YEAR 2
STEM Projects

Science Technology Engineering and Mathematics

(STEM) Projects – Teacher's Guide

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How To Use This Resource

The PALMS STEM projects are designed to be used to either supplement normal science lessons in the Earth and Space Science area or to be used as stand-alone projects with science classes, STEM clubs or extension classes.

This Year 2 STEM Project differs from the PALMS STEM projects for Years 4-6 in recognition of the abilities of younger students. This project is more teacher-guided with some shorter preliminary activities designed to stimulate students thinking about the topic and one longer project. The accompanying Student Booklet provides areas for students to record their findings and results where appropriate for the activities described in this Teacher's Guide.

To assist teachers to introduce students to the STEM Skills they need to be using when working on STEM projects, an accompanying PowerPoint presentation titled 'What do STEM Skills look like?' has been prepared. This can be discussed with the students before starting the main project. It should be reinforced that we are not asking them to think of ways to address the scenarios presented in this resource, but to identify the skills they would use. The STEM skills discussed here align with the WA Department of Education definitions found here: https://www.education.wa.edu.au/what-is-stem-

Students can be asked at the end of the project to identify which STEM skills they have used, to increase their overall understanding of the importance of these skills.

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Products From Our Planet

Introduction

A resource is anything that is useful. This STEM project (also a resource!) is going to concentrate on resources that are provided by the Earth. These are often referred to as natural resources.

Examples of natural resources include water, air, plants, sunlight, animals, soil, rocks, and minerals. A distinction between essential and non-essential resources may be made with essential resources being those that living things cannot exist without. Students can be introduced to these concepts through other learning activities in the PALMS Earth's Resources package.

The topic of using natural resources strongly lends itself to the cross-curriculum priority of **sustainability**. This is reflected in many of the activities included in this project, as are references to where further exploration of Aboriginal and Torres Strait Islander histories and cultures may be included.

Natural resources can be grouped into eight general categories:

- Animals
- Plants
- Water
- Air
- Soil
- People
- Rocks & Minerals (including fossil fuels used to manufacture products such as plastics)
- Energy (including fossil fuels used to generate electricity or petroleum)

Fossil fuels such as oil, natural gas and coal can be placed in both the Rocks & Minerals and the Energy categories as they can be used to manufacture products (e.g., some plastics and synthetic materials) and be burnt for

energy generation (e.g., coal, natural gas and petroleum products). Some teaching resources may consider them as a separate category; however, this resource includes them as mentioned above for simplicity.

Aboriginal and Torres Strait Islander people use their intimate knowledge of the land and living things to carefully manage natural resources. Based on observations of changes in the sky and seasons, they know when it is the best time to harvest or hunt. For example, observations of the position of the constellation the 'Emu in the Sky' would indicate when it was the best time to harvest emu eggs. Some more information and resources about the Emu in the Sky can be found at the following web pages:

- https://www.abc.net.au/science/articles/2009/07/27/2632463.htm
- https://www.abc.net.au/btn/classroom/aboriginal-astronomy/10523908
- http://aboriginalastronomy.blogspot.com/2014/03/the-kamilaroi-and-euahlayi-emu-in-sky.html

Water is such a precious resource in Australia and there are many examples of Aboriginal people protecting water sources from contamination such as by covering rock cavities that collect water with flat rocks or vegetation to prevent animals falling in and fouling the water. In Western Australia, these are rock cavities are known as gnamma holes. The article link below mentions a *gnaama boorna* (a tree with a hole to collect water) near Albany, WA. This is a tree that the local Aboriginal people have adapted to collect water.
Mention of the gnaama boorna is towards the end of the article which also discusses prescribed burning of bushland. Burning of bushland is an example of management of natural resources carried out both before and after colonisation. There is currently discussion as to whether the modern practice of prescribed burning is being carried out too often and should be more closely aligned to the method Indigenous people have previously used.

https://www.abc.net.au/news/2021-02-19/prescribed-burning-under-scrutiny-in-wa-south-west-wilderness/13110150

Aboriginal and Torres Strait Islander people rely on natural resources for survival – to make shelter, provide food and medicine and to make tools. As there are many diverse landscapes and ecosystems across Australia, there are numerous different examples of Indigenous people employing natural resources. Both the gnamma holes and gnamma boorna mentioned above are examples of management and use of natural resources by local people in areas of WA. We suggest researching examples local to your area and perhaps connecting with traditional owners to see if it may be possible to show or explain some examples to students.

Students are increasingly aware of environmental issues through their daily lives and school activities. The 'Three R's' of reduce, reuse and recycle are a simple way to live a more sustainable life. Television programs such as ABC's War on Waste have presented many suggestions as to how to incorporate sustainable practices into both school and home life. Educational resources from the War on Waste program are available online (see below) and whilst they are pitched at students from Year 4 up, some activities could be adapted to introduce younger students to sustainable use of natural resources.

- https://iview.abc.net.au/show/war-on-waste/
- https://www.abc.net.au/cm/lb/9935990/data/war-on-waste-toolkit-pdf-data.pdf

Many local councils also have education programs and staff employed to assist residents with using resources in a sustainable way. Your local council may offer incursions or excursions for students, so it is worth contacting them to enquire.

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There are many opportunities for schools to become involved in programs and initiatives to do with resource use. The Sustainability in Schools webpage run by the Australian Education for Sustainability Alliance contains links to resources and supporting organisations in each state and territory - https://sustainabilityinschools.edu.au/.

This webpage is a good starting point to find programs however, your local council or environmental organisations should be able to provide more information relevant to your area.

This STEM Project is presented as a series of short preliminary activities to spark students thinking about resources and how they are used. A longer project that ties together many of the ideas presented in the preliminary activities is included towards the end of the booklet. Each of the preliminary activities and longer project are designed to be used as standalone resources and can be adapted to suit your students' abilities and requirements. It is up to you if you choose to complete one or all the activities. The accompanying Student Workbook contains some supporting worksheets for activities, where relevant.

We hope you and your students enjoy this PALMS 'Products From Our Planet' resource!

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Short Preliminary Activities

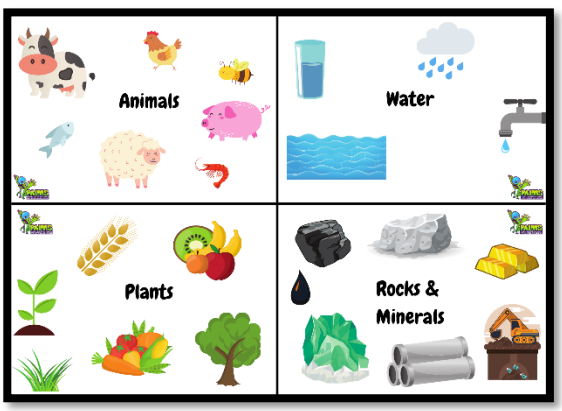
This series of short activities will help students to start thinking about what resources are and how we use them.

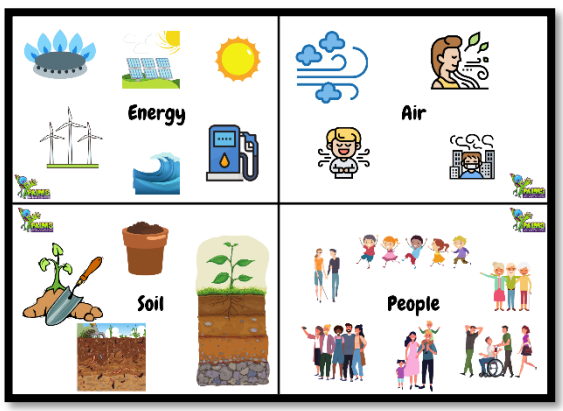
What do you use?

The *What do you use?* matching game asks students to consider what resources they use (based on the natural resources, as defined in the introduction to this resource) in a number of simple scenarios or actions. Teachers may like to print out several sets of the resource cards for students to play with. Or to save resources, the game could be run with a whole class by students putting their hands up or moving to different spots in the classroom to indicate which resources they think are used in a scenario.

There are eight small 'resource' cards and five 'scenario' cards with pictures to prompt students thinking. These cards are shown below and also available in a larger size in Appendix 4 of this Teacher's Guide.

Resource cards:





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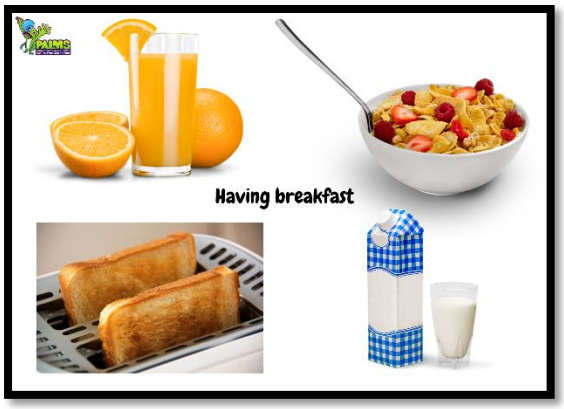
Scenario cards:



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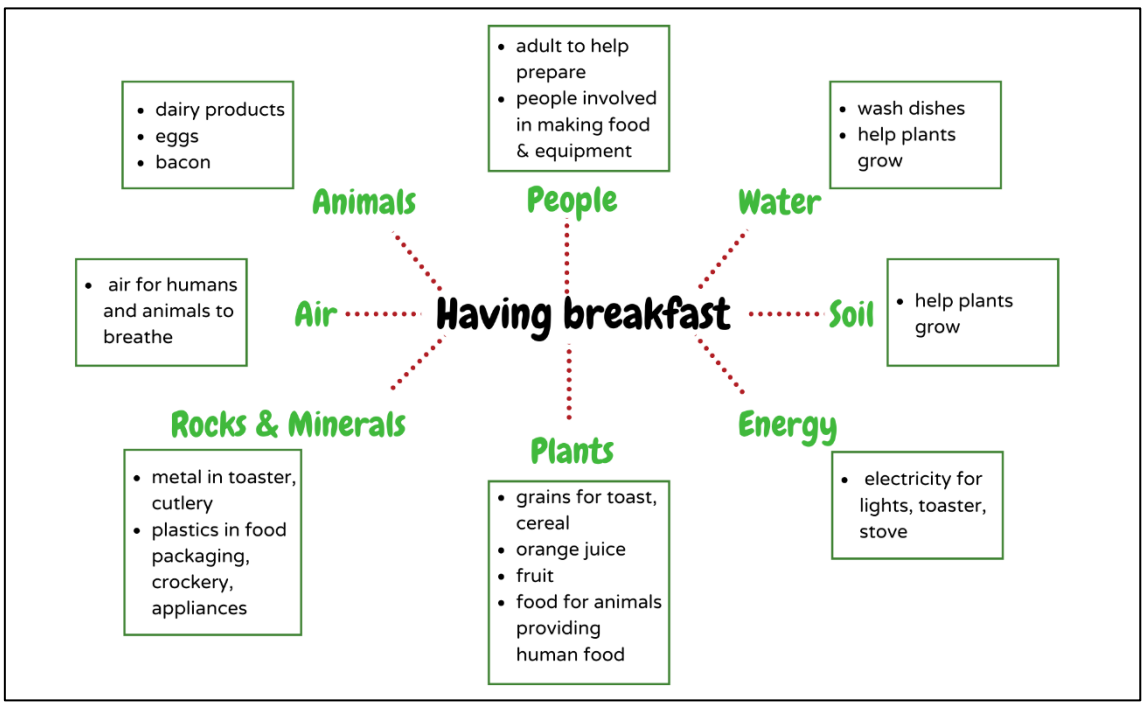
The diagrams below provide some example answers of how resources are used in each scenario, but the lists are not exhaustive, and students are likely to come up with many other answers.



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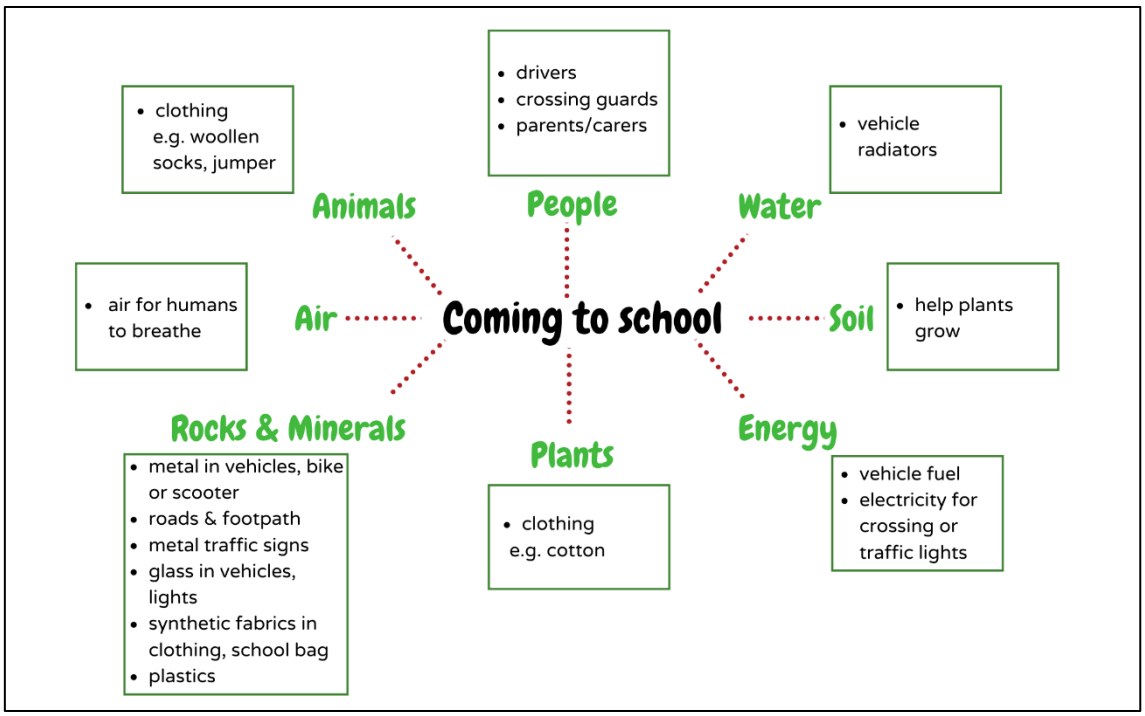

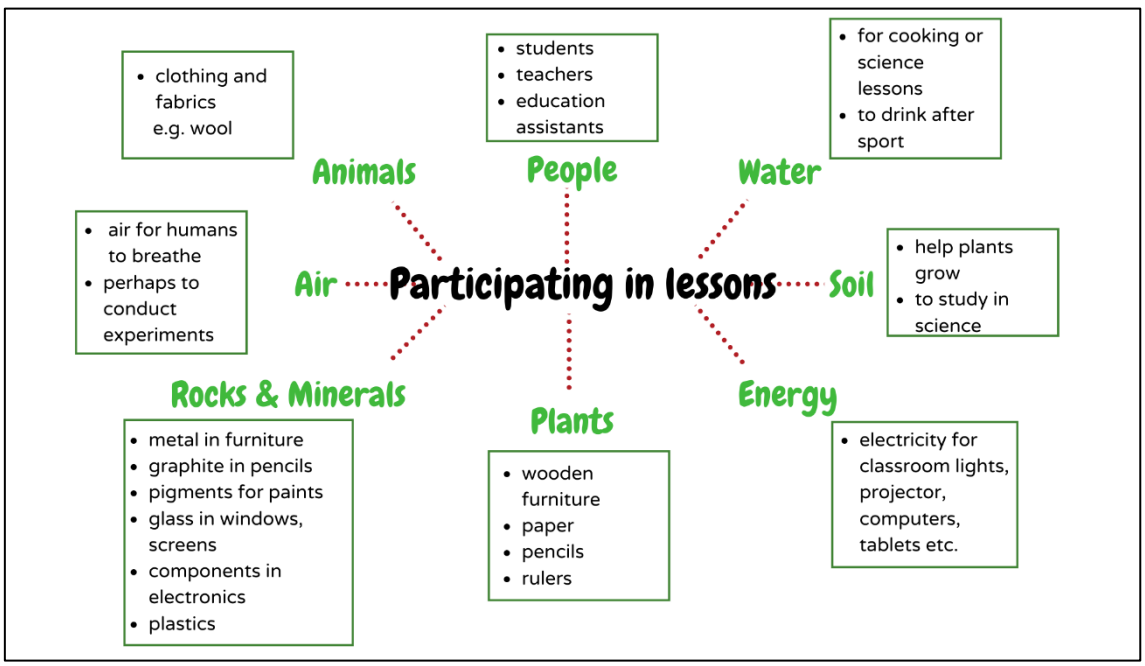

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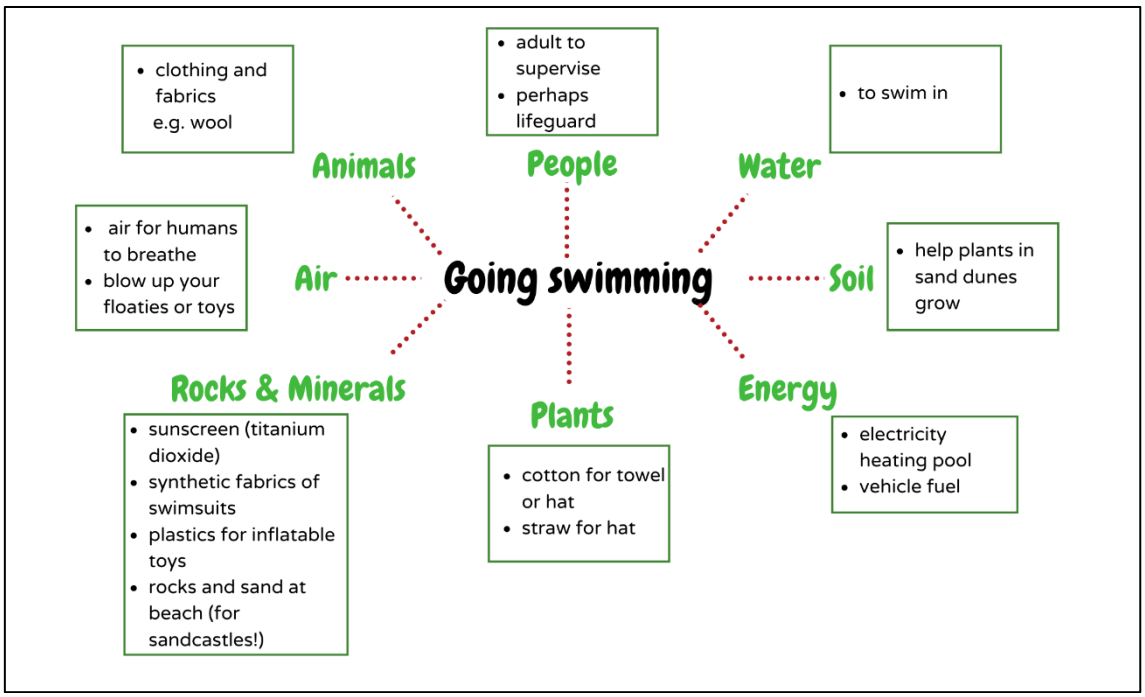

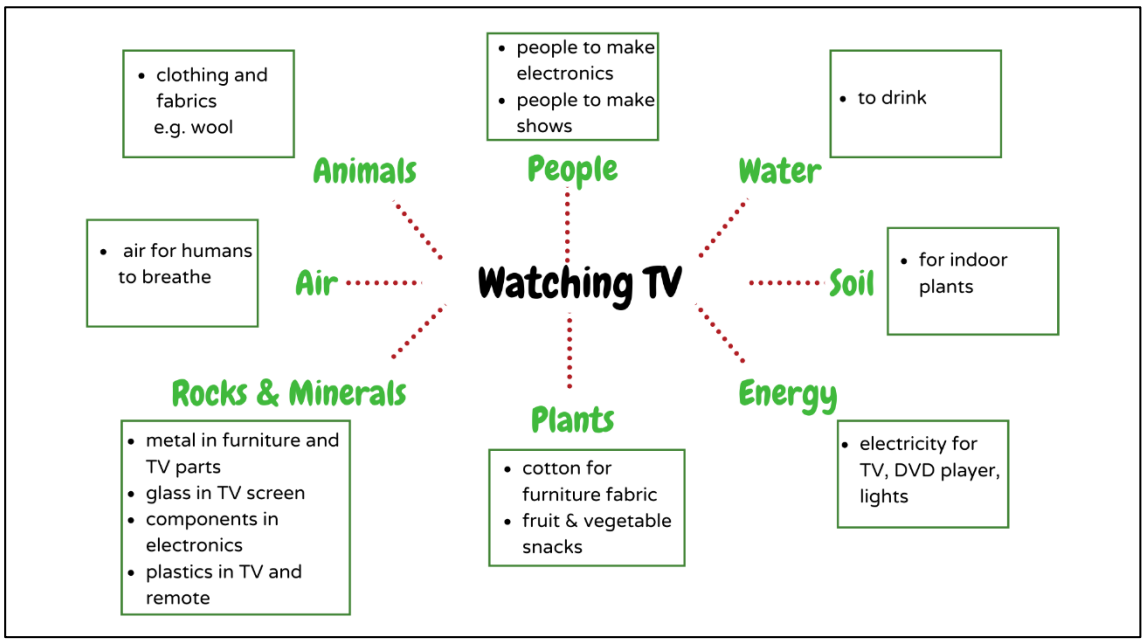

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Where is the Water?

In this activity, students locate different sources of water around the school (or a defined area within the school) and record those locations on a map. Depending on student's ability level, they could be provided with the map or draw it themselves. Students use different symbols of their choice for different types of sources (e.g., drinking fountains, toilets, outdoor taps) to indicate on the map their location.

To extend this activity, discuss with the students how the water from these different sources is used (e.g., for washing, for drinking etc) and if the use defines where the sources are located (e.g., outdoor tap is located close to a garden bed to make it easy to water plants). Make a count of how many sources are available for each use.

Another possible extension activity is for students to survey each other or other classes about how many times they use the different water sources each day. Students could ask questions such as: How many times do you flush the toilet? How often do you fill your water bottle at the drink fountain during the day?

Possible discussion questions:

- Why is there more than one tap in the student toilets or more than one tap at the drink fountain?
- Is the tap the gardener uses to water the plants in a convenient place?
- Why is the urn in the staffroom placed up high?
- Why are the drink fountains under the verandah instead of in the middle of the playground?

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Some other teaching resources on the topic of water resources that may be of use are listed below.

- WA WaterCorp classroom resources including videos, worksheets and virtual tours of desalination and water treatment plants https://www.watercorporation.com.au/Education

- WaterNSW classroom resources including videos and activities https://www.waternsw.com.au/water-quality/education/learn

- NT Power & Water Corporation (PowerWater) classroom resources including videos (with Baker Boy!) and activities. There is also, a link to resources designed for remote communities on this web page https://www.powerwater.com.au/about/community/thats-my-nt-water-story

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Reusing Vegetables

What do you do with the tops of your carrots or the bottom of your bunch of celery? How about those seeds in your capsicums or chillies?
Did you know that you can grow new vegetables from many of these scraps that would normally be discarded? This activity will explain how to do this.

There are several different methods of growing some vegetables and fruits from scraps. Some fruits and vegetables will give very fast results and others much slower, such as pineapples which can take 18 months to grow new fruit! A range of different methods are suggested below along with some examples you could try with students. Many of these methods start the growing process in water but plants need the nutrients that soil, another natural resource, provides to continue growing so you'll need to have a garden bed or pots prepared to grow new fruits and vegetables to consume.

Tips and tricks

- Sweet potatoes are probably the easiest to grow and are most reliable in sprouting – some others may require more trial and error.

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- Monitor and change water regularly to prevent the vegetables and fruits from rotting or attracting pests.
- The fresher the vegetable or fruit scraps are, the more likely they will successfully grow so you will have the most success when they are sourced directly from the garden.

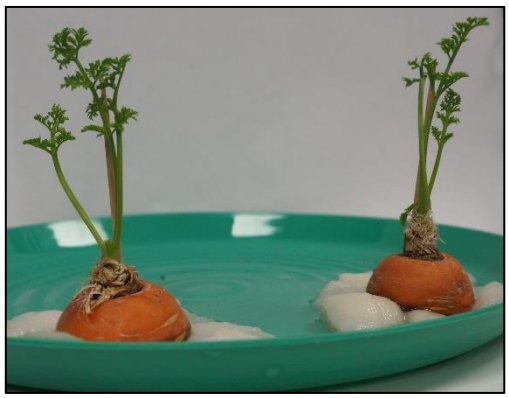
<u>Growing from tops of fruit and vegetables</u>

What you can grow:

carrots, parsnips, beetroot, swede, radish, pineapple (if you are patient!)

Method:

Retain the tops (where the leaves sprout from) and place in a saucer of water. To help retain moisture, you may like to place the tops on some cotton wool or paper towel.



Place in bright, indirect sunlight and top up water daily, keeping the top moist. Green tops will grow in a few days then small fibrous roots may also appear.

When the roots appear, or after the green tops are a reasonable size, transfer to soil and allow a new vegetable to grow.

If you are trying a pineapple top, it will take around 18 months to produce new fruit.

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Growing from collected fruit (and vegetable) seeds

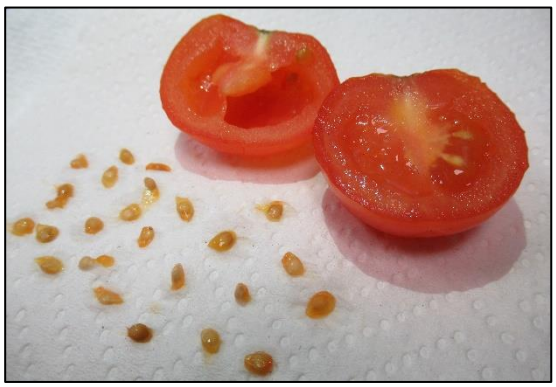
What you can grow:

tomatoes, capsicum, melons, pumpkins

Will take much longer to produce fruit – oranges, avocados, limes, grapefruit

Method:

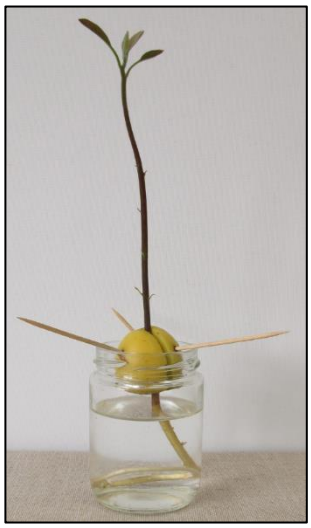
Collect and dry the seeds from ripe fruit on some kitchen paper. Plant in soil once dry and allow to grow.



Timeframes for new fruit production will vary.

For avocados:

Push 3 toothpicks into the clean seed, spaced at intervals. Suspend the seed in a container of water using the toothpicks resting on the edge of the container to hold the seed half in, half out of the water. Change the water daily. The seed will crack then sprouts and roots will form. The sprouting seed can then be planted however, it needs to grow into a tree (of which you will need two) and to wait around 7 years before new fruit is produced!



It is worth noting that many foods we consider vegetables are in fact fruits. The scientific definition is quite complicated but in simple terms, fruits are the fleshy structure of flowering plants that hold the seeds so things like cucumber, capsicum and pumpkin are truly fruits, not vegetables!

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Growing from bulbs or bottoms of vegetables

What you can grow:

celery, bok choy and similar leafy greens, onions, garlic, leeks, cabbage, spring (green) onions, lettuce (if roots intact)

Method:

For celery, cabbage and bok choy, retain the intact base (where the sticks or stems join together as shown in the photos).

Onions, garlic, leeks and spring onions can be grown from pieces, as long as it is the bottom pieces from where the roots usually grow.

Put the base upright in a container with enough water to keep the bottom wet. The onion-type vegetables need to sprout and form roots before they can be transferred to soil. Celery, cabbage and bok choy will start producing shoots or leaves within a few days, after which they should be transferred to soil (see photo below).

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Growing from herb cuttings

What you can grow:

mint, oregano, basil, thyme, rosemary (a little more difficult)

Method:

Cut a piece about 10cm long from the top of the herb stem, cutting just under a point where a leaf joins the stem. Remove the leaves towards the bottom of the stem and put in a glass or jar of water (so no leaves are in the water).

Change the water daily and when roots start appearing, transfer to soil.

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Growing from whole vegetables or pieces (tubers and rhizomes)

What you can grow:
sweet potatoes, ginger, yams

Method:
Place a piece of fresh ginger root (more correctly named a rhizome) with the skin on under a thin layer of soil in a warm, moist spot. Pieces with lots of growth buds (little horn-like lumps) will grow best in either pots or garden beds.

Sweet potatoes and yams should be started in water first. Suspend the potato or yam in a jar of water using toothpicks (shown in the photo) and wait for shoots and roots to develop before transferring to soil. If left in the perfect spot, the sprouts will get long quite quickly as shown in the photo below!

NOTE: Whilst you may be tempted to plant those old potatoes which sprout in your kitchen before you have had a chance to cook them, our research found this is not recommended. These potatoes can be highly susceptible to

diseases that will affect soil for a long time, or they may also be sprayed with a growth retardant. The special seed potatoes you can purchase from garden centres are a much better option if you want to grow potatoes.

Some discussion questions you might like to ask students:

- What resources have been used to grow the vegetables and fruits?
- What else could you do with the vegetable scraps? For example: compost them or feed them to chickens or pets
- Could you use these methods of growing vegetables to produce enough for your whole family to eat?

Another quick activity to try related to vegetables is to stand some celery stalks with leaves still attached in some water containing food colouring. It is best to make a strongly coloured solution using highly contrasting colours such as blue and red. Very fresh celery will give the best results.
After a few hours, you will notice the leaves of the celery starting to change colour. If you slice through the celery stalk you will be able to see how the coloured water has been transported through the 'veins' in the celery. White flowers such as carnations or daisies may also be used in place of the celery.
This demonstrates to students that plants transport their water and food (nutrients) around just like our body does to make sure all parts get what they need to survive.

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Recycling

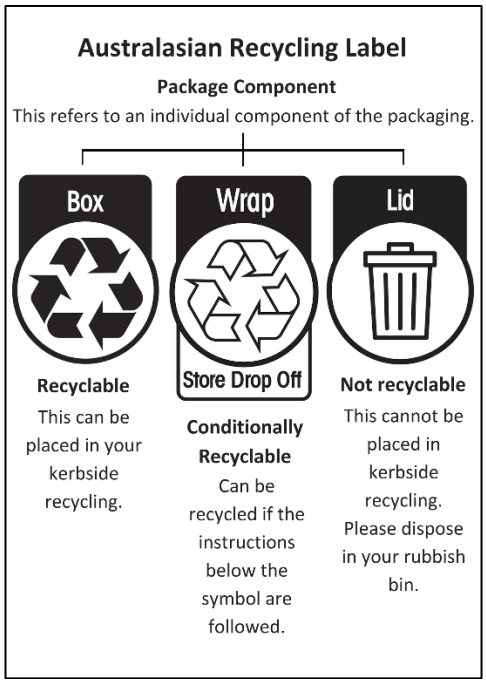
Recycling levels in Australia have significantly improved in recent years. Government and environmental organisations are always looking for ways to improve recycling even further through providing education, services and infrastructure.

Have you seen the symbols on plastic items that have a number inside triangular shaped arrows such as in the photos below?

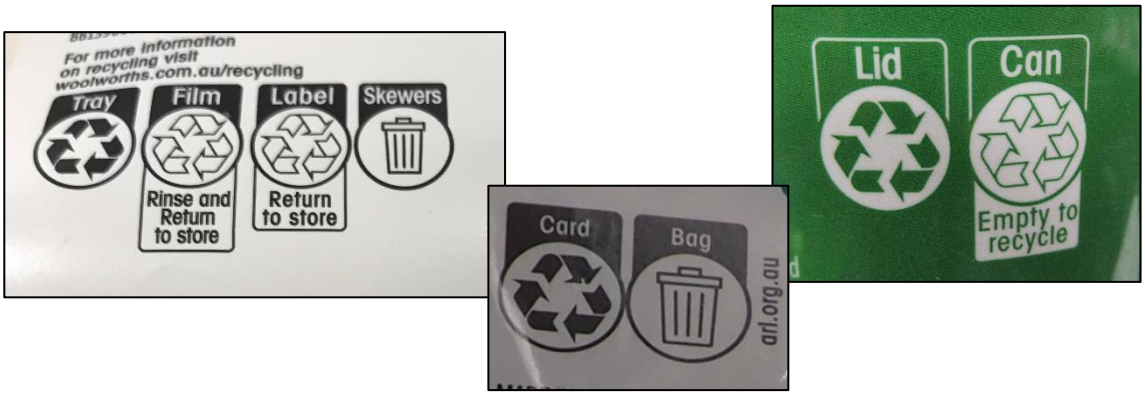
This is the American Society for Testing Materials International Resin Identification Coding System (abbreviated to RIC) which has been used since 1988 to identify the type of polymer plastic products are made from. There are 7 different RIC symbols, like those shown above, where the numbers represent different polymers used to make plastic. Polymers are useful chemicals made up of large molecules that can have different properties meaning they will need to be recycled differently. Since recycling capabilities vary so much by country and even by local council, the RIC system was designed to help consumers and recyclers identify which plastic could be recycled and how to recycle or dispose of them.

In 2020, a new labelling system for packaging was introduced in Australia

and New Zealand. The Australasian Recycling Label (ARL) aims to make it simpler for consumers to recycle both plastic and other packaging materials in the correct way. It is based on three types of symbols as shown in the graphic below. Businesses voluntarily opt to put the symbols on their packaging.



You may have noticed this on some packaging like the examples shown below.



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Recycling the Australasian Way

For this activity, students are asked to find examples of ARL symbols at home or in stores that they can either bring in to class or photograph.

On the worksheet in the Student Booklet, students can tally how many examples of each symbol they found and draw some examples. The collection of items brought into school could then be separated and sorted for recycling or disposal, demonstrating this process to students.

Students can then choose one of the items collected, draw a picture of where they found the symbols on the packaging and record where the container or packet should be put to recycle or dispose of it.

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Possible extension activity

An extension to this activity is to examine packaging not labelled with the ARL symbols and suggest how they should be labelled. Numerous resources about the ARL system, appropriate to use in the classroom, including videos, worksheets and posters can be found on the Planet Ark- Recycling Near You web page https://recyclingnearyou.com.au/arl/ . Students may like to design their own posters or other ways to educate their school about recycling.

For those items not accepted by council recycling programs, this web page contains information on alternate ways to recycle https://www.terracycle.com/en-AU/brigades

This activity could also be linked to the container deposit schemes across the country. As of early 2021, Victoria and Tasmania were still developing their schemes. Interestingly, South Australia's scheme has been in operation since 1977!

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Information about schemes in each state and territory can be found at the following web pages:

- South Australia https://www.sa.gov.au/topics/energy-and-environment/recycling-and-waste/container-deposit-scheme
- Northern Territory https://envirobank.com.au/bottle-and-can-recycling-northern-territory/
- New South Wales https://returnandearn.org.au/
- Queensland https://www.containersforchange.com.au/qld/
- Australian Capital Territory https://actcds.com.au/
- Western Australia https://www.containersforchange.com.au/wa/

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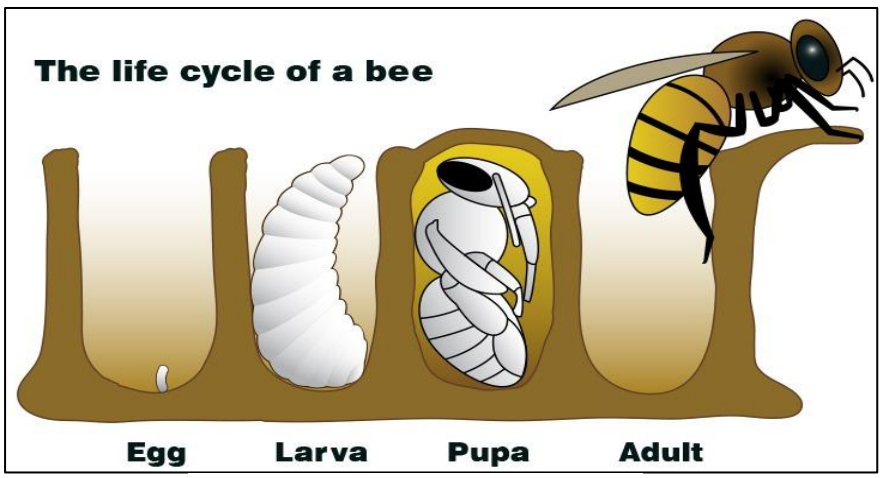
Resourceful Bees

Bees are fascinating insects that work very hard to collect and manufacture resources for themselves. Some of these resources are very useful for us also! There are many species of bees, including native Australian bees, which may have specific habits and characteristics. To keep things simple, this activity will use a generic species of bee, closely linked to honeybees.

This activity starts by introducing students to the life cycle of a bee which fits well into the Biological Sciences curriculum. There are many life cycle diagrams available from the internet or other sources, including the example provided below. Students can draw their own on the worksheet included in the Student Booklet which includes space to record other information about each stage.



Bee eggs are tiny and usually hatch about three days after being laid. The larva that hatches from the egg grows and develops into a worm-like grub without eyes or legs. Here is where the life cycle gets a little complex.

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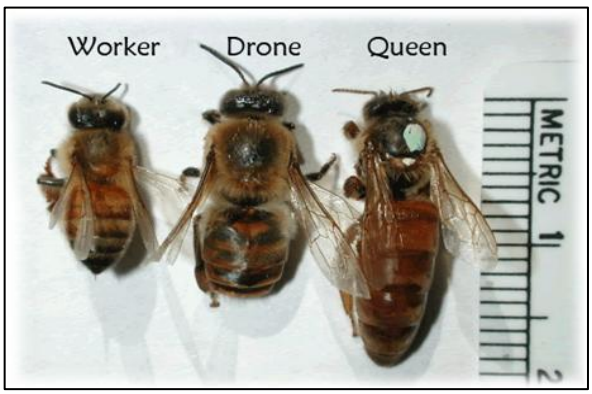
There are three kinds (castes) of bees that each fulfil different roles – the queen, worker bees and drones. During the larva stage of the bee life cycle, the role that the bee will have is decided.

- There will only be one **queen** bee in a hive, larger than the others, the role of this female is to lay eggs to populate the hive. The queen develops from larva that is fed on a diet of only royal jelly and will progress to the pupa stage after about 7 days.
- **Worker** bees are small, non-egg producing females that, as their name suggests, work to construct the hive, collect pollen and make honey. Worker bee larva are initially fed on a diet of royal jelly for two days, then switched to a diet of honey, water and pollen, progressing to pupa after about 8 days.
- **Drones** are male bees whose role is to mate with the queen. Larva that will become drones are also fed royal jelly for the first two days then honey, water and pollen, progressing to the pupa stage after about 9 days.



During the pupa stage, the body will develop into three distinct segments and eyes and legs develop. The pupa of queen bees will take about seven days to become a fully grown adult, worker bees will take about twelve days and drones about fourteen days. In a honeybee hive, there will be one queen, between 100-500 drone bees and 10,000-50,000 worker bees. You see the worker bees flying around outside the hive.

If you'd like to find out more about native Australian bees, further

information can be found on these web pages:

- https://blog.csiro.au/can-you-beelieve-our-guide-to-native-bees/
- https://www.aussiebee.com.au/beesinyourarea.html#locationtable

There is also a fascinating story behind an Australian invention the 'Flow Hive' which is a great link to Science as a Human Endeavour. More information on this innovative beehive that collects honey with less harm to both bees and apiarists (people that keep bees) can be found here: https://www.honeyflow.com/pages/about-us

Bees not only provide resources for themselves, but also provide humans with food (honey) and wax. Beeswax comes from the hexagonal cells that worker bees make honey in and can be used to make candles, as a lubricant, to polish wood, in cosmetics and to waterproof materials such as fabric.

Make Beeswax Wraps

A fun activity for students to do is to make beeswax wraps. These use bees' wax to waterproof cotton fabric. Beeswax wraps can be used to wrap food or cover containers, as a great, environmentally friendly alternative to plastic wrap.

Materials

- Fabric pieces (cotton or cotton blends)
- Scissors - use pinking shears if available to cut zigzag edges on the fabric to prevent fraying
- Beeswax – available from hardware stores, craft stores or online in blocks or pellets (check it is safe for use with food). One 30g block makes around three 15x15cm wraps
- Grater – used to grate wax block
- Electric frypan. You can also use a slow cooker or heatproof bowl over a saucepan of hot water. You may like to use an alfoil tray within the frypan or slow cooker to make it easy to clean up. Another

alternative is an alfoil tray placed on an open sandwich press.
- Tongs
- Coat hangers – one per student
- Pegs - two per coat hanger
- Rack to hang finished wraps on to dry. Something like a broom handle between two chairs would be suitable.
- Newspaper

SAFETY NOTE – As this activity uses **heat** sources, students should be carefully supervised. Additional adult help is recommended. Also check for any allergies to beeswax before commencing. Please note that beeswax is **flammable** so gas flames **should not** be used.

Materials

1. Wash and dry fabric before starting to prevent dyes running. Iron the fabric as this gives the best result.

2. Cut the fabric into the desired shape and size, one piece for each student. As mentioned above, pinking shears will give a zigzag edge that helps prevent fraying.

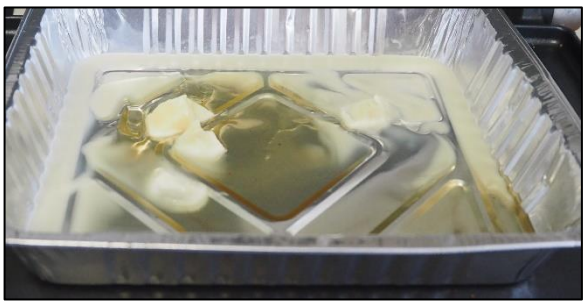
   The size will depend on what you want to use the wrap for. For example, a wrap needs to be about 30cm x 30cm to wrap a sandwich well, however, smaller wraps are useful for wrapping biscuits or small snacks.

3. Set up the drying area for the finished wraps, placing newspaper under the rack being used to put hangers on with drying wraps.

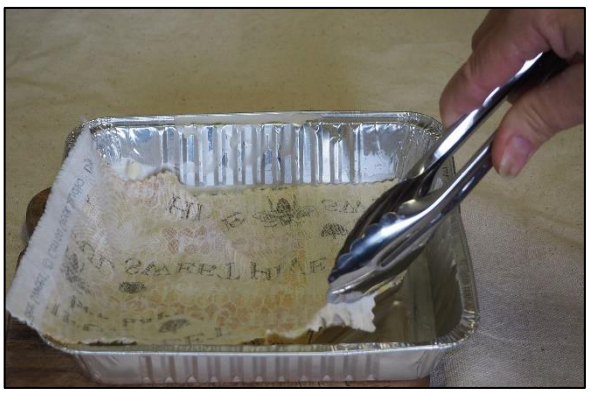
4. Cover a table with newspaper and set up the electric frypan or other heat source, ensuring the cord isn't a trip hazard. Have the tongs, coat hangers and pegs close to hand before starting and a clear path to the drying area.

5. Supervise students to grate the wax which can then be placed in the foil tray or directly into the frypan.

6. **(To be done by an adult)** Melt the wax using a low-medium heat setting on an electric frypan. Ensure students are supervised if they are near the frypan. Note that the wax needs to be deeper than in the photo.



7. Once the wax is fully melted, ask students to bring up their piece of fabric, one at a time and dip the fabric into the liquid wax, using the tongs to fully submerge it, allowing it to absorb the wax. An adult should assist students to dip



the fabric, ensuring they do not touch the hot frypan or wax.

8. Remove the fabric from the liquid wax using tongs, allowing excess wax to drip off (ensuring students are standing back).

9. Carefully peg the wax wrap onto the coat hanger and ask the student to place the hanger on the drying rack. Any remaining wax will drip onto the newspaper under the rack. The wax will cool and firm up within a few minutes but will remain flexible.

10. The wraps will be ready to use in less than an hour.

Alternative Method

If an electric oven is available:

1. Follow steps 1-3 as above.
2. Prepare pieces of stiff cardboard and baking paper slightly larger than the size of your cut fabric.
3. Preheat oven to 220°C.
4. Student should spread grated wax over the fabric as evenly as possible.
5. Carefully slide the fabric and baking paper onto an oven tray. The piece of fabric should not overhang the tray.

6. An adult can then place the tray into the oven for 1-2 minutes until

the wax melts.

7. Carefully remove from oven and allow to cool enough to be touched then peg onto coat hanger and hang until completely cool.

Hints and tips

- If the wax is uneven or lumpy you can iron the wax wrap between two sheets of baking paper. This will re-heat the wax and help spread it more evenly.
- If the wax becomes cracked with use over time, you can refresh the wrap by ironing as mentioned above. If there are sections of wax missing, you can grate a small amount of solid wax to fill the gap and iron to melt it.
- Some methods will add oils such as jojoba or coconut oil to the melted wax to help the wraps be more flexible. These are not vital and add to the cost, so we have not included them for simplicity. An internet search will show you many methods with the quantity of oil required if you wish to include it.
- Another ingredient that some methods add is pine resin. This will assist the wrap to stick to itself or to a container, to seal it, but again is not vital. An elastic band or something to tie the wrap will work just as well.

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Make Your Own Paper

The use of digital technology in classrooms has started to change how much wastepaper is generated, however, a lot still ends up being discarded. A fun, if slightly messy, way to reuse some of this wastepaper is to make your own recycled paper.

This activity could be quite time consuming so, we suggest combining it with an art lesson and bringing in additional adults to help.

Materials

- 2 wooden photo frames (size of frame determines finished paper size)
- Piece of flywire to cover back of frame (sold by the metre at hardware stores)
- Staple gun
- Sponge
- Old towels
- Blender
- Scrap paper – different colours will give interesting effects. Ensure there are no staples, cardboard or plastic envelope windows.
- Bucket
- Crate or deep tray
- Water

Optional

- Chopping boards or flat trays to transport wet paper sheets
- Pieces of fabric to dry paper on. Tea towels work well.
- Lengths of cotton, dried flowers or leaves to add to paper

NOTE: Flywire can be fibreglass or aluminium. Our testing found aluminium easiest to use as the fibreglass tended to stretch. However, be careful of sharp metal edges and wires with aluminium flywire.

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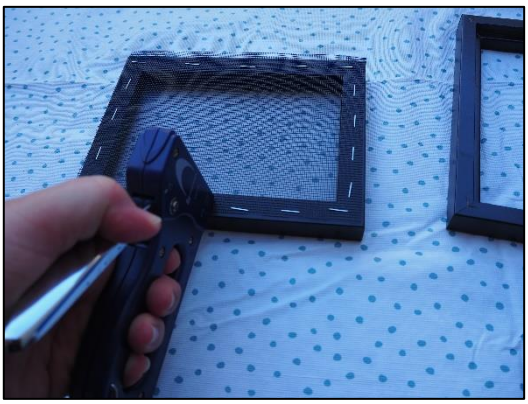
Method

Make mould and deckle from the photo frames **(to be done by adult):**

1. Remove back panel and glass or clear plastic from both frames.
   SAFETY NOTE – be careful of sharp edges of glass. If present, remove or bend metal tabs on back of frame with plyers so they are not sticking out.

2. Across the back of one frame, place flywire and use the staple gun to secure in place, ensuring it is held taut - this is your deckle. Leave other frame blank – this is your mould.



Make paper:

1. Tear up scrap paper into small pieces or use shredded paper. Put paper pieces in bucket, cover with plenty of water and soak overnight.

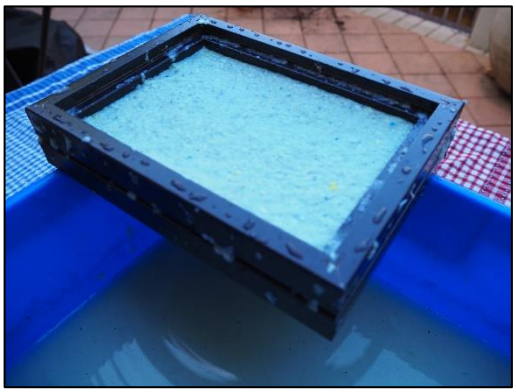
2. Prepare your work area (outside or classroom wet area is ideal), spreading out the towels where the new paper will be dried.

3. Add small batches of soaked paper to blender with some water (approx. 1 part paper to 3 parts water) and blend to smooth pulp.

4. Pour pulp into crate or deep tray. Add water to crate or tray, if needed, so pulp is very mobile. At this stage you could add in any cotton, dried flowers or leaves you might like to include in the paper.

5. Place two frames together, with the flywire side in the middle and the mould on top.

6. Holding the two frames firmly together, submerge into the tray of pulp and scoop up enough to cover flywire, ensuring it is not too thick. For students carrying out this step, you might like to use a large bulldog clip to keep the mould and deckle together. Shake to level the pulp out and drain excess water.

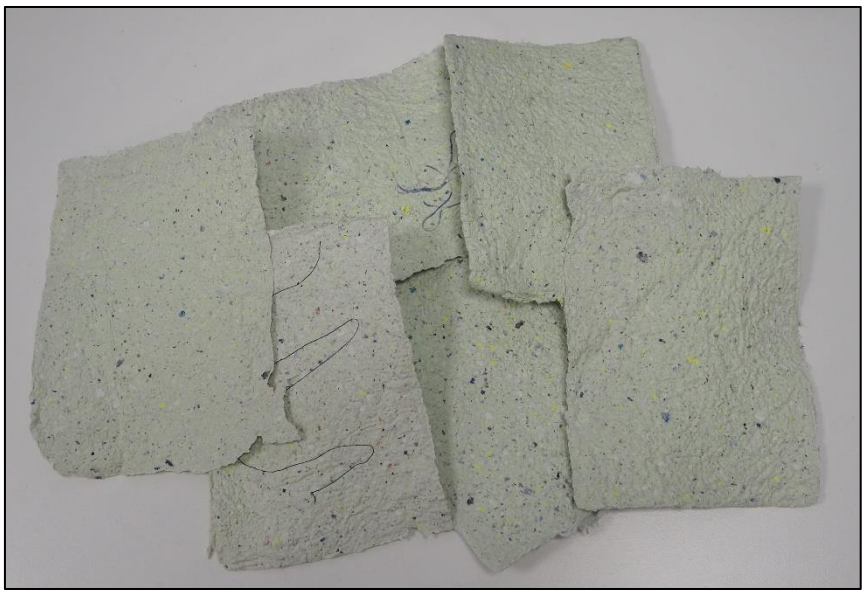


7. Gently press the sponge onto the paper pulp in the mould to remove more water. If you press too hard, the pulp will stick to the sponge. Remove top frame (mould), leaving pulp on the flywire of the deckle. Use sponge to gently remove more water.

8. Carefully turn the deckle over onto the towels and peel new paper off, ensuring the towels do not have any wrinkles (if using pieces of fabric, peel new paper sheets off onto fabric before placing onto towels). Another way to decorate your paper is to press objects into the wet paper such as large leaves or other shapes to leave an imprint.


9. Leave paper sheets to dry in sun on towels then slowly peel paper from towel or fabric.


This paper can now be used to write on or for art and craft projects, such as card making.



Hints & tips:

- Some textas or paints may bleed into the recycled paper.
- Certain types of sponges may stick more to the paper pulp so test carefully before using. Pressing the water out also helps to compress and bind the paper pulp.
- If the wet paper sheet sticks to the deckle, you may need to gently lift the edge of the paper with your fingernail to encourage it to peel off.
- To dispose of water containing left over paper pulp, pour the water through an old stocking to catch the pulp (otherwise it may clog drains).

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Longer Project - Resources I Use

This project is designed to get students consolidating what they have learned in some of the shorter activities and communicating their ideas.

Students track what resources they use in a set time period, perhaps creating a tally using the categories as defined in the *What Do You Use?* game. A suggestion is asking students to track all the resources they use from the time they get up to when they come to today's lesson.

Students should also note which recycling symbols they see on the resources they use and note how they dispose of any waste generated. Encourage students to take photos or sketch diagrams where possible. A suggested worksheet is included in the Student Booklet.

Ask students to choose one of the resources they used at school and a second one they used outside of school time. They should think about these two resources, answering the following points:

- Which category does the resource come from – animals, water, plants, rocks & minerals, energy, air, soil or people?
- Could this resource be reused or recycled?
- If there was packaging with the resource, did it have any of the ARL symbols on it?
- What did you do with this resource once you had finished with it? How did you dispose of it or any waste left over? How did you know what to do?
- Is this resource easy to get? Is there a lot of it or is it rare?
- Is this resource expensive?
- Was there a different resource you could have used instead? What was it?
- Any other interesting facts people might like to know about these resources.

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To conclude the project, students can then create an informative presentation* on these two resources, educating others on where they come from and how to treat them after use (e.g., recycling correctly)

* The presentation can be in any format the student or teacher chooses. Examples include written reports, posters, comic strips, videos, animations, skits or an assembly item. There are many apps that can be used by the students to make presentations.

PALMS
PRIMARY AUSTRALIAN LITERACY MATHEMATICS AND SCIENCE

Santos & ESWA supporting earth science education

YEAR 2 STEM PROJECTS Appendices

Appendix 1

Products From Our Planet Project Keywords

resource	soil	scraps	life cycle
Earth	people	plant	egg
natural	water	harvest	larva
use	tap	sort	pupa
reduce	filter	container	paper
reuse	access	deposit	waste
recycle	food	scheme	pulp
mineral	root	Australasia	deckle
rocks	seed	packaging	mould
animal	shoot	label	dispose
plants	sprout	bee	rare
energy	vegetable	wax	expensive
air	grow	honey	alternative

YEAR 2 STEM PROJECTS Appendices

Appendix 2

Year 2 Australian Curriculum links

Note: All curriculum areas may not be covered by each student depending on how the project is organised and assigned.

Science	Technology*	Engineering*	Mathematics
Science Understanding Biological Sciences Living things grow, change and have offspring similar to themselves (ACSSU030) Chemical Sciences Different materials can be combined for a particular purpose (ACSSU031) Earth and Space Sciences Earth's resources are used in a variety of ways (ACSSU075)	**Technologies and Society** People design and produce familiar products, services and environments to meet local and community needs (ACTDEK001) **Food and fibre production** Food and fibre choices for healthy living (ACTDEK003)	**Materials and technologies specialisations** Characteristics and properties of materials and individual components that are used to produce design solutions (ACTDEK004) **Investigating and defining** Explore design to meet needs or opportunities (WATPPS11)	**Number and Algebra** Recognise, model, represent and order numbers to at least 1000 (ACMNA027) Solve simple addition and subtraction problems using a range of efficient mental and written strategies (ACMNA030) **Measurement and Geometry** Interpret simple maps of familiar locations and identify the relative positions

YEAR 2 STEM PROJECTS Appendices

Science as a Human Endeavour Nature and development of science Science involves observing, asking questions about, and describing changes in objects and events (ACSHE034) Use and influence of science People use science in their daily lives, including when caring for their environment and living things (ACSHE035)	**Digital systems** Digital systems (hardware and software) are used for an identified purpose (ACTDIP001) **Digital implementation** Share and publish information in a safe online environment, with known people (ACTDIK006) **Representation of data** Data can have patterns and can be represented and used to make simple conclusions (ACTDIK002)	**Designing** Develop, communicate and discuss design ideas through describing, drawing, modelling and/or a sequence of steps (WATPPS12) **Evaluating** Use simple criteria to evaluate the success of design processes and solutions (WATPPS14) **Collaborating and managing** Work independently, or collaboratively when required, to organise information and ideas to safely create and share	of key features (ACMMG044) **Statistics and Probability** Identify a question of interest based on one categorical variable. Gather data relevant to the question (ACMSP048) Collect, check and classify data (ACMSP049) Create displays of data using lists, table and picture graphs and interpret them (ACMSP050)

YEAR 2 STEM PROJECTS Appendices

Science Inquiry Skills Questioning and predicting Pose and respond to questions, and make predictions about familiar objects and events (ACSIS037) Planning and conducting Participate in guided investigations to explore and answer questions (ACSIS038) Use informal measurements to collect and record observations, using digital technologies as appropriate (ACSIS039)	**Producing and implementing** Use components and given equipment to safely make solutions (WATPPS13)	sequenced steps for solutions (WATPPS15) **Investigating and defining** Define a sequence of steps to design a solution for a given task (WATPPS21)	

PALMS
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Processing and analysing data and information Use a range of methods to sort information, including drawings and provided tables and through discussion, compare observations with predictions (ACSIS040) Compare results with predictions, suggesting possible reasons for findings (ACSIS216) Evaluating Compare observations with those of others (ACSIS041)			

YEAR 2 STEM PROJECTS Appendices

Communicating Represent and communicate observations and ideas in a variety of ways (ACSIS042)			

*Drawn from Design and Technologies and Digital Technologies curriculum

YEAR 2 STEM PROJECTS Appendices

Links to other curriculum areas

Humanities and Social Science (HASS)

- The impact of changing technology on people's lives (e.g., at home, work, travel, communication, leisure, toys) and how the technology of the past differs from what is used today (ACHASSK046)

English

- Know some features of text organisation including page and screen layouts, alphabetical order, and different types of diagrams, for example timelines (ACELA1466)
- Understand the use of vocabulary about familiar and new topics and experiment with and begin to make conscious choices of vocabulary to suit audience and purpose (ACELA1470)
- Listen for specific purposes and information, including instructions, and extend students' own and others' ideas in discussions (ACELY1666)
- Use interaction skills including initiating topics, making positive statements and voicing disagreement in an appropriate manner, speaking clearly and varying tone, volume and pace appropriately (ACELY1789)

YEAR 2 STEM PROJECTS Appendices

Appendix 3

References used in preparing this project

GENERAL INFORMATION

- https://www.watercorporation.com.au/Education
- https://www.powerwater.com.au/about/community/thats-my-nt-water-story
- https://www.waternsw.com.au/water-quality/education/learn
- http://photosynthesis.org.au/year2/
- https://www.abc.net.au/everyday/growing-new-veggies-from-scraps/12128496
  https://www.ruralsprout.com/regrow-vegetables/
- https://www.urbancultivator.net/regrow-vegetable-cuttings/
- https://www.exploratorium.edu/snacks/vegetable-revival
- https://www.redcycle.net.au/
- https://recycleright.wa.gov.au/
- https://www.cleanup.org.au/
- https://en.wikipedia.org/wiki/Resin_identification_code
- https://www.primezone.edu.au/?s=k-3
- https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/aboriginal-and-torres-strait-islander-histories-and-cultures/
- https://education.abc.net.au/home#!/digibook/3630634/fight-for-planet-a-taking-action-against-climate-change
- https://greenskills.org.au/blog/2018/08/22/new-to-diy-beeswax-wraps-the-dipping-

method/
- https://www.goodhousekeeping.com/home/craft-ideas/g25642328/diy-beeswax-reusuable-wraps/
- https://www.paperslurry.com/2014/05/19/how-to-make-handmade-paper-from-recycled-materials/
- https://recyclingnearyou.com.au/arl/

Videos

- BTN episode on food waste https://education.abc.net.au/home#!/media/1918989/food-wastage
- Video on used chopsticks being re-purposed https://youtu.be/pLL4PW4LZT8
- Virtual tours of water treatment https://www.watercorporation.com.au/Education/Water-supply-and-water-conservation/Virtual-tours
- ABC TV War on Waste
  - https://education.abc.net.au/home#!/digibook/2597026/war-on-waste
  - https://education.abc.net.au/home#!/digibook/3184836/war-on-waste-from-waste-to-resource
- Making recycled paper https://www.youtube.com/watch?v=QxyKvyGC5GA

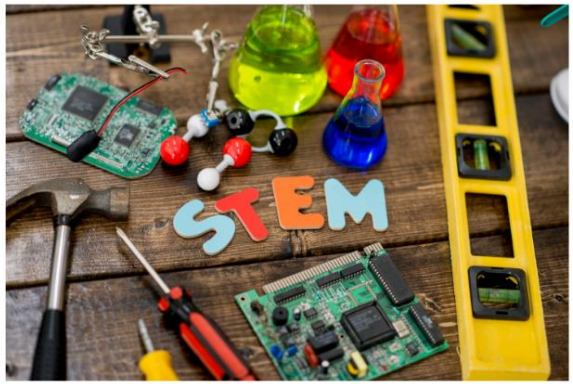
Appendix 4

Action and resource cards for *What do you use?* card game

Having breakfast

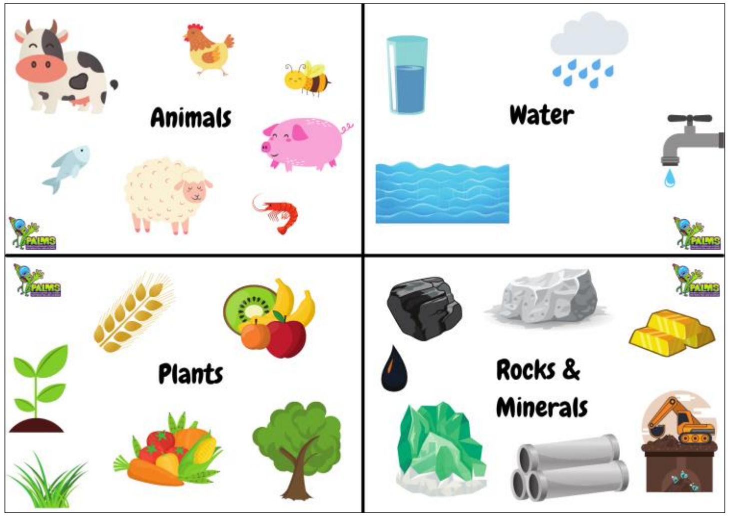
Coming to school

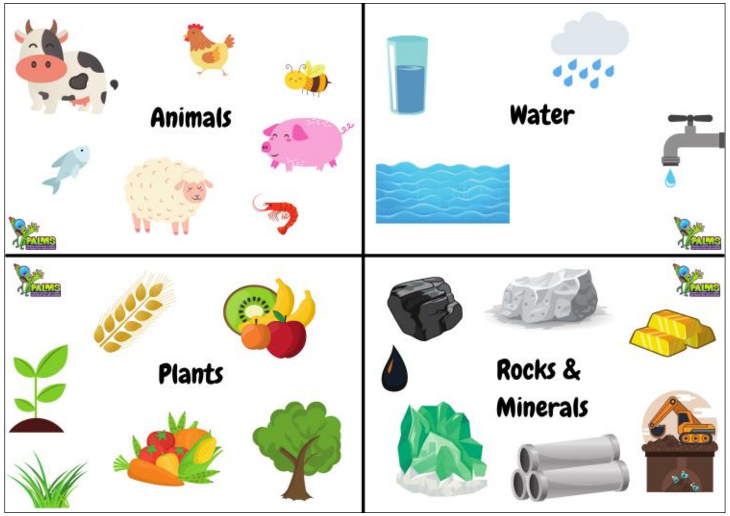
Participating in lessons



Going swimming

Watching TV


Animals
Water
Plants
Rocks &
Minerals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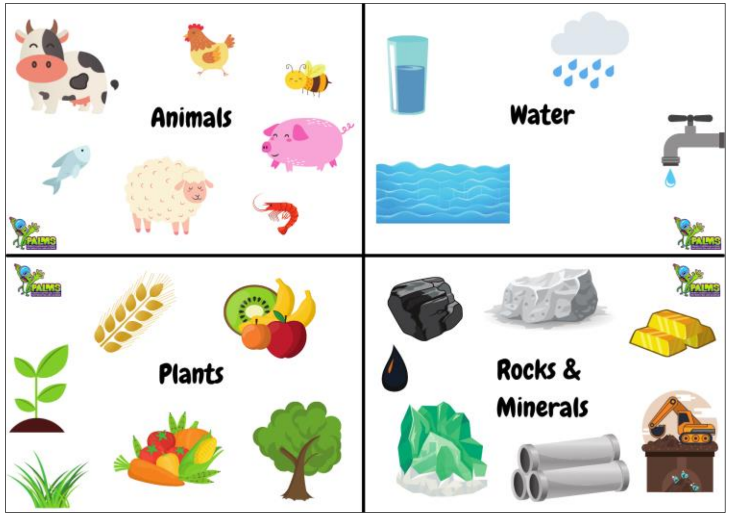
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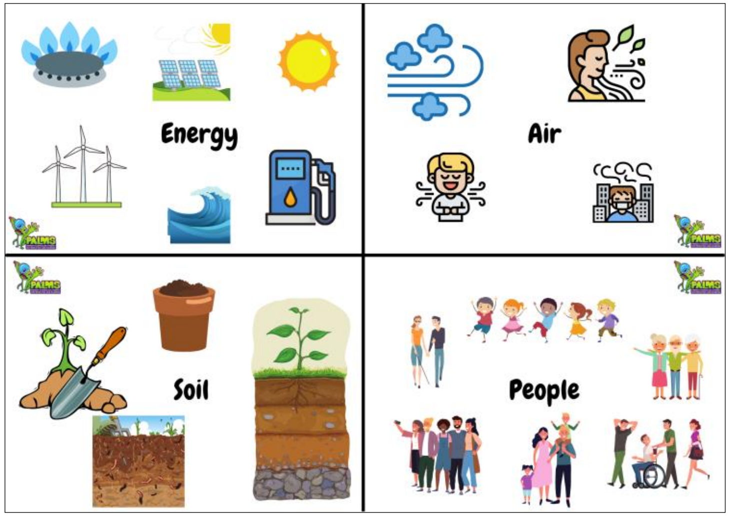
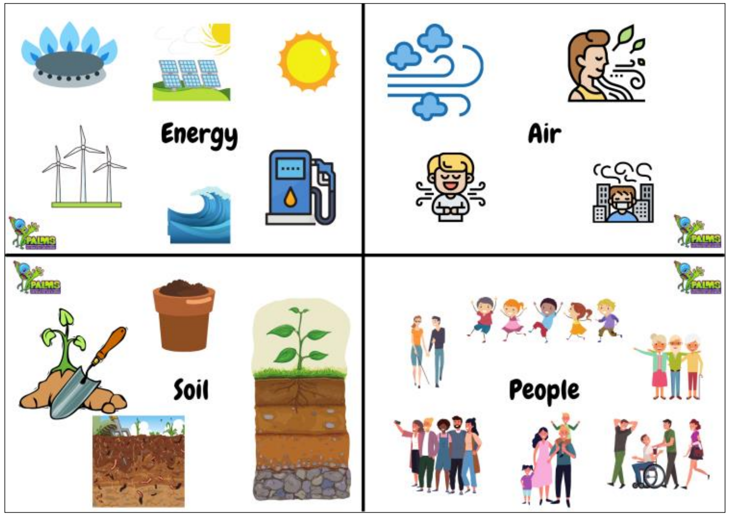

Energy
Air
Soil
People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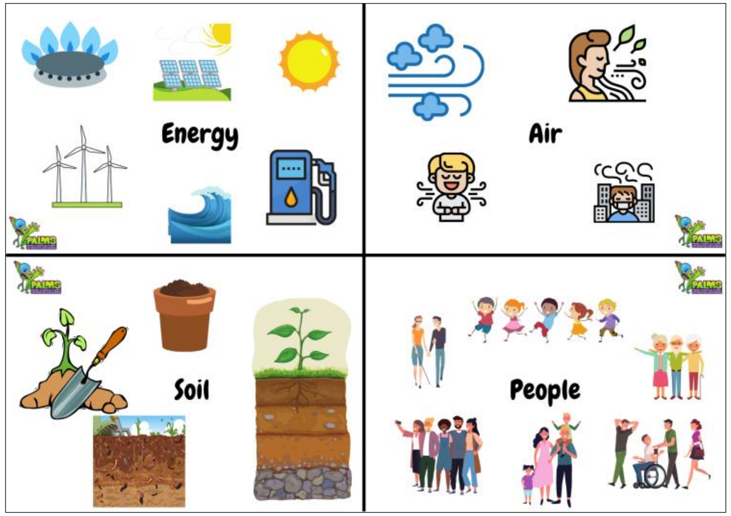
Soil
People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