

Level

F	1	2	3	4	5	6	B6
---	----------	---	---	---	---	---	----

Why materials are used for particular purposes

Strand

Natural and Processed Materials

Key concept

The uses of materials are determined by their properties, some of which can be changed.

Purpose

Activities in this module are designed to help students understand that different materials are used for particular purposes. Students have opportunities to:

- collect information about the various types of materials used for specific purposes;
- look for alternative materials to use in place of purpose-made ones;
- make links between properties of materials and their uses;
- describe the properties of common materials;
- explain how and why the uses of materials have changed over time.

Overview of activities

The following table shows the activities in this module and the way in which these are organised in **introductory**, **developmental** and **culminating** phases.

Introductory ►	Developmental ►	Culminating
Useful materials Material timelines	Building Cleaning Clothing Recreation Sticky glue Water, water everywhere! First aid scenario	Making a water-resistant box



Core learning outcomes

This module focuses on the following core learning outcomes from the Years 1 to 10 Science Syllabus:

Natural and Processed Materials

1.3 Students look for alternative ways that familiar materials can be used.

2.3 Students explain why common materials are used in particular situations.

Core content

This module incorporates the following core content from the syllabus:

Natural and Processed Materials

Natural materials

- organic — plants (wood, fibres), animals (wool, glue)
- inorganic — rocks, minerals

Processed materials

- plastics, salts, synthetic fibres, paper, brick, cement

Uses

- building, tools, clothing, food, cleaning, medicine, recreation

Changes made to properties of materials to meet required uses

Assessment strategy

Suggestions for gathering information about student learning are provided in each of the activities in this module. Once sufficient information has been collected, judgments can be made about students' demonstrations of outcomes. Typical demonstrations of this module's intended outcomes are provided here to indicate the pattern of behaviour to look for when making judgments.

Natural and Processed Materials

1.3 Students look for alternative ways that familiar materials can be used.

Students may:

- describe properties of familiar materials, using appropriate terminology;
- describe various uses of one material and identify the properties that make it useful for that purpose.

Natural and Processed Materials

2.3 Students explain why common materials are used in particular situations.

Students may:

- make links between common materials and their uses;
- explain the properties that make materials useful in particular situations;
- explain how various materials have changed their usefulness throughout history;
- describe the properties of materials that are used in a particular situation, such as building a house.

Background information

Current scientific conceptions

Properties of a material refer to the distinctive attributes of the material. Properties can be observed with the naked eye, by using a magnifying lens or microscope, or by testing and measuring. They are inherent to materials but can be changed in a variety of ways — for example, by combining materials or changing the material's underlying structure. Materials have been processed since early times; they are processed to change their properties.

Throughout this module it is important that students continually make links between the properties and uses of the materials. The property of:

- absorbency is the ability of the material to soak up liquids or gases;
- density is the state or quality of compactness — density = mass/volume;
- flexibility is the ability of a material to be bent, twisted, stretched or rolled;
- solubility is the degree to which a material dissolves and depends on the temperature and nature of the solvent;
- strength is the ability of a material to resist or absorb forces without a change in form;
- texture is the appearance and feel of materials — for example, rough, smooth, sticky, grainy;
- transparency is the ability of a material to transmit light so that objects can be seen distinctly through the material.

The uses of materials refer to common or known uses, as well as past and potential uses. Discussion should include the uses that people from different cultures may make of the material.

Conservation of materials and stewardship of resources is an issue in the management of resources for the future.

Students' prior understandings

Students' prior understandings may differ from current scientific conceptions in a range of ways. Some students may think that:

- familiar materials in their environment are present for their benefit;
- the material is used only for the purpose that the student has always chosen.

Students may never have considered that materials have specific properties or that they can be used for particular purposes.

Teachers could enhance students' understandings by successively presenting a range of scenarios that challenge students' thinking — for example, the use of different materials in different products found in the classroom, home and wider community. Teachers could encourage a diversity of suggestions to enable the students to critically explore their understandings about materials and their uses.

Terminology

Terms associated with natural and processed materials and uses of materials are essential to the activities in this module — for example:

bricks	fabrics	paper	sugar
building	first aid	plastics	tools
cement	food	recreation	water
cleaning	glass	rocks	wood
clothing	glue	salt	
conserve	metals	soap	

Students may already be familiar with some of these terms and understand their meanings and use in scientific contexts. If so, the activities in this module will provide opportunities for them to evaluate current usage. If not, these activities will provide opportunities for students to develop their understandings.

School authority policies

Teachers need to be aware of and observe school authority policies that may be relevant to this module.

Safety policies are of particular relevance to the activities that follow. It is essential that demonstrations and student activities are conducted according to procedures developed through appropriate risk assessments at the school.

In this module, teachers need to consider safety issues relating to use of:

- hot water;
- cleaning agents;
- various glues.

ACTIVITY

Useful materials

Introductory

Focus

This activity provides opportunities for students to understand that different materials are used for particular purposes.

Students use library resources to identify the types of materials illustrated and their uses.

Materials

For the teacher:

- Resource Sheet 1, 'Concept map of objects and materials'

For the class:

- library books illustrating a range of common materials being used in a variety of situations
- butcher's paper and poster pens

Teaching considerations

Organise learning centres where students can browse through library books. Prepare a list of materials illustrated in the books in case students have difficulty identifying them — for example, wood, metal, cloth and glass.

Model the drawing of a concept map for students. Start with 'objects I know' (use Resource Sheet 1 as a guide) and help students focus on materials and their uses.

**Working scientifically**

Time: 40 minutes

Accessing resources
Making links
Suggesting
Explaining ideas and decisions

- ▶ Students help the teacher create a concept map about 'objects I know'.
- ▶ Students form groups at learning centres where they search the library books for pictures of common materials being used in a variety of situations.
- ▶ Students then share their findings from the library books. They identify by name common materials and their uses. Students discuss how they will make a map of the information they have collected from the library books similar to the one modelled by the teacher.
- ▶ In groups, students draw concept maps to help explain the different uses of materials that they have discussed.
- ▶ Students share their concept maps and explain the uses based on the properties of the material — for example, 'We drink water because it is a liquid and it stops us from being thirsty'.

**Gathering information about student learning**

Sources of information could include:

- students' contributions to discussions and their use of terminology;
- students' concept maps and their explanations.

ACTIVITY

Material timelines

Introductory

Focus

This activity provides opportunities for students to explain why common materials have been used in particular situations throughout history.

Students discuss and illustrate uses of materials from historical contexts.

Materials

For the teacher:

- Resource Sheet 2, ‘Uses of materials’
- Resource Sheet 3, ‘Cloze — materials and their uses’

For the class:

- reference materials
- A4 blank paper for illustrating
- felt pens or coloured pencils

Teaching considerations

Allow space for a large display.



The uses of materials, and the materials used for particular purposes, have changed over the years. Some examples are provided on Resource Sheet 2. Ideas from the Resource Sheet could be used to prompt discussion.

About the activity

Cloze is a literacy strategy where text is given to students with parts of the text omitted. Students draw on the meaning of the remaining text to fill in the missing parts. There is not necessarily one correct answer. The exercise can be extended to one where inferences are drawn and generalisations made about the content of the text and the strategies used to complete the task.



Prepare a cloze paragraph that focuses on the materials selected to help students reflect. Prepare it in large print on A3 paper so that it may be used with the class group. Some examples are provided on Resource Sheet 3.



Working scientifically

Time: 60 minutes

Accessing resources
Forecasting and backcasting

▶ Students share their prior knowledge of materials that were used in earlier times. They offer some explanations of why each material was useful.

Making comparisons
Illustrating

▶ Students collect pictures which they annotate with the names of the materials shown, their purpose and why those materials were used for that purpose. The pictures could be of historical or present-day situations.

▶ Students create a timeline around the room using the pictures.

▶ Students discuss how new materials have been developed, often replacing materials previously used for particular purposes. For example, wood was used to make horse-drawn coaches while metal is used to make modern-day cars. Wood is used in older-style houses for window frames while aluminium is used for many modern window frames.

- ▶ Students collate the information they have collected about materials and their properties and uses. The collation could be done as a wall chart, mobile or simple computer database spreadsheet.
- ▶ Students complete a cloze exercise related to their specific observations and discussions.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions and explanations;
- students' annotated pictures;
- students' collation of information;
- students' completed cloze exercises.

A C T I V I T Y

Building

Developmental

Focus

This activity provides opportunities for students to explain why common materials are used in particular situations in building houses.

Students construct and use models of houses.

Materials

For each group of students:

- construction materials to build model houses
- card strips for labels

For the class:

- video clips of house building or a carpenter at work (optional)
- display of building tools (optional)

Teaching considerations

Organise equipment at learning centres that can remain for a period of time.

About the activity

Provide materials for modelling that allow students to reflect their local community housing. Sensitivity to students' circumstances may be necessary when comparing different kinds of housing.

Provide examples of materials and their uses to which the students can respond — for example, 'The walls of the house could be made of sponge'. 'No, because a sponge soaks up the rain and water would come inside the house.'

Organise a display of tools and discuss the display in terms of the properties of the materials used — for example, the builder's level is made from plastic and wood or metal so it is relatively unbreakable and has 'see-through' windows.

Show an appropriate video clip of a house being built to help students link properties of materials with their uses. A video clip from a home improvement show would be suitable.

Some students may not readily differentiate between 'hard' and 'strong' or between 'weak' and 'light'; the specific uses of these terms might need to be discussed.



Safety

Inform students of safe practices when using scissors.



Working scientifically

Time: varied

- Handling materials
- Seeking reasons
- Making comparisons
- Constructing and using models

▶ Students build a model house using available construction materials. They label modelling materials with the name of the material used in a real house, and the reason for its use — for example, concrete needs to be strong to act as a base to hold up the house.

▶ Students discuss the uses of various materials and the reasons for using particular materials. They share explanations of their houses with the class, emphasising the materials, properties and uses.

► Students make comparisons between their models and a real house. They discuss their ideas on ‘houses of the future’ and, considering the demands imposed, suggest possible materials that may be used.



Gathering information about student learning

Sources of information could include:

- students’ contributions to discussions and explanations;
- students’ construction of model houses;
- students’ labelling of models with materials and properties;
- students’ comparisons between model and real houses, based on the properties and uses of construction materials.

ACTIVITY

Cleaning

*Developmental***Focus**

This activity provides opportunities for students to test cleaning materials and to explain why particular materials are used in certain situations.

Materials

For each group of students:

- vinegar
- cake of soap
- laundry detergent
- sand
- sodium bicarbonate (bicarbonate of soda)
- salt
- cooking oil, motor oil, machine oil (any one, or all three)
- kitty litter and sand (for cleaning up oil spills)
- water
- dirty cups or saucepans (crookery smeared with sauce and margarine is suitable)
- chart paper and poster pens
- disposable gloves (optional)

For each student:

- planning and reporting worksheets (see the sourcebook guidelines, appendix 3)

Teaching considerations

Organise work areas outside and close to a water source.

About the activity

Discuss various uses for the materials provided — for example:

- oil stops objects squeaking when they rub together and forms a layer over metals that contain iron, which protects them from rusting;
- soap is a cleaning agent that can also be used as a lubricant.

Use planning and reporting worksheets to help students structure their investigations.

**Safety**

Students should not taste any materials.

Students should identify any materials to which they might have an allergic reaction. Wearing disposable gloves and working in a well-ventilated room may reduce the chance of adverse reactions.



Working scientifically

Time: 30 minutes

- Handling materials
- Identifying variables
- Looking for alternatives
- Creating presentations

- ▶ Students working in small groups discuss the common uses and the properties of the materials provided.
- ▶ Students are challenged to find out which material cleans a dirty item most effectively. They decide whether to dissolve the cleaning material or to use it dry. Students use the planning and reporting worksheets to structure their investigations. They could use a table like the one below to record results.

Comparison of cleaning products

What was being cleaned	Product used	How it was used	What happened
oil stains on cotton	soap	Fabric was rubbed with soap for 30 seconds and rinsed in hot water.	Most of the stain disappeared.

- ▶ After testing, students list the cleaning materials in order from most effective to least effective.
- ▶ Students suggest explanations for the observed results, including variables such as the kind of 'dirt', the amount of 'dirt', and the nature of the object that was 'dirty'. Led by the teacher, they reflect on uses for the materials investigated.
- ▶ Students make charts of other possible uses for the listed materials and display them.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' completed planning and reporting worksheets;
- students' charts about uses of materials.

ACTIVITY

Clothing

Developmental

Focus

This activity provides opportunities for students to explain which properties of common materials make them useful as insulators.

Students test the effectiveness of fabrics as insulators.

Materials

For each small group:

- 4 thermometers
- 4 plastic bottles or beakers
- 3 types of fabric (for example, wool, cotton and nylon) in dark and light colours to wrap around the bottles
- warm water
- notepads and pencils for each group, or a class chart

Teaching considerations

Organise activity in a wet area.

Adjust the times of individual experiments to suit your classroom management.

Ensure students engage in discussion, illustrating, reading and similar tasks in between recordings.

Water at a temperature of 50–55°C will give reasonable results without being a danger to students.

About the activity

Bottles containing hot water can be used to represent human bodies. A fabric covering for these bottles would represent clothing.

Discuss the variables of the experiment and how these may be controlled — for example, the amount of water used, the size and shape of the bottles, fabric size and colour, number of layers of fabric, combinations of fabrics used, and temperature measurement. Discuss with students the use of a 'control' bottle, without insulation, as a comparison.

Negotiate with students the question that they will investigate. The planning and reporting worksheets could be used to help students structure their investigations (see the sourcebook guidelines, appendix 3).

Consider the temperature of the day and its effect on the rate of cooling. The greater the difference in temperature between an object and its surroundings, the faster heat will be exchanged between them. It may be better to do this activity at a cooler time of the day or year.

**Safety**

Use plastic containers in preference to glass.

Dispense hot water for students.

Inform students of safe practices when handling hot objects — for example, walls of unprotected glass beakers filled with hot water may cause burns if students grasp beakers with bare hands.

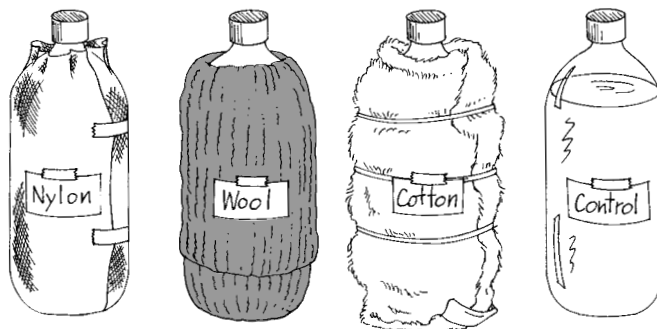


Working scientifically

Time: 45 minutes preparation

- Performing experiments
- Handling materials
- Identifying and controlling variables
- Measuring
- Making comparisons
- Creating tables
- Discussing thinking

- ▶ Students discuss the properties of different fabrics that are used for clothing. They discuss the fabrics that they wear in summer, when they are trying to stay cool, and those that they wear in winter, when they are trying to keep warm.
- ▶ Students discuss their understandings of the term ‘insulation’ and how this relates to reasons for wearing clothes.
- ▶ Students formulate questions related to the effectiveness of different fabrics as insulators. In groups, they select a question to investigate, determine the variables involved and plan their experiments. Students could use the planning and reporting worksheets as a guide.
- ▶ Students carry out the experiments they designed to determine the rate of cooling of warm water in bottles wrapped in different materials. They create a ‘control’ for the investigation by preparing one bottle without a covering.



- ▶ Students draw up a table similar to the following in their notebooks or as a group chart:

Effect of different fabric covers on rate of cooling

Time (min)	Temperature (°C)			
	No cover	Wool cover	Cotton cover	Nylon cover
Start 0				
5				
10				
15				
20				

- ▶ Students compare and discuss their results when the table is complete. They make links between the temperature of the water at the end of the investigation and the effectiveness of the insulating material. The most effective insulation reduced the rate of heat loss. The coolest water was in the bottle surrounded by material that allowed the most heat loss in the time. They infer from the results which materials would be suitable for clothing appropriate for different seasons of the year.

- ▶ Students write an explanation of their experiment, including the inferences drawn.
- ▶ Students describe the properties of the fabric (light, heavy, thick, thin; tightly or loosely woven fibres; colour and lustre) and relate these to its usefulness with regard to particular situations such as seasons. They elaborate on this thinking by extending discussion to other situations where the type of fabric is important — for example, the fabrics used in sportswear need to be light and cool.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' planning of experiments;
- students' written explanations of their experiments, including their findings and inferences.

ACTIVITY

Recreation

Developmental

WHY MATERIALS ARE USED FOR PARTICULAR PURPOSES • LOWER PRIMARY

Focus

This activity provides opportunities for students to explain why common materials are used in particular recreational situations.

Students plan a camping trip.

Materials

For each small group:

- chart paper and felt pens

Teaching consideration

Organise students for small groups or for individual activity.



Working scientifically

Time: 30 minutes

- Making plans**
- Applying ideas and concepts**
- Looking for alternatives**
- Clarifying ideas and concepts**

► The teacher leads students in a discussion of the equipment that they have taken camping or the equipment that they think needs to be taken. They suggest why each piece of equipment is necessary and the characteristics it would require.

► Students plan a camping trip on which purpose-built camping equipment is not used. They improvise using familiar objects in new ways according to the properties of the materials used to make the object. For example, they might use a tin can for boiling water, a bed sheet for a tent and a school bag for a pack. They explain why these alternatives would or would not be useful, with reference to the properties of the substitute. For example, a bed sheet would not make a good tent because it is not waterproof. A tin can could be used as a billy if it had a handle.

► Students share with the class their plans and explanations for the alternatives that they suggested.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions and their suggestions;
- students' plans and explanations.

ACTIVITY

Sticky glue

Developmental

Focus

This activity provides opportunities for students to assess and discuss the properties and suitability of a range of glues for a particular purpose.

Students build a boat from wood and glue and test its water resistance.

Materials

For each small group:

- PVA glue, wood glue (PVA-based), paper paste, flour and water glue, glue stick, glue-gun glue
- beakers
- water
- disposable gloves
- thin flat sheets of wood (such as balsa) and ice-block sticks
- bucket or basin of water

Teaching considerations

Prepare equipment at learning centres in a wet area.



Safety

A glue-gun with an on/off trigger is safest and should be used only by a teacher or other adult. Check available glues for toxicity and other safety issues before use.



Working scientifically

Time: 45 minutes

- ▶ Students discuss the everyday use of each type of glue.
- ▶ Students determine which glues dissolve in water. They then discuss the practicality of using each glue for making a raft or boat.
- ▶ Led by the teacher, students collect information about the specific use of each glue. They make links between the properties of the glues and the uses made of them.
- ▶ Students share their findings with the whole class.
- ▶ Students then build a raft or boat using the glue of their choice. They test the water resistance of their rafts and boats in water and discuss their results.

Collecting information

Designing and performing experiments

Handling materials

Looking for patterns and meanings

Assessing and reassessing

Examining and evaluating

Making comparisons

Discussing thinking



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' investigative and testing processes.

ACTIVITY

Water, water everywhere!

Developmental

Focus

This activity provides opportunities for students to demonstrate their understanding that water can be used for many purposes due to its properties.

Materials

- water and containers
- posters and pamphlets on conserving water

Teaching considerations

Organise the activity in an outside wet area.

About the activity

Give a brief explanation of the water cycle in an age-appropriate manner if it will help students. Consider using resources and choosing issues from water conservation campaigns to support the activity.

Define for students the terms 'conservation' and 'resource':

- *conservation*: the preservation of natural resources so as to keep them available for future generations; to preserve them from loss, decay, waste or injury — for example, water and coal.
- *resource*: a source of supply, support or aid.

**Working scientifically**

Time: 30 minutes

Formulating questions

Playing

Developing possible, probable and preferred options

Reflecting and considering

Discussing thinking

Envisioning alternative futures

► In groups, students engage in investigative play with water and consider the different uses of water because of its properties. They discuss their thinking with the class.

► In groups, students consider the following questions:

- What sources of water do you know about?
- What do people use water for?
- What do we use instead of water?
- What will happen if we do not have clean water for the future?
- Why are dams built?
- Why do some people have tank water?

They discuss their responses to the questions with group members and then list their group's ideas. Students share their ideas with the rest of the class.

► Students reflect on the properties of water that make it a valuable resource.

► Students discuss conservation of water. They explore the meanings of the terms 'conservation', 'conserving' and 'resource'. Students browse through literature describing conservation strategies and issues regarding water.

► Each student makes a statement of how they are going to start or continue to conserve water for the future.

- ▶ Students create a concept map centred around water that links sources of water with its properties and uses, and includes ways of conserving water for the future.



Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' suggestions for future options, reflections about properties and statements on conservation;
- students' concept maps.

ACTIVITY

First aid scenario

Developmental

WHY MATERIALS ARE USED FOR PARTICULAR PURPOSES • LOWER PRIMARY

Focus

This activity provides opportunities for students to demonstrate their understanding that common materials with particular properties can be used to provide novel solutions in unexpected situations.

Materials

- materials for splints (e.g. lengths of wood, sticks)
- materials for strapping (e.g. belts, stockings, pantyhose, T-shirts, socks)

Teaching considerations

In this activity, students consider a situation when first aid is required and suggest ways in which everyday materials may be used for this purpose when conventional materials such as bandages and ice packs are not available.

Invite a guest speaker — for example, nurse, doctor, ambulance officer — to talk to students about their suggestions and offer further ideas and information.

If possible, obtain newspaper articles about emergencies in which first aid was needed. Encourage students to relate these to the ideas and information discussed during the activity.



Working scientifically

Time: 45 minutes

Engaging with problems
Examining and evaluating
Exploring and elaborating ideas

- ▶ Students are presented with a problem and are challenged to find a solution — for example, ‘You and a friend go bushwalking. Your friend falls down, breaks a leg and has cuts and bruises causing bleeding. You are to use only the available materials to give first aid until the rescue helicopter arrives’.
- ▶ In pairs, students think of solutions to the problem and experiment with the materials to test their ideas. They share their solutions with the class.
- ▶ A nurse, doctor or ambulance officer presents various solutions to problems caused by accidents and subsequent injuries, including the one in the problem considered earlier.
- ▶ Students reflect on the solutions presented and state the fact that they think is most significant.



Gathering information about student learning

Sources of information could include:

- students’ contributions to group discussions and creative solutions;
- students’ reflections.

A C T I V I T Y

Making a water-resistant box

Culminating

Focus

This activity provides opportunities for students to apply ideas and concepts as they select and use materials to make a decorated water-resistant box.

Materials

Materials required will depend on the box designs decided on by the students.

Teaching considerations

Organise students to work in groups of three or four to complete a problem-solving task. A suggested task is:

- Construct a box with a decorated lid that will keep the contents dry if the box is immersed in water for at least 12 hours. The decoration on the lid and the structure of the box should be unaffected by the water.
- Evaluate the box using criteria that have been agreed on by the class.
- Present the evaluation to the class.

Questions to assist in determining the criteria for evaluation could include:

- Did the contents of the box remain dry for the full 12 hours?
- Did water enter the box through the material used for its construction, or through the joins, or through crevices between the lid and its seating?
- Was there any buckling or other change in shape of the sides of the box?
- Did the colours of the decoration fade or disappear? Did this happen immediately or did it take a long time?
- Did the decoration soften, dissolve or fall off?

Students who are unable to construct a box could modify an existing box to make it waterproof. They evaluate the modification.



Working scientifically

▶ As a class, students discuss the task and decide on ways of testing the boxes, and criteria for judging the effectiveness of the water-resistant box.

▶ In small groups, students suggest materials that could be used to construct and decorate the box. Questions for discussion could include:

- What properties will the materials need to have?
- What do we know about properties of the materials that have been suggested as suitable for making the box?
- What do we know about properties of the materials that have been suggested as suitable for decorating the box?
- In what situation are these materials being used?
- How do these materials have to be treated to make them waterproof—for example, waxed or painted?
- What could be used to fasten the parts of the box together?
- What do we know about the different glues or fasteners (nails, screws, staples)?

Collecting information

Exploring phenomena

Formulating questions

Handling materials

Making and judging observations

Applying ideas and concepts

Assessing and reassessing

Dealing in an orderly manner with the parts of a complex whole

Examining and evaluating

Creating presentations
Discussing thinking
Negotiating

▶ Students formulate questions to which they need answers and decide how they will find the answers. Working in their groups, students share the tasks of gathering the necessary information. This may involve testing each material for properties that they think will be required. Students report their findings to the group.

▶ Students decide which materials they will use and how they will construct the box. They make the box, test it in the agreed way and prepare an evaluation based on the agreed criteria. They suggest ways in which their designs could have been changed to make them more effective.

▶ The boxes and evaluations are displayed for the rest of the class. The class discusses the results and decides on the best design of a box to meet the criteria. If time and resources permit, this box could be constructed according to this design and then tested.

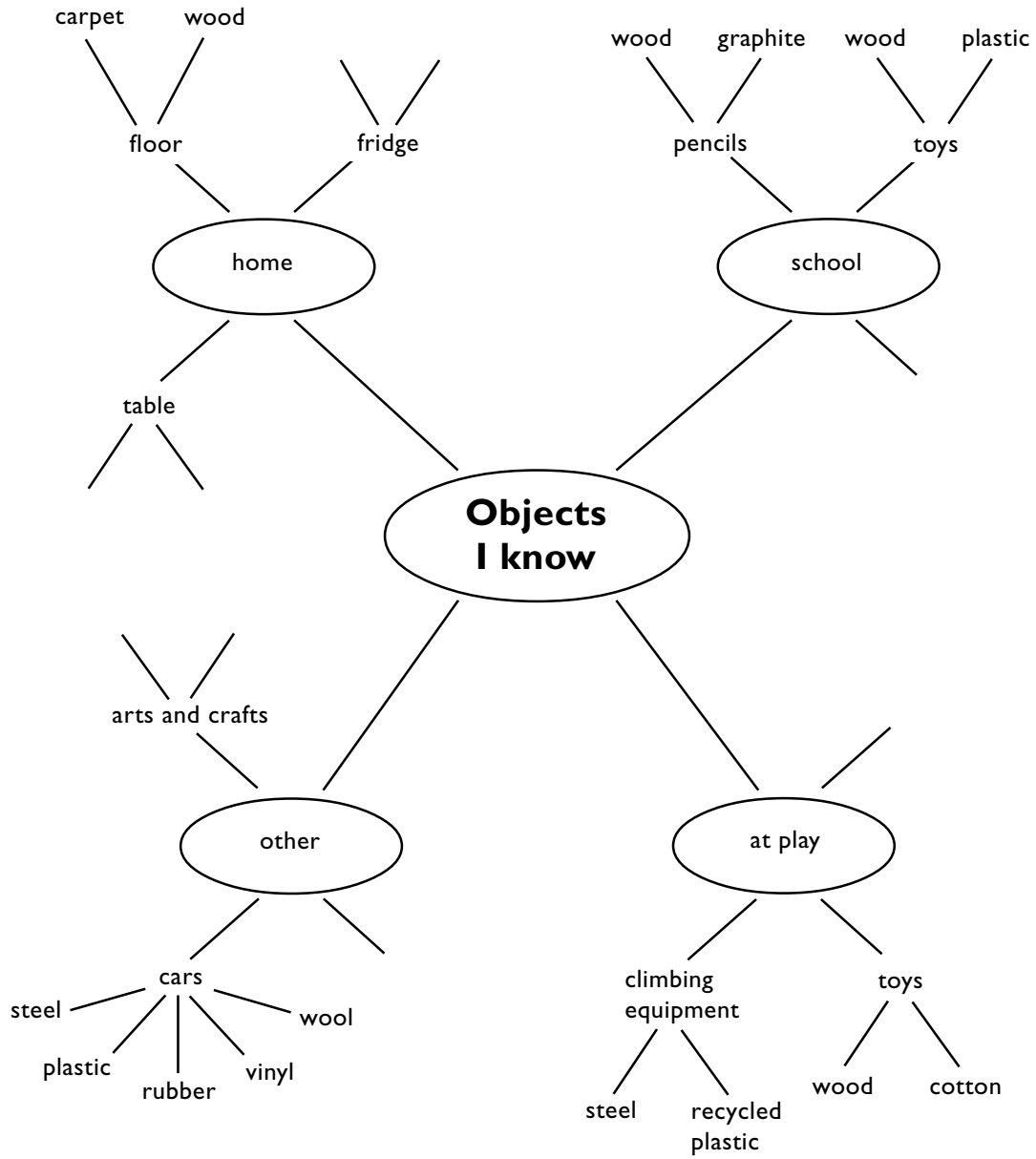


Gathering information about student learning

Sources of information could include:

- students' contributions to discussions;
- students' plans for their products;
- students' testing and evaluation of the products.

Concept map of objects and materials



Uses of materials



The uses of materials, and the materials used for particular purposes, have changed over the years. Some examples, grouped in categories, are provided below. Ideas from this resource sheet could be used by teachers to prompt discussion.

Minerals

- Clays were used to decorate people and places. Clays with different mineral content from different areas provided different colours.
- Some clays were used for medicinal purposes. Kaolin, a kind of clay, is still used to calm some digestive disorders.
- Coal found lying on the surface of the earth was burned to provide heat.
- Metals that softened in fire were used to make strong edges and points on tools and weapons, as well as armour to protect warriors. Today, weapons are likely to be made from one polymer and protective vests from another polymer such as Twaron fibre. Polymers usually have a structure based around carbon or silicon atoms.
- Synthetic fibres are made from petroleum products.
- Early cans were made of tin. Today they are made of aluminium or steel. Many containers are made of plastics which are synthetic polymers.
- Rocks were used in earlier times to make stone axes and spear heads because the rock could be chipped away to form a particular shape and it was hard; today tools are made of metals, synthetic and composite materials.
- Horse shoes were made of a metal easily softened in the fire and shaped. Today horse shoes are made of a different metal that can be shaped by hammering.
- Irons used to smooth out wrinkles in clothes were very heavy and heated on a stove. Today electric irons are heated by electricity, are light by comparison and quick to heat and cool.

Fabrics

- Natural fibres were used for clothing and home furnishings. Fibres such as flax, coconut, jute, hemp, bamboo, cotton, wool, papyrus and felt provided for a wide range of needs. Most are still used today; some are even enjoying a resurgence in popularity and are used both alone and with polymer fibres.
- Cotton cloths were chosen to be wrapped around Christmas puddings before boiling because the cotton 'breathed'. Today such cloths may include synthetics with similar properties.

(continued)

Uses of materials (*continued*)



- Synthetic fibres used today include nylon (the first synthetic polymer to be produced), polyester and Twaron (used in bullet-proof vests).
- Synthetic fibres can be purpose-made because the structure that influences properties can now be manipulated.

Daily life

- Water in streams was used to keep food cool before refrigeration was invented.
- The first refrigerators were large industrial plants, some of which produced block ice that was delivered to households in horse-drawn carts. To delay spoiling, perishable food was stored in the home in ice-boxes containing one or more of these blocks of ice.
- Before pneumatic rubber tyres were developed, the part of a wheel in contact with the ground was made of metal, wood or solid rubber.
- Washing soda, salt and soap were used for washing clothes before detergents were mass-produced.
- Sugar and salt were used as food preservatives for fruits, meats and vegetables.
- People once used make-up and paint with a high lead content. Lead is poisonous and causes a wide range of symptoms depending on the age of the person, the dose and duration of exposure. It can affect most systems of the body. Well-known symptoms occur in the blood, nerve and gastro-intestinal systems and the kidneys. Lead has been replaced in today's products with other colouring pigments.
- Some first homes may have been caves in rock. Then plant materials were found to be useful for home building. Today both plant products and mineral products, usually significantly processed, are the major components of home building materials.
- Skins of animals, feathers of birds, grasses, tree bark and leaves have been important clothing and bedding materials for many cultures.

Cloze — materials and their uses



The following paragraphs may be used as a guide to prepare your own cloze paragraph, based on the activities of your students and the materials they have discussed. These paragraphs have been created to be used as a masked cloze. They can be enlarged on A3 paper for use in a whole-of-class or group discussion.

Features of materials

All kinds of materials are used to make things. The same article made of various kinds of materials can be used for different purposes. Each material has special features that make the objects useful for particular purposes — for example, a coat or jacket made of wool can keep a person warm; a coat made of a plastic material is waterproof and can be used to keep a person dry in the rain.

Sometimes, a material can be used for a variety of purposes. For example, glass can be used for windows because it keeps out rain and wind but allows in light. Glass is also used to make drinking glasses and spectacles.

Building homes

In the past, people have built homes from mud, straw and plant materials; many houses are still built this way. When people learned to ‘fire’ blocks of clay in kilns to make bricks, they found they had a stronger and more lasting material. Today a wide range of synthetic, natural and processed materials is used to build homes. Some kinds of wood and straw are better than others for protecting people from the effects of weather.

Medical materials

The materials used for medical purposes have changed a great deal over the years. Once butter was smeared over burns; now they are treated with cold water, ice and special synthetic dressings. Plaster of Paris was once used to make ‘casts’ (that were moulded around the limb) to immobilise limbs in which bones had been broken. Plaster is very heavy and has to be cut off when no longer needed. Light manufactured synthetic materials have replaced plaster; sometimes the moulds can be removed for therapy and replaced again. Synthetic moulds may even be coloured to your liking.

Acknowledgments

This module is based on material developed by Rita McNaught who attended a module writing workshop organised by the Science Teachers' Association of Queensland and the Queensland School Curriculum Council.

This sourcebook module should be read in conjunction with the following Queensland School Curriculum Council materials:

Years 1 to 10 Science Syllabus

Years 1 to 10 Science Sourcebook: Guidelines

Science Initial In-service Materials

ISBN 0 7345 2094 8

© The State of Queensland (The Office of the Queensland School Curriculum Council) 2000

Queensland schools are permitted to make multiple copies of this module without infringing copyright provided the number of copies does not exceed the amount reasonably required for teaching purposes in any one school. Copying for any other purposes except for purposes permitted by the Australian *Copyright Act 1968* is prohibited.

Every reasonable effort has been made to obtain permission to use copyright material in all sourcebook modules. We would be pleased to hear from any copyright holder who has been omitted.

The State of Queensland and the Queensland School Curriculum Council make no statements, representations, or warranties about the accuracy, quality, adequacy or completeness of, and users should not rely on, any information contained in this module.

The State of Queensland and the Queensland School Curriculum Council disclaim all responsibility and liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs whatsoever (including consequential loss) users might incur to person or property as a result of use of the information or the information being inaccurate, inadequate, or incomplete.

Any inquiries should be addressed to:
Queensland School Curriculum Council
PO Box 317
Brisbane Albert Street, Q 4002
Australia

Telephone: (07) 3237 0794
Facsimile: (07) 3237 1285
Website: <http://www.qscc.qld.edu.au>
Email: inquiries@qscc.qld.edu.au

Illustrations by Stephen Francis

PIP 99160
