



Science Numeracy Enhanced Plan

This resource is aligned to the New Zealand Curriculum (2007) and provides support for the teaching and learning of literacy and numeracy in preparation for the NCEA Co-requisite. It aims to support those students who are using the NCEA qualification pathway.

Making kawakawa balm

Context

In this set of activities ākonga harvest kawakawa leaves, and make kawakawa balm as part of learning about rongoā Māori in Year 9 or 10 Science.

Numeracy connections

Operations with numbers

- » Recognise the (degree of) precision required for measuring ingredients to make kawakawa balm.

Measurement

- » Select and use the appropriate measuring equipment to measure mass, volume, and temperature.

Achievement objectives

Level 4 Science

Ākonga will:

- » appreciate that science is a way of explaining the world and that science knowledge changes over time.

Level 5 Science

Ākonga will:

- » understand that scientists' investigations are informed by current scientific theories and aim to collect evidence that will be interpreted through processes of logical argument.

Resources:

- » [NZASE making kawakawa balm resource](#)
- » [Science Learning Hub Pokapū Akoranga Pūtaiao Rongoā Māori](#)
- » [TKI The Science of Rongoā resource](#)

Prior Learning

Before being introduced to this learning activity, ākonga will have explored:

- » rongoā Māori (Māori systems of healing)
- » the definitions of the terms antibacterial, antiviral, anti-inflammatory, and analgesic
- » how kawakawa is used in rongoā. Resources for this include: [NZASE making kawakawa balm resource](#) and [The Science of Rongoā](#).



Sequence of learning

Preparation for this lesson:

Ask ākonga, whānau hāpu or iwi ahead of time to share local tikanga (protocols) around harvesting kawakawa leaves (recognising that these differ). Invite them to share their knowledge of tikanga with the class and acknowledge their time and expertise with an appropriate koha.

Some basic guidelines about the tikanga for harvesting kawakawa can be found in the [NZASE making kawakawa balm resource](#)

Equipment needs to be food safe so that students can use the kawakawa balm they make. If possible, use of a food technology room is recommended. A full list of the equipment required can be found in [Appendix 1](#).

You may like to make a batch of kawakawa balm yourself before completing this activity with the class.

**1**

Activity 1: Sequence of learning



45 min

Harvesting the kawakawa leaves and preparation for making kawakawa balm

Activity note: The description of this activity includes a recipe for kawakawa balm. You can adjust this recipe to suit your context, including using a recipe that has been shared with you by a whānau or hapū member with knowledge of kawakawa balm and its tikanga.

Activate the prior knowledge of ākonga by asking them to **discuss in pairs** what they know about rongoā Māori.

Invite ākonga, whānau, hapū or iwi member you have connected with to **share the tikanga of harvesting kawakawa leaves**.

Mātauranga Māori connection: Connecting with local hapū and sharing the tikanga of harvesting kawakawa leaves with ākonga supports further learning of mātauranga Māori.

Provide each ākonga with the recipe in [Appendix 1](#) to make 120g of kawakawa balm.

In groups of up to four, ākonga **identify the equipment** needed to measure out each ingredient. They discuss **how they can measure** the amount of olive oil as accurately as possible.

Have ākonga **note down** the equipment they need to measure out each ingredient.

Answers: A measuring cylinder is needed to measure out 150ml of olive oil. To measure accurately with a measuring cylinder:

- » ensure the measuring cylinder is dry
- » place the measuring cylinder on a flat surface
- » read the measuring cylinder at eye-level, with the measurement taken at the bottom of the meniscus
- » check the unit on the measuring cylinder is ml and identify what scale the measuring cylinder goes up in.

In a food technology classroom, ākonga would use a measuring jug to measure the olive oil. The same ideas apply when measuring accurately.

A set of scales is needed to measure the mass 18g of beeswax. To accurately measure the mass with a set of scales, check that the scales are:

- » reading zero to start
- » resting on a flat surface
- » set to grams
- » on a clean surface

Numeracy connection: Ākonga plan how to use measuring equipment accurately.



1 Activity 1: Sequence of learning (continued)

Activity note: If possible, **harvest the kawakawa leaves with ākonga**, respecting local tikanga.

Demonstrate step 1 (appendix 1) of the method for ākonga. Display good [health and safety practices](#) for them.

Ākonga **think-pair-share their observations** of how you did step 1, including the steps you took to ensure you stayed safe - and that others stayed safe.

In groups of four, ākonga **put their leaves in a jar** (approximately 500 mL capacity) with the olive oil, following appropriate health and safety procedures.

Activity note: Check that ākonga are **using the methods they discussed** about accuracy of measure when pouring the olive oil.

Leave this mixture at room temperature until the next lesson. This infuses the oil with kawakawa.



Making the kawakawa balm

In their groups, ākonga **take turns describing** what they need to do at each step of the recipe and **writing what equipment each step requires**. Encourage ākonga to **recall what good health and safety practice looks** like from the previous activity for each step. For example, in step 2 we need to pour the olive oil mixture into a jug. We need to make sure the leaves are not poured into the jug. If we spill any of the mixture on the floor, we need to let our kaiako know and clean this up straight away.

Literacy connection: *Allowing ākonga to ask questions about the text supports ākonga who are working at different literacy levels.*

Discuss phase changes and melting with ākonga. Ask them to **predict** at what temperature the beeswax will begin melting. Note down their predictions on one half of the whiteboard or in a spreadsheet.

Activity note: *Asking ākonga to predict when the beeswax will melt will provide an opportunity later in the lesson to challenge the common misconception that all substances change phase at the same temperature.*

Use think-pair-share to check that ākonga know how to use a thermometer.

Answers: *Ākonga might state that to use a thermometer, they need to:*

- » *stir the mixture with an ice block stick so the temperature is even before using the thermometer*
- » *not stir the mixture using the thermometer*
- » *place the thermometer vertically into the liquid*
- » *ensure the bulb is under the surface of the liquid*
- » *not allow the bulb to touch the wall or bottom of the flask or beaker*
- » *crouch down (if needed) to ensure the top of the liquid (alcohol) column is at eye level. Some thermometers will have a meniscus and the bottom of the marker should be read for consistency.*
- » *immediately note the temperature.*

Numeracy connection: *Ākonga use measuring equipment accurately to follow a method for making kawakawa balm.*

As ākonga make the kawakawa balm, **circulate the room** to ensure that they are following the correct steps and health and safety procedures are being adhered to.

When ākonga have finished making the kawakawa balm, **record, collate, and share** the measured temperature when the beeswax melted using the other half of the whiteboard or the second column of your spreadsheet.

Use think-pair-share to identify reasons why the measurements of the melting temperature might differ.

Numeracy connection: *Ākonga reflect on how their measurements were made and what factors may affect their accuracy.*



2

Activity 2: Sequence of learning (continued)

Ask ākonga to **reflect on how their prediction** of the melting temperature of beeswax compared to the measured temperatures. **Explore with ākonga** the concept that different substances change phase at different temperatures.

Return any kawakawa leaf remains to the harvesting site. This is the final step in honouring the tikanga of harvesting kawakawa leaves.

Next steps in Numeracy learning

To build on this learning ākonga could use measures of average (mean, median, mode) to compare the temperatures that the beeswax melted at that the class predicted and measured.

See the [Numeracy Pedagogy Guide for Science](#) for additional ideas on how to integrate Numeracy learning into your teaching practice.

Appendix 1

1 Kawakawa balm recipe (for ākonga)

Note: This may need adapting depending on the availability of equipment and if a food technology room is used.

Kawakawa balm recipe

Makes 120g of kawakawa balm

Ingredients

12 kawakawa leaves

150 mL olive oil

18 g beeswax

Optional: Essential oils (e.g. lavender, tea tree)

Method

1. Place the kawakawa leaves in a clear jar or food safe beaker with the oil and leave overnight at room temperature.
2. Decant the olive oil from the mixture into a pyrex jug, using a clean ice block stick to push aside the leaves.
3. Set aside the used kawakawa leaves so they can be returned to the harvesting site.
4. Tare (zero) the balance with a paper cupcake case on it to measure the mass of beeswax on it using a spatula. Add this to the olive oil.
5. Heat gently on a hotplate set to a low temperature, stirring gently with a clean ice block stick until the beeswax fully dissolves.
6. Measure the temperature of the mixture once the beeswax has fully dissolved, ensuring the tip of the thermometer is approximately one centimetre above the bottom of the pyrex jug.
7. Remove from the heat, taking care to use paper towels or oven mitts when handling hot equipment.
8. Test the consistency of the mixture by dipping a spoon in and placing the spoon in a beaker of cold water. The mixture should be firm enough that it does not drip off the spoon and soft enough that it can be spread. If it is too soft you can add a bit more wax (add small amounts) and return to the heat until dissolved. If it is too hard, add a little more olive oil.
9. Add in a few drops of essential oil if using.
10. Transfer to sterilised jars for storage and label.

Cleaning up

To avoid blocking the drains, wipe out as much of the balm as possible from glassware with a paper towel and then wash with hot soapy water.

Appendix 2

Supporting information for teachers

Equipment

The following equipment is required for these activities. Alternatives are provided depending on the availability of equipment in your school. **All equipment** in contact with the kawakawa balm must be **food safe** for ākonga to be able to use the balms they make.

Large jars or beaker (500 mL)
Wooden ice block sticks
Balances, paper cupcake cases, spatulas
Pyrex jug, small saucepan, or beaker
Hotplates or bunsen burners (with tripod and gauze mats)
Beakers for water bath (if a bunsen burner is being used)
Tongs or paper towels or small oven mitts
Teaspoons
250 mL beakers
Sterilised jars with lids
Emulsifier (if available)

The method that ākonga receive will need to be adjusted depending on the availability of equipment or if it is taking place in a food technology room.

Sterilisation of jars

Jars for ākonga to store their kawakawa balm can be sterilised using one of the following sterilisation methods:

- » dishwasher (using the rinse cycle) or steriliser
- » soaking in a mixture of 1 teaspoon bleach per litre of water for ten minutes and air drying inverted on a clean surface

In a food technology classroom, jars and lids can be sterilised by washing in hot soapy water, standing upside down on a roasting tray while they are still wet, and putting the tray into a preheated oven at 160 °C for 15 minutes.

Tips for cleaning up

To avoid blocking the drains, ākonga should wipe out as much of the balm as possible from glassware with a paper towel and then wash the glassware with hot soapy water.

An emulsifier can be used to help with cleaning if available.

Appendix 2

Health and Safety

The following are reminders of the health and safety actions needed for this activity. These will need to be adapted back on any changes made to the method, the equipment that is available, and if this is taking place in a food technology classroom.

- » Safety glasses should be worn at all times when heating plates and bunsen burners are used and chemicals are being measured
- » Covered shoes should be worn in the Science lab
- » Using hot equipment:
 - A hot pyrex jug needs to be picked up using paper towels or oven mitts
 - Hot apparatus take time to cool down. Allow time to cool them down before packing away
 - Inform your kaiako straight away if you burn yourself or if someone else burns themselves.
- » Using bunsen burners (if applicable):
 - Tie back long hair and secure loose clothing
 - Keep on an orange flame when not heating (so it can be seen) and then a blue flame for heating
 - Use a water bath to heat the mixture.
- » Using hot plates safely:
 - Ensure any spills are cleaned up quickly
 - Do not touch the surface of the hot plate.
- » Using the balance:
 - Tare (zero) the balance with a paper cupcake case and use this to carefully measure the mass onto
 - Clean up any spills quickly.
- » Using glassware:
 - Examine glassware before using
 - Do not use chipped or cracked jars or beakers
 - Ensure that all glassware is clean
 - Let your kaiako know if any glassware is broken.
- » Reminders about handling chemicals
 - Before using any chemicals, read the label carefully
 - Do not return unused chemicals to the original bottle
 - Clean up any spills quickly
 - Check with your kaiako before anything goes down the sink.

If food safe equipment is not used, then the kawakawa balm should not be used by anyone at the end of the activity.