 Show students the sentence beginning, 'It is...' at the bottom of the hat and tell them that is where they will write, or someone will help them to write, a word that describes their decoration. For example, 'It is fluffy'. Encourage students to use the word wall to help them write their word.



Work sample of 'My hat decoration' (Resource sheet 2)



- 6 Allow time for students to complete the activity. Ask students to share their ideas with a partner.



- 7 Add any new words to the word wall that students used to describe their decorations.

Curriculum links



Indigenous perspectives

- Select materials and objects of significance to local Indigenous group(s) to add to the collection box and 'feely bag'.
- Source or look up images and information about traditional ceremonial headdresses and the materials used to make them. See the 'Aboriginal Culture' website:
http://www.aboriginalculture.com.au/body_adornment4.html

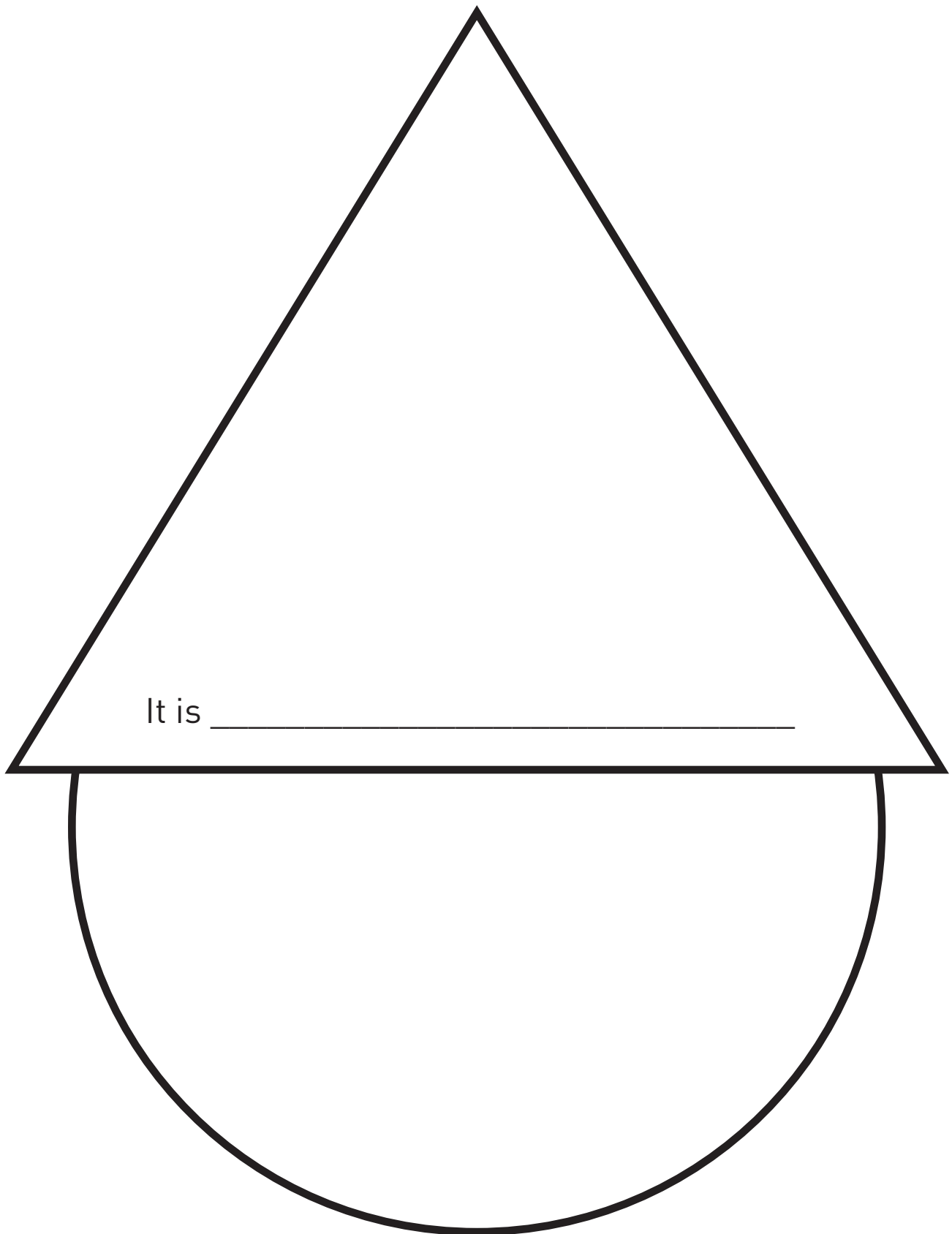
PrimaryConnections recommends working with Aboriginal and Torres Strait Islander community members to access local and relevant cultural perspectives. Protocols for engaging with Aboriginal and Torres Strait Islander community members are provided in state and territory education guidelines. Links to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

English

- Read other stories about hats. For example,
 - *Hooray for hat!* by Brian Won, ISBN 0544159039
 - *This is not my hat* by Jon Klassen, ISBN 0763655996.

My hat decoration

Name: _____ Date: _____



Lesson 2 Simple sorting

AT A GLANCE

To provide students with hands-on, shared experiences of sorting objects according to the properties of their materials.

Students:

- describe objects made of different materials
- work in teams to sort and label a group of objects made from materials with similar properties.

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 how:

- objects are made of materials that have observable properties.

You will also monitor their developing Science Inquiry Skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- identify and sort materials into groups based on their properties.

Literacy

Students will be able to:

- contribute to discussions about the properties of materials
- contribute a page to a class book on the properties of materials.

This lesson also provides opportunities to monitor the development of students' general capabilities (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, plastic film is lightweight and water resistant and is useful in rain hats and coats. Wool is useful for insulation in beanies because it traps heat well. Aluminium foil is reflective and lightweight, making it useful as a shiny decoration.

The properties of an object can include its size and shape. The properties of an object can also rely on the materials that it is made of, such as water resistance and transparency. Properties of materials do not rely on the properties of the object. For example, a plastic doll with one missing arm is a different object from a doll with two arms, 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 that students might look for in this unit include:

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

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 1 enlarged copy of 'Sorting hat' (Resource sheet 3)
- collection box (see Lesson 1, Session 1 'Preparation')
- scissors
- 1 card strip (10 cm x 3 cm)
- self-adhesive tape
- stapler

FOR EACH TEAM

- each team member's science journal
- role wristbands or badges for Manager and Speaker
- samples from the collection box (see 'Preparation')
- 1 x A3 copy of 'Sorting hat' (Resource sheet 3)
- 1 card strip (10 cm x 3 cm)
- self-adhesive tape

Preparation

- Read 'How to organise collaborative working teams (F–Year 2)' (Appendix 1).
Note: Consider whether your students are ready to work in collaborative learning teams. If not, then provide an A4 copy of the resource sheet to each student.
- Prepare a collection of small samples of the objects in the collection box from Lesson 1, for each team.
- Cut out card strips (10 cm x 3 cm) so that there is one for each team plus one more (for you to use on the example page).

Lesson steps

- 1 Review the previous lesson, focusing students' attention on the words on the word wall that they used to describe objects from the 'feely bag'.
- 2 Place the enlarged copy of 'Sorting hat' (Resource sheet 3) on the floor so that it is in the middle of the class group. Place a sample of different objects from the collection box around the resource sheet.
- 3 Explain to students that you are going to sort the objects into two groups. Discuss the purpose and features of a sorting diagram.

Literacy focus

Why do we use a sorting diagram?

We use a **sorting diagram** to show how things fit into different groups.

What does a sorting diagram include?

A **sorting diagram** includes two or more groups which do not overlap. It might include headings for each of the groups.



- 4 Explain to students that you will think of one describing word and then you will place all the objects that match that word inside the hat. For example, choose 'fluffy' and place all of the objects that match that description inside the sorting hat and leave all of the objects that are not fluffy next to the sorting hat.

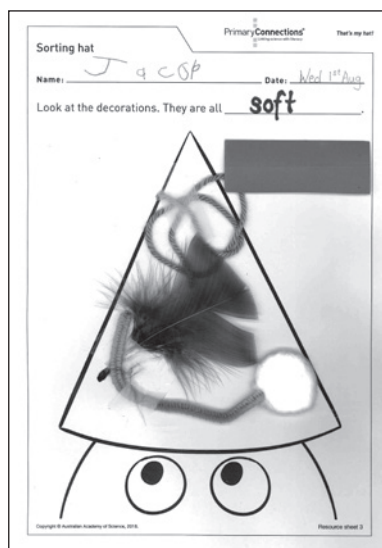


Note: While colour is an easily distinguishable characteristic, sorting using a colour at this point might focus students' attention on different colours rather than on different textures or other descriptions that relate to different properties, such as sticky or shiny.

- 5 Ask students to think carefully about what describing word matches ALL of the materials inside the hat but NONE of the materials next to the hat. Encourage students to use this word to complete the sentence, for example, 'They are all soft'.

Note: Ask students to respectfully discuss other students' ideas, for example, 'Yes they are all soft, but so is the cotton wool that is not inside the hat'.

- 6 When students have agreed on a suitable describing word complete the sentence on the enlarged copy of 'Sorting hat' (Resource sheet 3). Staple or tape the materials to the page. Cover the sentence on the bottom with a sheet of card, placing self-adhesive tape just above it to create a flap.



Work sample of completed 'Sorting hat' (Resource sheet 3)

- 7 Explain that students will work in collaborative learning teams to create their own 'Sorting hat' page using a collection of materials. Brainstorm words that they might use to sort the materials and add them to the word wall.
- 8 Form pairs and allocate roles. Show students the equipment table from where Managers will collect team equipment. Ask Managers to collect their team's equipment.

If students are using collaborative learning teams for the first time, introduce and explain the team skills chart and the team roles chart. Explain that students will wear role wristbands or badges to help them (and you) know which role each team member should be doing.
- 9 Allow time for students to complete the activity.
- Optional:* Ask teams to share their sorting with another team before taping or stapling their objects to the page.
- 10 Ask teams to present their completed copy of 'Sorting hat' (Resource sheet 3) and ask students to guess what the description word under the flap is.
- 11 Use completed resource sheets to create a big class book.
- 12 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

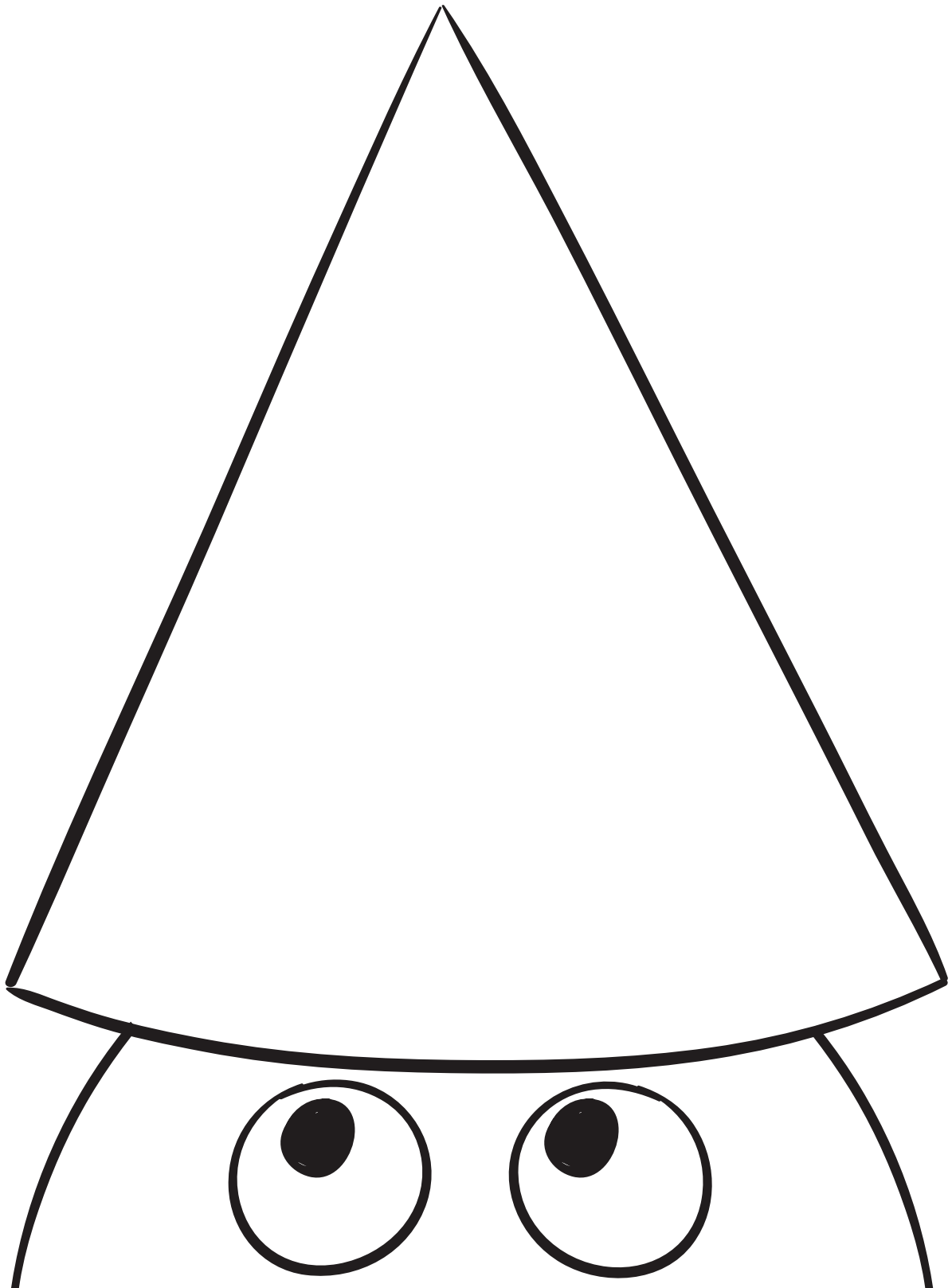
English

- Read *That's not my ...* touchy-feely books (Usborne Children's Books).

Sorting hat

Name: _____ Date: _____

Look at the decorations. They are all _____.



Lesson 3 What if it is wet?

AT A GLANCE

To provide students with hands-on, shared experiences of exploring the water resistance of objects made from different materials.

Students:

- work in teams to investigate what happens to different materials when they become wet
- discuss their results.

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 how:

- objects are made of materials that have observable properties.

You will also monitor their developing Science Inquiry Skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- investigate the effect of water on different materials
- make claims about the effect of rain (water) on their party hat and its decorations.

Literacy

Students will be able to:

- record their results in a T-chart
- use words and images to record their observations.

This lesson also provides opportunities to monitor the development of students' general capabilities (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 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 needs to be unaffected by water and 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 (filling in the spaces) with another material that does not 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. Plastic and rubber are everyday examples of waterproof materials.

Equipment

FOR THE CLASS


- class science journal
- word wall
- team roles chart
- team skills chart
- 1 enlarged copy of 'Rainy days' (Resource sheet 4)
- 1 set of 6 objects made from different materials (see 'Preparation')
- 1 eye dropper or teaspoon
- 1 small container of water
- *optional*: stapler or self-adhesive tape

FOR EACH TEAM

- each team member's science journal
- role wristbands or badges for Manager and Speaker
- *optional*: 1 copy of 'Rainy days' (Resource sheet 4) per student
- 1 set of 6 objects made from different materials (see 'Preparation')
- 1 eye dropper or teaspoon
- 1 small container of water

Preparation

- Collect six objects made from different materials for each team:
 - 1 plastic object (eg, straw or lid)
 - 1 wooden object (eg, popstick or block)
 - 1 metal object (eg, aluminium foil or teaspoon)
 - 1 paper object (eg, tissue or crêpe paper)
 - 1 feather
 - 1 cotton ball
- Prepare a page in the class science journal as follows:

 Is it useful for a rainy day party?	
Yes	No

- **Tip:** This lesson involves students using water. Cover desks with plastic or locate an area that this activity can be conducted in, such as a 'wet' area or outside area.

Lesson steps



- 1 Review the previous lesson, focusing on the big book that the class made describing the properties of objects made from different materials.
- 2 Ask students to think about how they might decorate their party hat. Ask them to imagine wearing their hat to a party that is outside and then it starts to rain.
- 3 Introduce the enlarged copy of 'Rainy days' (Resource sheet 4). Explain that students will work in collaborative learning teams to find out what happens to different party decorations when they get wet.

Optional: Ask students to complete their own copies of 'Rainy days' (Resource sheet 4) in their teams.

- 4 Introduce the collected objects (see 'Preparation') and ask students which one is made from paper. Write the name of the object, for example, tissue, on the line in the first box and read the sentence to the class. For example, 'A tissue is made of paper.' Discuss what it looks and feels like and record one or two describing words on the enlarged copy of 'Rainy days' (Resource sheet 4).
- 5 Repeat step 4 for each of the other objects.
- 6 Explain that teams will place 20 drops of water onto each object in turn and then observe the decoration to see if it still looks and feels the same.

Optional: Ask students to pour 4 teaspoons of water on each object rather than use an eye dropper.



- 7 Form pairs and allocate roles. Ask Managers to collect team equipment.



- 8 Ask teams to select their decoration made from paper. Allow time for teams to put 20 drops of water onto the object and then observe what happens.



- 9 Ask Speakers to share their teams' observations. Ask questions such as:

- Does the paper decoration look the same or does it look different?
- What words describe how it looks or feels? (soggy, slimy, floppy).

Record a final description of the object after water on the enlarged copy of 'Rainy days' (Resource sheet 4).

- 10 Repeat lesson steps 8 and 9 for each of the other objects.

Rainy day ☁️

PrimaryConnections® That's my best!

Name: KHD Date: 17th April

Describe the hat decorations before and after they get wet.

<p>A <u>tissue</u> is made of <u>paper</u>. Before: <u>soft</u> After ☁️: <u>soggy, ripped</u></p>	<p>A <u>popstick</u> is made of <u>wood</u>. Before: <u>hard</u> After ☁️: <u>soggy, a bit softer</u></p>
<p>A <u>piece of foil</u> is made of <u>metal</u>. Before: <u>shiny crinkly</u> After ☁️: <u>shiny crinkly wet</u></p>	<p>A <u>bottle top</u> is made of <u>plastic</u>. Before: <u>hard</u> After ☁️: <u>hard wet</u></p>
<p><u>Cotton wool</u> Before: <u>soft, puffy</u> After ☁️: <u>slimy</u></p>	<p>A <u>feather</u> Before: <u>fluffy</u> After ☁️: <u>thin, slippery</u></p>

Copyright © Australian Academy of Science, 2016. Resource sheet 4.

Work sample of 'Rainy days' (Resource sheet 4)

- 11 Go to the prepared page in the class science journal (see 'Preparation'). Explain that this is a T-chart. Discuss the purpose and features of a T-chart.

Literacy focus

Why do we use a T-chart?

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

What does a T-chart include?







A **T-chart** includes two columns with headings. Information is put into the columns based on the headings.



- 12** Ask students to think about their investigation and identify which decorations would be useful for a rainy-day hat, and which would not. Record students' ideas on the T-chart.



Optional: Add the objects to the T-chart using self-adhesive tape or staples.

Is it useful for a rainy day party? ☁️🌧️	
Yes	No
 metal foil	 crepe paper
 plastic bread clip	 cotton wool
	 feather
	 wooden toothpick







Work sample of a class T-chart

- 13** Review students' questions to see if any have been answered. Update the word wall with words and images.

Rainy days

Name: _____ Date: _____

Describe the hat decorations before and after they get wet.

<p>A _____ is made of paper. Before:</p> <p>After  :</p>	<p>A _____ is made of wood. Before:</p> <p>After  :</p>
<p>A _____ is made of metal. Before:</p> <p>After  :</p>	<p>A _____ is made of plastic. Before:</p> <p>After  :</p>
<p>Cotton wool</p> <p>Before:</p> <p>After  :</p>	<p>A feather</p> <p>Before:</p> <p>After  :</p>

Lesson 4 Sun safety

AT A GLANCE

To provide students with hands-on, shared experiences of the transparency of different materials.

Students:

- discuss why some hats are better to wear than others on sunny days
- work in teams to investigate which materials provide more shade.

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 how:

- objects are made of materials that have observable properties.

You will also monitor their developing Science Inquiry Skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- classify materials based on the shadows they make
- identify materials that might be useful for hats worn on sunny days.

Literacy

Students will be able to:

- complete a survey using a table
- engage in, and contribute to, discussions about hats for sunny days.

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

Teacher background information

Ultraviolet (UV) radiation is a form of light just outside the visible spectrum and constitutes approximately 10% of the total light output of the Sun. Materials that completely block visible sunlight also tend to block UV radiation. However, this is not always the case. Some eye glasses might have dark lenses and look like sunglasses but do not block UV radiation, and therefore can result in as much, or more, damage to the eyes as wearing no glasses at all. Australian Government standards require sunglasses to be labelled with their UV protection rating.

Hats play a very large role in school sun protection policies. Broad-brimmed hats or legionnaire-style hats (cap with neck flap) are common requirements and must be worn during the months of the year when the greatest UV radiation from the Sun reaches our position on Earth. These hats provide shade to the head and neck, preventing much of the UV radiation from reaching the skin. Prolonged exposure of our skin to UV radiation can cause sunburn and skin cancer.

The shape of a hat, or the way the material is put together, can also affect how much sun protection a hat can provide. For instance, straw is a material that is not transparent (lets no light through), but if woven loosely together in a straw hat, will permit light through, making a hat that does not completely protect its user from UV radiation.

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 1 enlarged copy of 'Sunny days' (Resource sheet 5)
- 1 plain party hat
- 1 sun hat with a brim
- sheets of different materials (see 'Preparation')
- glue or self-adhesive tape

FOR EACH TEAM

- each team member's science journal
- role wristbands or badges for Manager and Speaker
- 1 copy of 'Sunny days' (Resource sheet 5) per team member
- scissors
- glue or self-adhesive tape
- 1 paper plate (see 'Preparation')
- *optional*: torch

Preparation

- Prepare paper plate viewers by cutting a 5 cm diameter hole out of the middle of each paper plate and then taping or gluing a thin sheet of material over the hole. Materials might include: cardboard, cellophane, hessian, aluminium foil, crêpe paper, plastic or felt. Prepare enough viewers so that each team will have one viewer at a time to investigate. Write the name of the material on the paper plate. Keep offcuts for students to glue onto their resource sheets.

Sunny days	
Name: H. Harper	Date: Tuesday 1/5/14
What did you see? A dark shadow 	Material foil cardboard
A grey shadow 	crepe paper
Not much shadow 	bubblewrap cellophane

Work sample of 'Sunny days' (Resource sheet 5)

Note: Consider if your class is ready for working in teams, if not then conduct the investigation as a whole class.

Lesson steps

- 1 Review the previous lessons, focusing on students' ideas of what would happen if they wore their party hats outside on a rainy day.
- 2 Introduce the party hat and the sun hat with a brim. Ask questions such as:
 - What is the same about these two hats?
 - What is different about these two hats?
 - What makes this sun hat good to wear outside on a sunny day?
 - How could we improve the party hat so that it shades our face on a sunny day?
 - How could we find out what is the best material to make a brim out of to shade our face?
- 3 Explain that students will be working outside in collaborative learning teams to investigate which materials are best to use to make a brim for the party hat to help shade their face on a sunny day.

Optional: Have students work inside in a darkened room with torches if the day is overcast.

- 4 Introduce the enlarged copy of 'Sunny days' (Resource sheet 5). Explain that this is a table. 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.

- 5 Introduce the paper plate viewers. Discuss how each paper plate viewer has a different sheet of material in the centre, and how the name of the material is written on the plate.
- 6 Model holding a paper viewer up to the light to see what kind of shadow it makes on the ground, on the table or on a sheet of white paper.



Safety note: Remind students not to look directly at the Sun, or to look through materials at the Sun.

- 7 Discuss how the images in the table of 'Sunny days' (Resource sheet 5) represent materials that make a dark shadow, ones that makes some shadow and ones that hardly make a shadow at all. Model completing an entry on the enlarged copy of 'Sunny days' (Resource sheet 5) by cutting a piece of the same material and pasting or taping it into the appropriate column on the resource sheet.

Optional: Ask students to write the names of the materials on their copy of 'Sunny days' (Resource sheet 5), using the paper plate viewers for reference.



- 8 Form pairs and allocate roles. Ask Managers to collect team equipment.

- 9 Allow time for teams to complete the activity.



- 10 Ask Speakers which materials their team found made a dark shadow, a grey shadow and not much of a shadow. Discuss and record final class results in the class science journal.



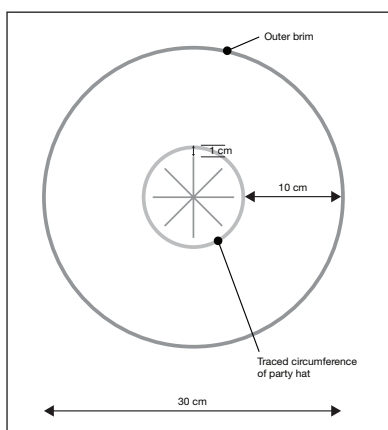
- 11 Ask students which materials would be best to use to make a brim for the party hat to help shade their face on a sunny day. Ask students to provide reasons for their choices. Record students' responses in the class science journal.

- 12 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links

Science/Design and Technology

- Test students' ideas by making and testing party hat brims.
One method is:
 - Place a party hat on the centre of the material and trace around the edge of the hat.
 - Draw another circle that is approximately 15 cm distance from the edge of the hat.
 - Cut around the outside circle.
 - Mark the centre of the smaller circle and rule six lines through the centre to 1 cm before the edge of the first circle (see diagram).
 - Cut along each line.
 - Place the material over the party hat to form a brim.



Party hat brim template



Example of party hat brim made from cardboard

Sunny days

Name: _____ Date: _____

What did you see?	Material
<p>A dark shadow</p> 	
<p>A grey shadow</p> 	
<p>Not much shadow</p> 	

Lesson 5 Sorting it out

AT A GLANCE

To support students to represent and explain their understanding of how objects are made of materials that have observable properties.

To introduce current scientific views about objects, materials and their properties.

Session 1 Testing three hats

Students:

- predict, observe and explain the properties of three prototype hats based on the properties of their materials.

Session 2 The scientist's suitcase *(Optional)*

Students:

- play a game where objects are sorted based on a property of the material they are made of.

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 how:

- objects are made of materials that have observable properties.

You will also monitor their developing Science Inquiry Skills (see page xi).

Key lesson outcomes

Science

Students will be able to:

- predict and explain whether hats are suitable to wear on sunny or rainy days based on the properties of their materials
- identify and match materials that have similar properties.

Literacy

Students will be able to:

- contribute to discussions about the properties of materials and objects (hats)
- follow the rules of a game about the properties of materials.

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

Session 1 Testing three hats

Equipment

FOR THE CLASS

- class science journal
- word wall
- 1 enlarged copy of 'Testing hats' (Resource sheet 6)
- 3 plain party hats (see 'Preparation')
- 1 balloon
- crêpe paper
- marking pen
- self-adhesive tape
- scissors
- cellophane to cover one party hat and make a brim (see 'Preparation')
- bubble wrap to cover one party hat and make a brim (see 'Preparation')
- aluminium foil to cover one party hat and make a brim (see 'Preparation')

FOR EACH STUDENT

- science journal
- *optional*: 1 copy of 'Testing hats' (Resource sheet 6)

Preparation

- Make a model of a head using a balloon and crêpe paper strips for the hair.
- Source three party hats, or make them out of a cone of A4 paper, and then modify as follows:
 - **Hat 1:** Cover with colourful strips of cellophane but with gaps between the strips that would allow water in, and have a brim made of black paper with strips of cellophane dangling over the edge. (Not waterproof but suitable for sunny days.)

– **Hat 2:** Cover completely with bubble wrap and have a brim also made of bubble wrap. (Waterproof but not suitable for sunny days.)

– **Hat 3:** Cover completely with aluminium foil and have a brim that is star shaped, making the shadows fall unevenly on the face. (Waterproof but not suitable for sunny days or rainy days due to the shape of the brim.)

Optional: If your hat looks very different from the photos below, consider taking and printing photos of your hats to paste over the photos in 'Testing hats' (Resource Sheet 6).



Examples of the three hats described above on a balloon head

Lesson steps

- 1 Revise the previous lessons, focusing students' attention on the different words they have learned to describe the properties of materials.
- 2 Explain that you have been designing a party hat for yourself and introduce the three prototype hats (see 'Preparation'). Ask students which of the words from the word wall they would use to describe the materials each hat is made of.
- 3 Introduce the enlarged copy of 'Testing hats' (Resource sheet 6). Read through and explain that students will predict what they think will happen when they test each hat to find out if it is a rainy day hat or a sunny day hat.



- 4 Hold up Hat 1. Ask students to stand up if they think the hat would shade your face on a sunny day. Count the number of students standing and record next to 'a sunny day hat' in the 'We think it is' column of 'Testing hats' (Resource sheet 6). Ask students to provide reasons for their choice to stand up or not.

- 5 Continue holding up Hat 1. Ask students to stand up if they think the hat would keep your head dry on a rainy day. Count the number of students standing and record next to 'a rainy day hat' in the 'We think it is' column of 'Testing hats' (Resource sheet 6). Ask students to provide reasons for their choice to stand up or not.

- 6 Repeat lesson steps 4 and 5 with Hat 2 and Hat 3.

Optional: Give each student a copy of 'Testing hats' (Resource sheet 6) and ask them to circle their predictions for each of the hats.

- 7 Show students the balloon head and explain that it will be a 'test dummy' for finding out if each of the hats is a sunny day hat or a rainy day hat.

- 8 Take the class outside and put Hat 1 on the balloon head. Ask students to look to see if the hat blocks the sunlight from the face of the balloon head.
- 9 Pour water over Hat 1. Ask students what they notice and if they think the hat is a rainy day hat or not.
- 10 Repeat lesson steps 8 and 9 with Hat 2 and Hat 3.
-  11 Go back inside and record the results on the enlarged copy of 'Testing hats' (Resource sheet 6). Ask students questions such as:
 - Which hats were not sunny day hats? Why not?
 - Which hats were not rainy day hats? Why not?
- 12 Discuss and record in the class science journal simple explanations, such as, 'The brim let light through', 'The brim was the wrong shape', 'The gaps let the water in'.
-  13 Ask students for ideas on how to improve each hat to make them suitable for wearing on a sunny day or a rainy day.
- 14 Review students' questions to see if any have been answered. Update the word wall with words and images.

Curriculum links



Asia and Australia's engagement with Asia

- Source or view images of traditional Southeast Asian farmers' hats, particularly the broad conical hats. Visit 'The World of Hat' Ethnic Museum (see links below) and read the information about each of the similarly shaped hats from neighbouring countries that are made from different (more readily available) materials.
 - 'Non la' (leaf hats) of Vietnam: <http://worldhat.net/en/exhibition/non-la>
 - 'Cane hat' of Laos: <http://worldhat.net/en/exhibition/hat-3>
 - 'Pumpkin hat' of the Philippines: <http://worldhat.net/en/exhibition/pumpkin-hat>
- Discuss what properties make each hat good for sunny or rainy weather.

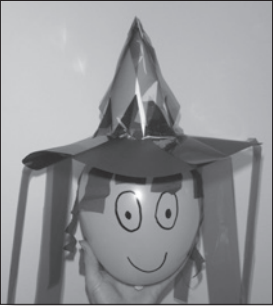




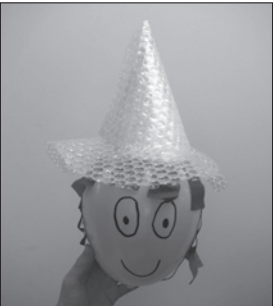









Art/English

- Create descriptive words out of the materials they are describing. For example, cut out the letters of the word 'shiny' from aluminium foil or use glue to write the word 'soft' on paper and stick cotton wool to it. Add the word creations to the word wall.



Testing hats

Name: _____ Date: _____

	<p>We think it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>	<p>We found out that it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>
	<p>We think it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>	<p>We found out that it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>
	<p>We think it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>	<p>We found out that it is:</p> <p> a sunny day hat</p> <p> a rainy day hat</p>

Session 2 The scientist's suitcase *(Optional)*

Equipment


FOR THE CLASS

- class science journal
- word wall
- collection box (see Lesson 1, Session 1 'Preparation')
- 1 large hoop

FOR EACH STUDENT

- science journal

Lesson steps

- 1 Revise the previous lessons, focusing students' attention on the words they have learned to describe different materials.
- 2 Place a large hoop on the floor with space for the class to sit around it. Place the collection box next to the hoop.
- 3 Explain to students that they are going to play a game called 'The scientist's suitcase'. Explain that you are a scientist going to the Moon to investigate a certain property of materials and that you are packing a suitcase with materials that have that property.
- 4 Start packing your 'suitcase' by thinking of a property, for example, 'fluffy', and placing two objects made of materials with that property in the hoop. Explain that those two objects share a property and that the students have to work out what that property is.
- 5  Ask one student to choose an object from outside the hoop to test their idea of what the property might be:
 - If the student chooses a material that has the same property that you are thinking of then say, 'Yes, that object can come to the Moon with me' and place the object in the hoop.
 - If the student places an object that does not have the same property as what you are thinking of then say, 'No, that object can't come to the Moon with me' and place the object outside the hoop.
- 6 At any time a student can decide that they are sure of what the property is and can announce 'Eureka'. They stand up and announce which property they think it is. Students that agree also stand up. If they are correct, all students standing go to the Moon. If they are not, they watch the other students guess the property.
- 7 Continue the game until:
 - a group of students correctly guesses the answer and/or
 - there are no more objects that have the same property as those objects you packed into your 'suitcase'.

Optional: Discuss false positives. This happens when students think of a property, for example, white, and then test it by choosing an object that coincidentally has the same property as the one you are thinking of. For example, they choose a white cotton ball and you accept it because it is fluffy.



- 8** Take all the objects out of the hoop to start the game again with a different property.

Optional: Ask the student who announced the correct property to become the scientist.

- 9** Review students' questions to see if any have been answered. Update the word wall with words and images.

Lesson 6 My marvellous hat

AT A GLANCE

To support students to design and make a party hat decorated with objects made from materials with different properties.

Students:

- draw a plan to decorate a party hat using objects made from different materials
- follow their plan to make a decorated party hat.

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).

Key lesson outcomes

Science

Students will be able to:

- choose three different properties
- plan and make a party hat with objects made out of materials that have those properties.

Literacy

Students will be able to:

- draw an annotated plan of their party hat.

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

Equipment

FOR THE CLASS

- class science journal
- word wall
- team roles chart
- team skills chart
- 1 enlarged copy of 'My party hat planner' (Resource sheet 7)
- collection box (see Lesson 1, Session 1 'Preparation')
- camera
- *optional*: materials to make balloon heads

FOR EACH TEAM

- each team member's science journal
- role wristbands or badges for Manager and Speaker
- 1 copy of 'My party hat planner' (Resource sheet 7) per team member
- 2 plain party hats (see 'Preparation')
- scissors
- glue
- self-adhesive tape

Preparation

- Refill the collection box and add materials such as: sponges, ribbon, coloured paper, counters, paper party tins, tinsel, pompoms and wrapping paper.
- Source two plain party hats per team or make them by creating a cone from a white sheet of A4 paper and attaching an elastic or two lengths of string below to tie it.

Optional: If time and student ability permit, ask students to construct their own cone-shaped party hats using a sheet of paper and self-adhesive tape.

- *Optional:* Prepare balloons with crêpe paper hair to test the hats (see Lesson 5, Session 1 'Preparation').

Lesson steps

- 1 Review the previous lessons using the class science journal and word wall, focussing students' attention on the different decorated party hats they tested.
- 2 Explain that students will be working in collaborative learning teams to design and make their own party hats using materials from the collection box.
- 3 Explain that teams will pick three different properties and then choose decorations for their hat that have those properties. For example, if students choose 'smooth, fluffy and soft' then both team members will decorate their hats with decorations made from materials that have one or more of those properties.
- 4 Introduce the enlarged copy of 'My party hat planner' (Resource sheet 7). Explain that this is where students will plan what their party hat will look like. Discuss the purpose and features of an annotated drawing.

Literacy focus

Why do we use an annotated drawing?

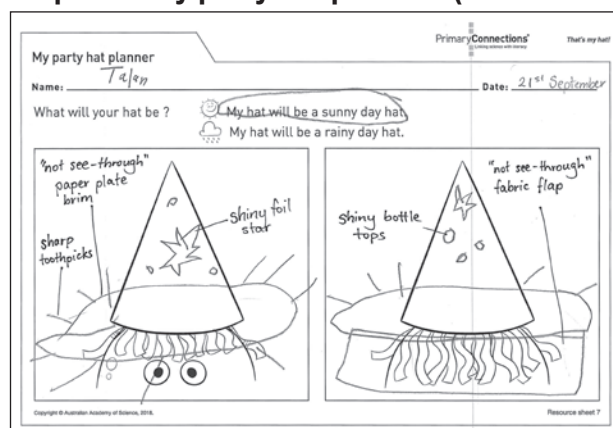
We use an **annotated drawing** to show an idea or object.

What does an annotated drawing include?

An **annotated drawing** includes a picture and words or descriptions about the idea or object.

- 5 Explain that students will draw the decorations on their hats, add words to describe the materials they are made of and then draw a line to connect the words with the decoration.

Work sample of 'My party hat planner' (Resource sheet 7)



- 6 Draw students' attention to the top of the resource sheet. Explain that students will circle whether they are making a sunny day hat and/or a rainy day hat.



- 7 Form pairs and allocate roles. Ask Managers to collect team equipment.



- 8 Allow time for teams to plan and decorate their hats.

Optional: Allow students to test whether their hat is a sunny day hat or a rainy day hat using a balloon with crêpe paper hair (see Lesson 5, Session 1, 'Preparation').



- 9 Ask Speakers to show the class their teams' hats and explain what three properties they were thinking of. Ask each team:



- What properties did you chose? Which of your decorations have those properties?
- How would you describe that decoration?
- What properties did you chose? Which of your decorations have those properties?
- How would you describe that decoration? Is the hat suitable for a rainy day? Why or why not?
- Is the hat suitable for a sunny day? Why or why not?
- What do you like most about your hats?
- What did you find difficult about making the hats? What could you do differently next time?

- 10 Take photos of the finished hats on students' heads. These photos will be used in the next lesson.

Optional: Organise to take photos of the hats as part of a hat parade.

- 11 Review students' questions to see if any have been answered. Update the word wall with words and images.



Examples of party hats made by students

My party hat planner

Name: _____ Date: _____

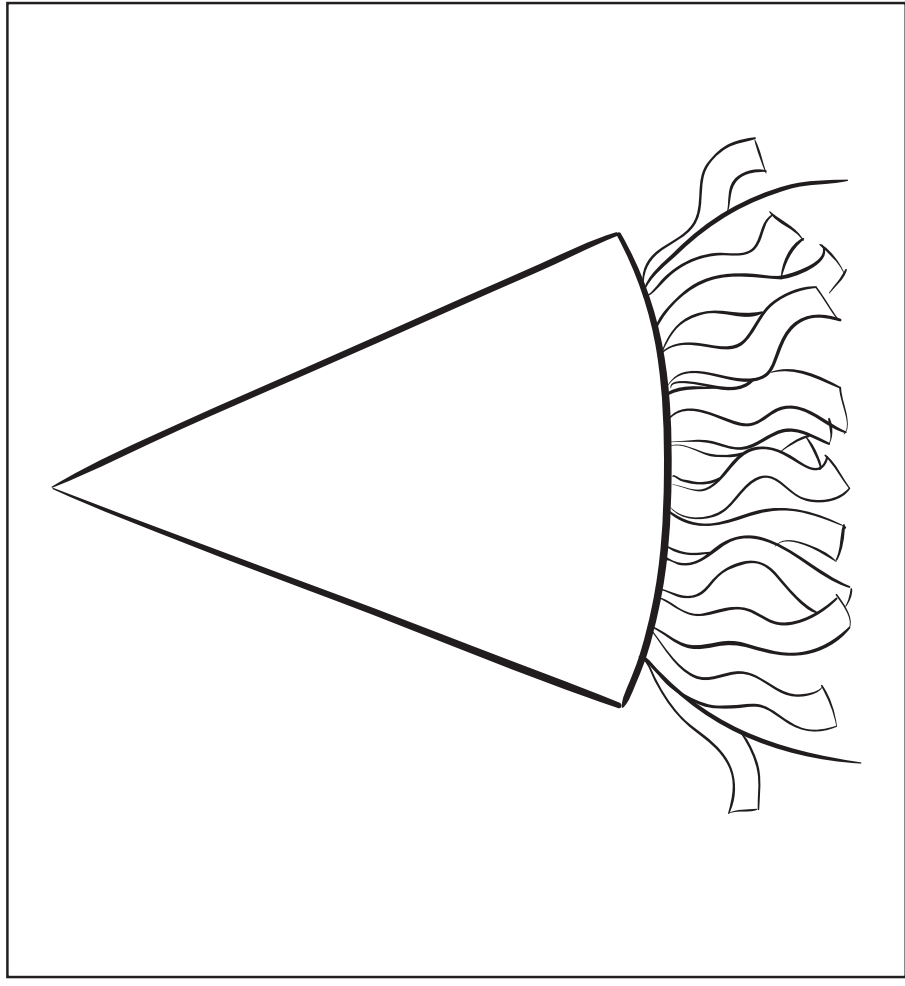
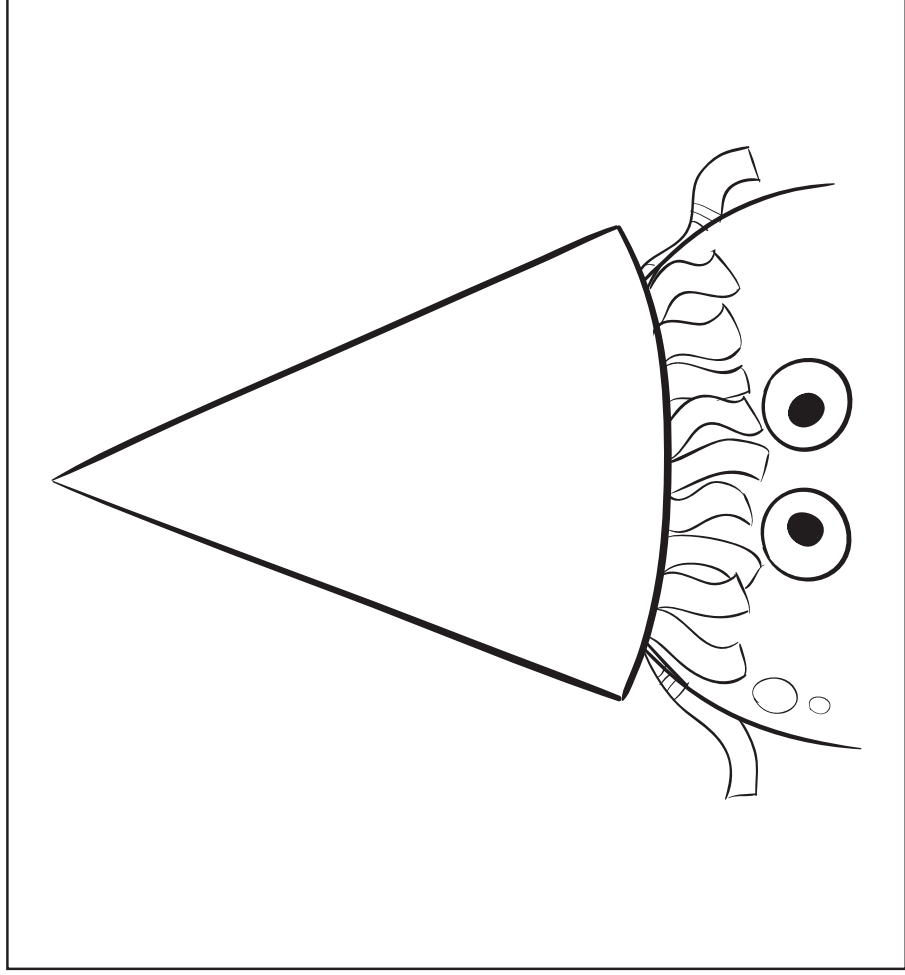
What will your hat be ?



My hat will be a sunny day hat.



My hat will be a rainy day hat.



Lesson 7 About my hat

AT A GLANCE

To provide opportunities for students to represent what they know about how objects are made of materials that have observable properties, and to reflect on their learning during the unit.

Students:

- describe the properties of the materials of their party hat's decorations.
- compare properties and identify matching descriptions
- 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. In this lesson you will be looking for evidence of the extent to which students understand how:

- objects are made of materials that have observable properties.

Key lesson outcomes

Science

Students will be able to:

- describe the properties of the objects and materials used to decorate their hats
- reflect on their learning.

Literacy

Students will be able to:

- use oral and written language to show their understanding and reflect on their experiences.

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

Equipment

FOR THE CLASS

- class science journal
- word wall
- 1 enlarged copy of 'My party hat' (Resource sheet 8)
- photos of students' completed hats
- glue or self-adhesive tape (see 'Preparation')
- stapler
- scissors

FOR EACH STUDENT

- science journal
- 1 copy of 'My party hat' (Resource sheet 8)

Preparation

- Prepare a copy of 'My party hat' (Resource sheet 8) for each student by pasting the photo taken of them in their hat in Lesson 6 in the resource sheet.

Optional: Bring photos and ask students to find their own and attach them to their copies of 'My party hat' (Resource sheet 8).

- *Optional:* Plan a hatters' tea party or hat parade.

Lesson steps

- 1 Review the previous lessons using the class science journal and the word wall.
- 2 Introduce the enlarged copy of 'My party hat' (Resource sheet 8). Read through and discuss how to complete the first three sentences with a word describing the property of one of the hat's decorations. Remind students that they can use the word wall.
- 3 Model how to complete the section by circling one of the sentences to explain if their hat is a sunny day hat or a rainy day hat.

Work sample of 'My party hat' (Resource sheet 8)

My party hat

PrimaryConnections

Name: Anie Date: Friday 10

It is a rainy day hat. ☔

It is a sunny day hat. ☀

One decoration is waterproof

One is bendy

One is bumpy

Copyright © Australian Academy of Science, 2016. Resource sheet 8

- 4 Ask students to collect their copy of 'My party hat' (Resource sheet 8) (see 'Preparation').



- 5 Allow time for students to complete the activity.



- 6 Ask students to compare their copies of 'My party hat' (Resource sheet 8) with each other. For example, they can find someone with the same or different describing words.

- 7 Collect and staple together the completed pages to make a class book and read through with students.

Optional: Cut each page between the photo and the description to make a 'flip book'.

Ask students to match descriptions with different hats when reading.



- 8 Ask students to reflect on the unit. Ask questions such as:

- What was the most interesting thing that you learned?
- What are some things that you have learned that you did not know before?
- Which activity helped you learn something new?
- Which activity did you like best?
- What are you still wondering about?

Optional: Celebrate the end of the unit with a hatters' tea party or hat parade.

Curriculum links


English

- Read about the mad hatter's tea party in *Alice in Wonderland*.

My party hat

Name: _____ Date: _____

It **is** a rainy day hat. 

It **is** a sunny day hat. 

One decoration is _____ .

One is _____ .

One is _____ .

Appendix 1

How to organise collaborative learning teams (F–Year 2)

Introduction

Students working in collaborative teams is a key feature of the PrimaryConnections 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 experience working 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 F–Year 2, teams consist of two students—Manager and Speaker. (For Year 3–Year 6,

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 wristband, badge or colour-coded clothes peg. 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–Year 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.

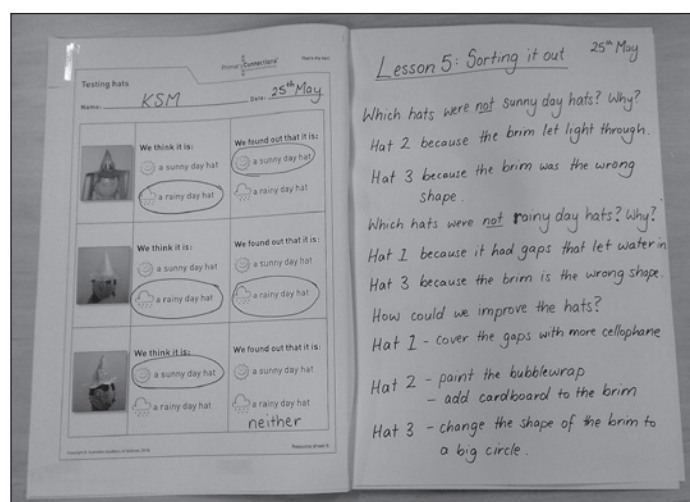
Monitoring students' journals allows you to identify students' alternative conceptions, find evidence of students' learning and plan future learning activities in science and literacy.

Maintaining 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.



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 different dialects and 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

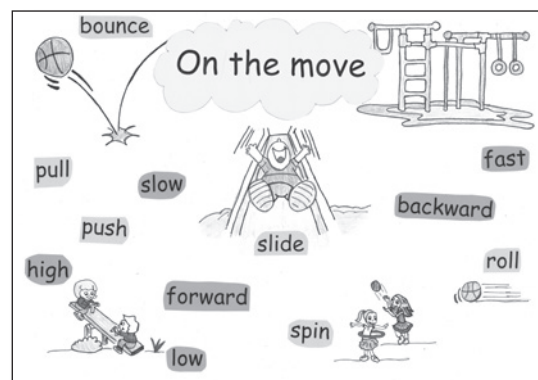
Position the word wall so that students have easy access to the words. They need to be able to see, remove and return word cards to the wall. A classroom could have one main word wall and two or three smaller ones, each with a different focus, for example, high-frequency words.

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 a self-adhesive dot 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 unit about the different properties of the materials might be arranged under 'Looking at materials', 'Feeling materials' and 'When materials are wet'.

**Weather in my world word wall****On the move word wall**

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 piece of clothing 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.

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.

**That's my hat! word wall**

Appendix 4

How to facilitate evidence-based discussions

Introduction

Argumentation is at the heart of what scientists do; they pose questions, make claims, collect evidence, debate with other scientists and compare their ideas with others in the field.

In the primary science classroom, argumentation is about students:

- articulating and communicating their thinking and understanding to others
- sharing information and insights
- presenting their ideas and evidence
- receiving feedback (and giving feedback to others)
- finding flaws in their own and others' reasoning
- reflecting on how their ideas have changed.

It is through articulating, communicating and debating their ideas and arguments that students are able to develop a deep understanding of science content.

Establish norms

Introduce norms before starting a science discussion activity. For example:

- Listen when others speak.
- Ask questions of each other.
- Criticise ideas not people.
- Listen to and discuss all ideas before selecting one.

Question, Claim, Evidence and Reasoning

In science, arguments that make claims are supported by evidence. Sophisticated arguments follow the **QCER** process:

- We claim that the objects made of plastic were better for decorating rainy day hats.

We claim that the plastic objects are better for decorating rainy day hats because raincoats are made from plastic.

Q What **question** are you trying to answer? For example, 'What happens to different party decorations when they become wet?'

C The **claim**. For example, 'The objects made of plastic are better for decorating rainy day hats.'

E The **evidence**. For example, 'When we dropped water onto the objects made of plastic, the water rolled off and did not change how the plastic looked or felt.'

R The **reasoning**. How the evidence supports the claim. (Not required at Foundation Year level but in this case: 'We think the objects made of plastic are better to use for decorations on 'rainy day hats' because they do not change or get damaged when they get wet.').

Students need to be encouraged to move from making claims only, to citing evidence to support their claims. Older students develop full conclusions that include a claim, evidence and reasoning. This is an important characteristic of the nature of science and an aspect of scientific literacy. Using science question starters (see next section helps to promote evidence-based discussion in the classroom.

Science question starters

Science question starters can be used to model the way to discuss a claim and evidence for students. Teachers encourage team members to ask these questions of each other when preparing their claim and evidence. They might also be used by audience members when a team is presenting its results. (See PrimaryConnections 5Es video, *Elaborate*).

Science question starters

Question type	Question starter
Asking for evidence	I have a question about _____. How does your evidence support your claim _____? What other evidence do you have to support your claim _____?
Agreeing	I agree with _____ because _____.
Disagreeing	I disagree with _____ because _____. One difference between my idea and yours is _____.
Questioning further	I wonder what would happen if _____? I have a question about _____. I wonder why _____? What caused _____? How would it be different if _____? What do you think will happen if _____?
Clarifying	I'm not sure what you meant there. Could you explain your thinking to me again?

DISCUSSION SKILLS

- 1** Listen when others speak
- 2** Ask questions of each other
- 3** Criticise ideas not people
- 4** Listen to and discuss all ideas before selecting one

Appendix 5

That's my hat! equipment list

[illegible]

Equipment and materials					
stapler	1 per class				•
stapler or self-adhesive tape	1 per class	•			
stapler or self-adhesive tape <i>optional</i>	1 per class		•		
sun hat with a brim	1 per class			•	
text about decorating a hat	1 per class	•			
torch <i>optional</i>	1 per team			•	
Resource sheets					
'Information note for families' (RS1) <i>optional</i>	1 per student	•			
'Information note for families' (RS1), enlarged <i>optional</i>	1 per class	•			
'My hat decoration' (RS2)	1 per student		•		
'My hat decoration' (RS2), enlarged	1 per class		•		
'Sorting hat' (RS3), A3 size	1 per team		•		
'Sorting hat' (RS3), enlarged	1 per class		•		
'Rainy days' (RS4) <i>optional</i>	1 per student			•	
'Rainy days' (RS4), enlarged	1 per class			•	
'Sunny days' (RS5)	1 per student			•	
'Sunny days' (RS5), enlarged	1 per class			•	
'Testing hats' (RS6) <i>optional</i>	1 per student				•
'Testing hats' (RS6), enlarged	1 per class				•
'My party hat planner' (RS7)	1 per student				•
'My party hat planner'(RS7), enlarged	1 per class				•
'My party hat' (RS8)	1 per student				•
'My party hat' (RS8), enlarged	1 per class				•
Teaching tools					
class science journal	1 per class	•	•	•	•
student science journal	1 per student	•	•	•	•
word wall	1 per class	•	•	•	•
team roles chart	1 per class		•	•	•
team skills chart	1 per class			•	•
role wristbands or badges for Manager and Speaker	1 set per team			•	•
Multimedia					
camera	1 per class				•
photos of students' completed hats	per class				•

Appendix 6

That's my hat! unit overview

ENGAGE	SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
	Students will be able to represent their current understanding as they:	Students will be able to:	Students:	
Lesson 1 Daring decorations Session 1 A funny feeling Session 2 My favourite decoration (Optional)	<ul style="list-style-type: none"> describe the properties of different materials that objects are made from using the senses of touch and sight. 	<ul style="list-style-type: none"> represent their ideas about the properties of materials using drawings and oral language. 	Session 1 A funny feeling <ul style="list-style-type: none"> discuss a story about decorating a hat choose and describe different materials from a 'feely bag' Session 2 My favourite decoration (Optional) <ul style="list-style-type: none"> select and describe a decoration. 	Diagnostic assessment <ul style="list-style-type: none"> Class science journal entries Word wall contributions Class discussions 'Our questions' contributions 'My hat decoration' (Resource sheet 2)

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

	SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
	Students will be able to:	Students will be able to:	Students:	
EXPLORE	Lesson 2 Simple sorting <ul style="list-style-type: none">• identify and sort materials into groups based on their properties.	<ul style="list-style-type: none">• contribute to discussions about the properties of materials• contribute a page to a class book on the properties of materials.	<ul style="list-style-type: none">• describe objects made of different materials• work in teams to sort and label a group of objects made from materials with similar properties.	Formative assessment <ul style="list-style-type: none">• Class science journal entries• Word wall contributions• Class discussions• ‘Our questions’ contributions• ‘Sorting hat’ (Resource sheet 3)
EXPLORE	Lesson 3 What if it is wet? <ul style="list-style-type: none">• investigate the effect of water on different materials• make claims about the effect of rain (water) on their party hat and its decorations.	<ul style="list-style-type: none">• record their results in a T-chart• use words and images to record their observations.	<ul style="list-style-type: none">• work in teams to investigate what happens to different materials when they become wet• discuss their results.	Formative assessment <ul style="list-style-type: none">• Class science journal entries• Word wall contributions• Class discussions• ‘Our questions’ contributions• Contribution to class T-chart• ‘Rainy days’ (Resource sheet 4)

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

	SCIENCE OUTCOMES*		LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
	Students will be able to:		Students will be able to:	Students:	
EXPLORE	Lesson 4 Sunny safety	<ul style="list-style-type: none">• classify materials based on the shadows they make• identify materials that might be good for hats worn on sunny days.	<ul style="list-style-type: none">• complete a survey using a table• engage in, and contribute to, discussions about hats for sunny days.	<ul style="list-style-type: none">• discuss why some hats are better to wear than others on sunny days• work in teams to investigate which materials provide more shade.	Formative assessment <ul style="list-style-type: none">• Class science journal entries• Word wall contributions• Class discussions• ‘Our questions’ contributions• ‘Sunny days’ (Resource sheet 5)
EXPLAIN	Lesson 5 Sorting it out Session 1 Testing three hats Session 2 The scientist's suitcase (Optional)	<ul style="list-style-type: none">• predict and explain whether hats are suitable to wear on sunny or rainy days based on the properties of their materials• identify and match materials that have similar properties.	<ul style="list-style-type: none">• contribute to discussions about the properties of materials• follow the rules of a game about the properties of materials.	Session 1 Testing three hats <ul style="list-style-type: none">• predict, observe and explain the properties of three prototype hats based on properties of their materials. Session 2 The scientist's suitcase (Optional) <ul style="list-style-type: none">• play a game where objects are sorted based on a property of the material they are made of.	Formative assessment <ul style="list-style-type: none">• Class science journal entries• Word wall selections and contributions• Class discussions• ‘Our questions’ contributions• ‘Testing hats’ (Resource sheet 6)

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

	SCIENCE OUTCOMES*	LITERACY OUTCOMES*	LESSON SUMMARY	ASSESSMENT OPPORTUNITIES
	Students will be able to:	Students will be able to:	Students:	
ELABORATE	Lesson 6 My marvellous hat <ul style="list-style-type: none"> choose three different properties plan and make a party hat with objects made out of materials that have those properties. 	<ul style="list-style-type: none"> draw an annotated plan of their party hat. 	<ul style="list-style-type: none"> draw a plan to decorate a party hat using objects made from different materials follow their plan to make a decorated party hat. 	Summative assessment of Science Inquiry Skills <ul style="list-style-type: none"> Class science journal entries Word wall contributions Cass discussions 'Our questions' contributions Hat presentations 'My party hat planner' (Resource sheet 7)
EVALUATE	Lesson 7 About my hat <ul style="list-style-type: none"> describe the properties of the objects and materials used to decorate their hats reflect on their learning. 	<ul style="list-style-type: none"> use oral and written language to show their understanding and reflect on their experiences. 	<ul style="list-style-type: none"> describe the properties of the materials of their party hat's decorations compare properties and identify matching descriptions reflect on their learning during the unit. 	Summative assessment of Science Understanding <ul style="list-style-type: none"> Class discussions 'My party hat' (Resource sheet 8) Identifying similar or different hats with peers

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

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?	Package it better		Smooth moves
	Among the gum trees			
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