

**Wonder**  
Project

## Ice Cream Challenge

**Rōpū name:**

**Rōpū  
members:**



Activity 1.1:  
STEM roles quiz

Find out which STEM role suits your skills and interests best!

Circle one answer in each row. Then, count how many of each letter you've circled to find out which Ice Cream Challenge role is the best match for you.

| Pātai                                                          | A                                                | B                                               | C                                                                        | D                                                                         |
|----------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------|
| 1. You're buying an ice cream – how do you choose?             | I eat with my eyes! If it looks tasty, I want it | I go straight to the weird and wacky flavours   | I like ice cream with chunks – cookies, sprinkles, and sauce, yes please | I grab something from the dairy freezer. Ice cream on a stick all the way |
| 2. What class do you always look forward to?                   | Drama – the stage is my second home              | Maths – numbers are my thing                    | Technology – I'm a champ on a computer                                   | Science – I want to know everything about everything                      |
| 3. Which event are you hosting at school?                      | Arts and crafts expo                             | Math Olympics                                   | Robotics competition                                                     | Science fair                                                              |
| 4. What's your go-to role in a class project?                  | Tester – I make sure the idea works              | Idea innovator – I dream up the idea            | Creator – I bring the idea to life                                       | Project manager – I make sure things run smoothly                         |
| 5. What dessert are you bringing for shared lunch?             | Colourful pavlova                                | Something with a unique flavour                 | A smooth cheesecake                                                      | I'm more of a savoury person                                              |
| 6. You're in charge of levelling-up ice cream. What do you do? | Add sprinkles for a pop of colour                | Design a flavour inspired by my favourite place | Create a machine that makes ice cream in 2 minutes                       | Invent ice cream that stays safe and doesn't melt outside of the freezer  |
| 7. What STEM project would you like to work on?                | Creating a perfume to gift to my whānau          | Making vegetables taste like my favourite snack | Inventing a new video game                                               | Designing a machine to clean my room                                      |
| 8. What are you doing on your lunch break?                     | Playing outside                                  | Snack swapping                                  | Building a LEGO tower                                                    | Organising a school event                                                 |
| 9. What's your favourite way to learn something new?           | Give it a go                                     | Listen to someone explain it                    | Create something to test the idea                                        | Write notes and research                                                  |
| Count your answers!                                            | A total                                          | B total                                         | C total                                                                  | D total                                                                   |

Your Ice Cream Challenge role:

| Quiz result | Role               | Goal                                         | Tasks                                                                                                                                          |
|-------------|--------------------|----------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
| Mostly As   | Sensory Scientist  | Make the ice cream smell and look yummy      | <ul style="list-style-type: none"><li>• Help choose colours and presentation</li><li>• Observe ice cream creation and record results</li></ul> |
| Mostly Bs   | Flavour Chemist    | Create exciting flavours for the ice cream   | <ul style="list-style-type: none"><li>• Dream up flavour ideas</li><li>• Measure and add ingredients</li></ul>                                 |
| Mostly Cs   | Texture Technician | Make sure the ice cream is smooth and creamy | <ul style="list-style-type: none"><li>• Decide on the best method for a creamy base</li><li>• Mix ice cream</li></ul>                          |
| Mostly Ds   | Hygiene Hero       | Keep the ice cream safe to eat               | <ul style="list-style-type: none"><li>• Check that everything is clean and safe</li><li>• Stop germs from growing in the ice cream</li></ul>   |



**Choose your role**

Form a rōpū of 4. Then, use your quiz results to help decide your Ice Cream Challenge role.



Rōpū name:

Sensory Scientist:

Flavour Chemist:

Texture Technician:

Hygiene Hero:

Science behind the scoop

We made ice cream creamy by adding:

- ☐ Milk
- ☐ Cream
- ☐ Something else:

Creamy ice cream has small/large (circle one) ice crystals.

Fat makes ice cream creamy because:

We made ice cream scoopable by adding:

- ☐ Whipped cream
- ☐ Unwhipped cream
- ☐ Icing sugar
- ☐ Condensed milk
- ☐ Something else:

Sugar makes ice cream scoopable because:

Air makes ice cream scoopable because:

We made ice cream flavourful by adding:

The best ingredient for yum ice cream was:

The best method for yum ice cream was:

Activity 6.2:  
Scoop showcase!

Show off your sweet scoops and answer the challenge pātai

I wonder what makes ice cream yum?

Rōpū name:

Ice cream goals:

Creamy, scoopable and flavourful!

Draw a poster about your ice cream.

Activity 1.2:  
Ice cream goals

Think about what you want to achieve in the Ice Cream Challenge

The big problem you need to solve is:

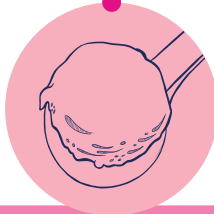
*I wonder what makes ice cream yum?*

To solve this problem, you're going to explore three goals.

Work with your rōpū to investigate these goals and how they might help with your ice cream.



Goal 1: Creamy



Goal 2: Scoopable



Goal 3: Flavourful

Observe

*What do you notice about ice cream?*

Think about ice cream you've eaten before. Tick the options that made the ice cream yum.

Creamy

- ☐ Icy
- ☐ Smooth
- ☐ Light
- ☐ Rich
- ☐ Thin
- ☐ Thick

Scoopable

- ☐ Hard
- ☐ Soft
- ☐ Falls apart
- ☐ Stays together
- ☐ Melts quickly
- ☐ Melts slowly

Flavourful

- ☐ One flavour
- ☐ Multiple flavours
- ☐ Weak taste
- ☐ Strong taste
- ☐ Taste fades quickly
- ☐ Taste stays in your mouth

Other ideas:

Think

Why do these things make ice cream yum?

Look at the options you circled. Think about why these things are important.

We think creamy ice cream is important because...

We think scoopable ice cream is important because...

We think flavourful ice cream is important because...

Ingredients list

Cross out the ingredients you're not using.

| Amount | Ingredient               |
|--------|--------------------------|
| 3 tbsp | Water                    |
| 1 tbsp | Milk powder              |
| 3 tbsp | Unwhipped cream          |
| 6 tbsp | Whipped cream            |
| 1 tbsp | Icing sugar              |
| 1 tbsp | Sweetened condensed milk |
|        | Flavour:                 |
|        | Toppings/mix-ins:        |
|        | Colour:                  |
|        | Something else:          |

Suggested roles:

Sensory Scientist:

Chooses colour and presentation

Flavour Chemist:

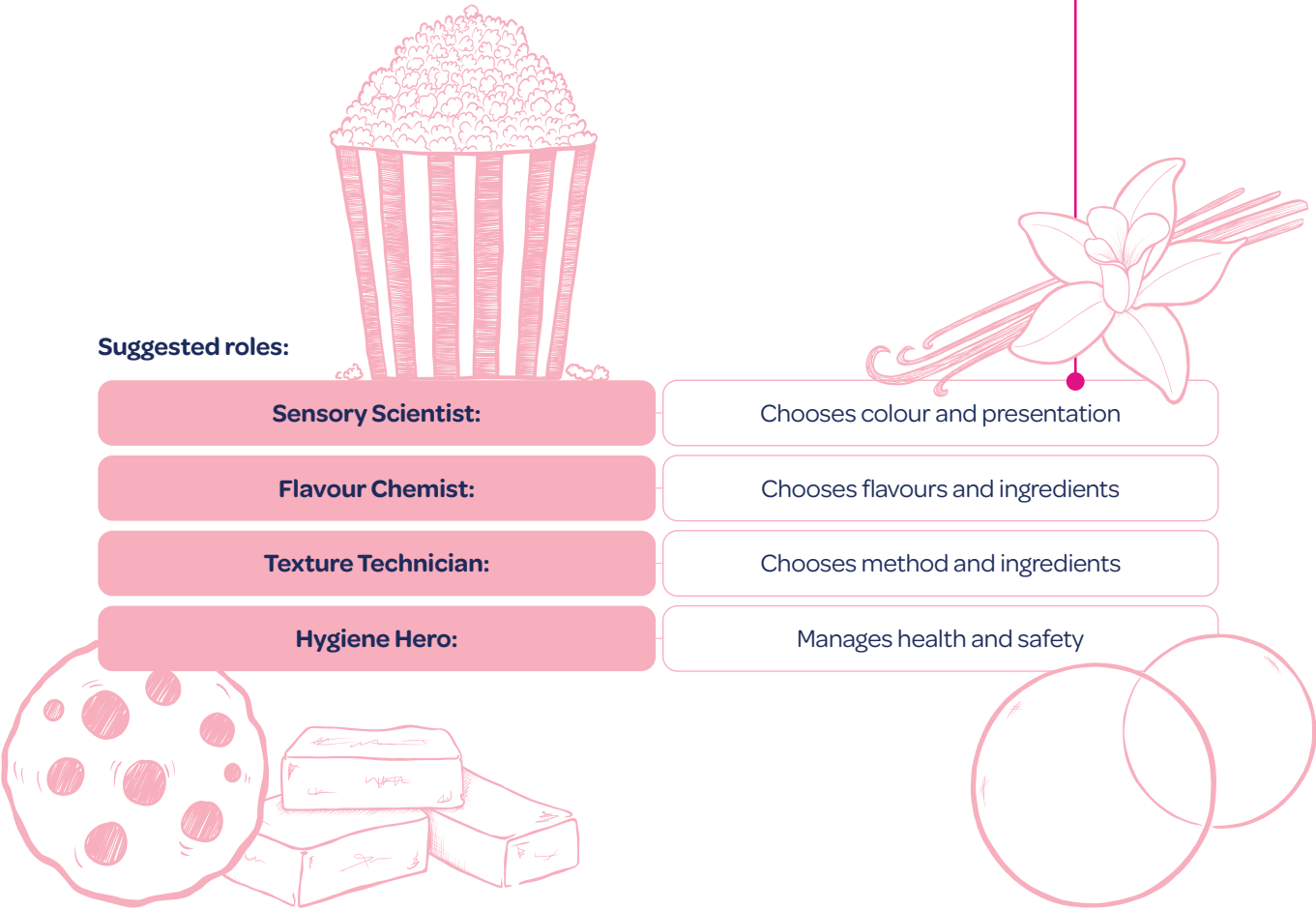
Chooses flavours and ingredients

Texture Technician:

Chooses method and ingredients

Hygiene Hero:

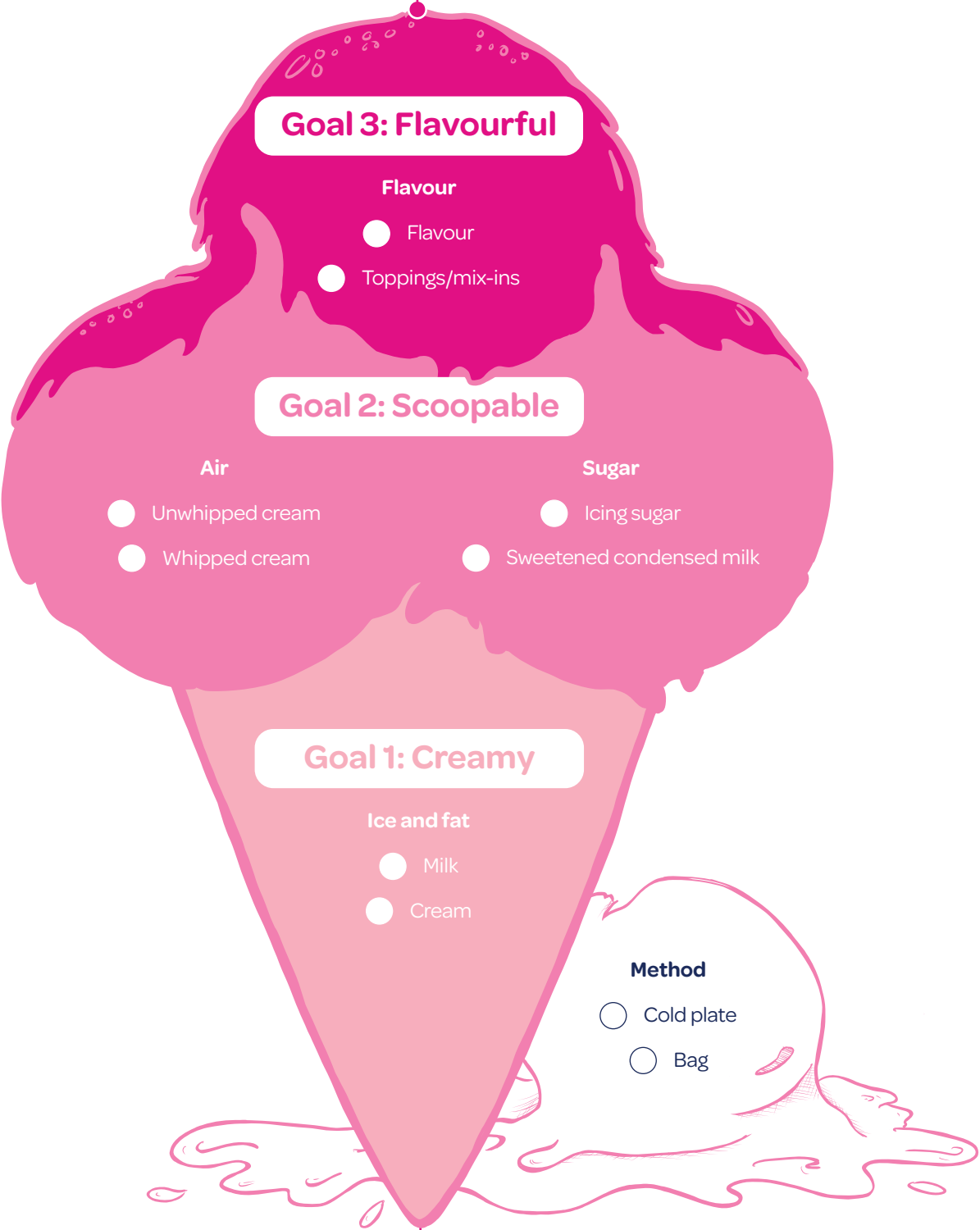
Manages health and safety



# Activity 5.3: Ultimate ice cream plan

## Harness your sweet STEM skills to plan the ultimate ice cream

Tick the ingredients and methods you'll use to meet your three ice cream goals.



## Reflect

### What have you discovered about yum ice cream?

Think about everything you've learned. Then, think about how you could investigate these ideas in your own ice cream.

We're most looking forward to exploring:

- ☐ Goal 1: Creamy    ☐ Goal 2: Scoopable    ☐ Goal 3: Flavourful

### Because:

### To make yum ice cream, you need all three goals because...

### Things to think about:

Any allergies?

Any flavours people dislike?

Any flavours everyone likes?

### We will make an ice cream that is:

Creamy

Scoopable

Yum!

### How will we know if we succeeded?

# Activity 1.3: Germ hunter

## What microorganisms are growing in your classroom?

See what bacteria are lurking on different surfaces by taking samples, then watching them grow!

### Experiment

Make it fair! To make this a fair test, only 1 thing can change. We call this a **variable**.

#### Variable (thing that will change):

☒ Surface

Surface 1:

Surface 2:

#### Controlled conditions (things that stay the same):

- ☒ The petri dish used
- ☒ How the bacteria are collected
- ☒ Waiting time before checking the results

### Ask

What questions/pātai do you have about bacteria?

### Predict

What do you think will happen?

We think surface 1 will grow more/less (circle one) bacteria than surface 2, because:

### Think

Complete the sentences.

Cream has more  than milk. This makes ice cream icy/creamy (circle one).

Whipped cream has more  than unwhipped cream. This makes ice cream scoopable/hard (circle one).

Sweetened condensed milk has medium fat, high  and low .

This makes ice cream: (tick all the answers you think fit)

☐ Scoopable ☐ Hard ☐ Creamy ☐ Icy

### Reflect

Which ingredients will perform the best to help you achieve your challenge goals?

Why do you think this?

**The science:** Sweetened condensed milk has low water content, medium fat and high sugar, which helps make ice cream creamy and scoopable.

# Activity 5.1: Magic ingredients

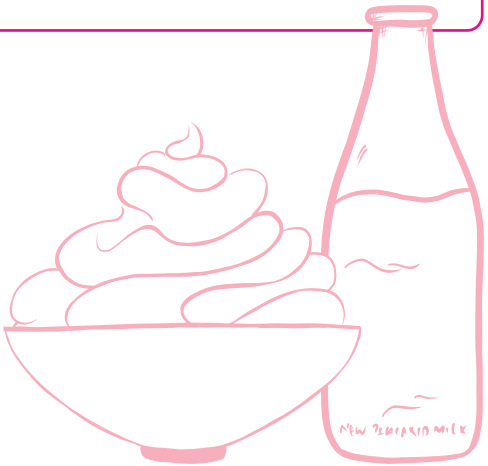
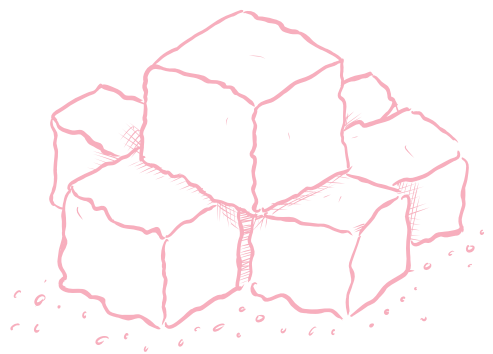
## Explore ingredient choices and how they change your ice cream

Using your challenge knowledge, work out the magic ingredients that will make your final ice cream yum!

### Observe

What level of sugar, fat, water and air do these ingredients have?

| Ingredient               | Sugar                         | Fat                           | Water                         | Air                           | How it freezes |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|----------------|
| Pick from these words:   | None<br>Low<br>Medium<br>High | None<br>Low<br>Medium<br>High | None<br>Low<br>Medium<br>High | None<br>Low<br>Medium<br>High | Soft<br>Hard   |
| Milk                     |                               |                               |                               |                               |                |
| Unwhipped cream          |                               |                               |                               |                               |                |
| Whipped cream            |                               |                               |                               |                               |                |
| Sugar                    |                               |                               |                               |                               |                |
| Sweetened condensed milk |                               |                               |                               |                               |                |



### Test

#### Do your experiment!

- ✓ Swab surfaces
- ✓ Swab petri dish
- ✓ Store safely
- ✓ Observe changes over time

Tick or draw what you notice:

#### Day 1

- ☐ No bacteria
- ☐ Small dots
- ☐ Something else

#### Day 4–6

- ☐ Small round colonies
- ☐ Fuzzy patches
- ☐ Wavy shapes
- ☐ Different colours

### Explain

#### What did you learn?

Your results:

What does this mean?

#### Was your prediction correct?

- ☐ Yes
- ☐ No

#### Suggested roles:

##### Sensory Scientist:

Records results

##### Flavour Chemist:

Chooses samples to test

##### Texture Technician:

Swabs agar plate

##### Hygiene Hero:

Manages health and safety

**The science:** Good hygiene helps keep ice cream safe to eat.

# Activity 2.1: Ice crystal investigation

## Zoom in to discover how ice crystals impact the creaminess of ice cream

Scientists use special tools called microscopes to look at ice cream really closely and learn more about the state of matter inside it. This gives them clues on its creaminess!



Image 1

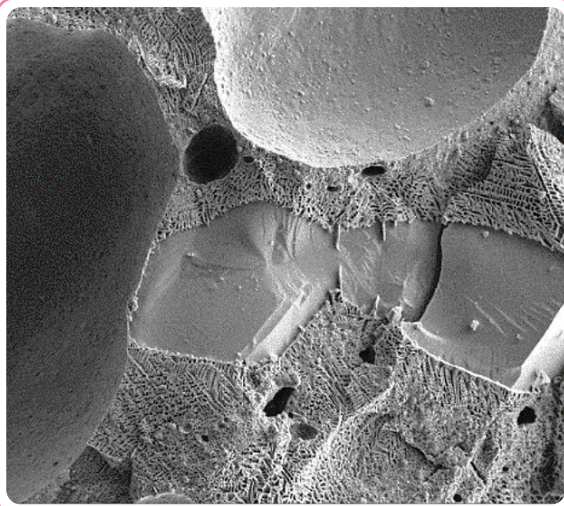
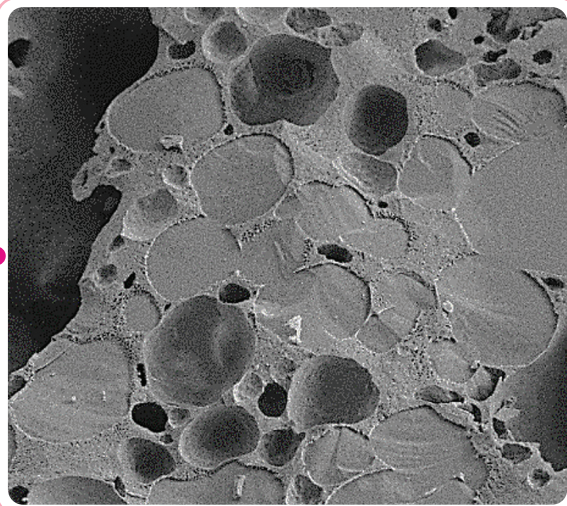


Image 2



### Observe

What do you notice  
about each image?

Image 1

Image 2

Crystal size

- ☐ Small  
☐ Large

- ☐ Small  
☐ Large

Crystal spacing

- ☐ Even  
☐ Uneven

- ☐ Even  
☐ Uneven

Crystal texture

- ☐ Smooth  
☐ Rough

- ☐ Smooth  
☐ Rough

### Explain

What did you learn?

Your results:

What does this mean?

Was your prediction correct?

- ☐ Yes ☐ No

Suggested roles:

Sensory Scientist:

Records results

Flavour Chemist:

Helps decide the final flavour guess

Texture Technician:

Makes sure only one sense is changed at a time

Hygiene Hero:

Manages health and safety

The science: Sight, smell and taste all work together to communicate with your brain about flavour.



Predict

What do you think will happen?

We think that

will have the biggest impact on flavour because...

We think that

will have the least impact on flavour because...

How easy will it be to identify the flavour in each test?

Why do you think this?

Test 1:

Test 2:

Test 3:

Easy

Medium

Hard

Easy

Medium

Hard

Easy

Medium

Hard

Test

Do your experiment!

✓

 Taste, smell, and look at your flavours as instructed

Can you identify the flavour?

| Test | What did you notice? | Flavour guess | Confidence                                                                           |
|------|----------------------|---------------|--------------------------------------------------------------------------------------|
| 1    |                      |               | <div><div></div> Low</div> <div><div></div> Medium</div> <div><div></div> High</div> |
| 2    |                      |               | <div><div></div> Low</div> <div><div></div> Medium</div> <div><div></div> High</div> |
| 3    |                      |               | <div><div></div> Low</div> <div><div></div> Medium</div> <div><div></div> High</div> |

Think

What do you think this means?

Image 1

Image 2

This ice cream would probably feel:

Creamy

Smooth

Icy

Crunchy

Why?

This ice cream would probably feel:

Creamy

Smooth

Icy

Crunchy

Why?

Reflect

Which image is the creamiest ice cream?

Image 1

Image 2

Why?

The science: Small, even ice crystals help ice cream feel smooth and creamy.

# Activity 2.2: Ice cream in a bag

## Test how fat makes ice cream creamy!

Make and shake two ice creams in a bag to discover the secret to a creamy, smooth texture.

### Experiment

Make it fair! To make this a fair test, only 1 thing can change. We call this a **variable**.

#### Variable (thing that will change):

✓ Fat

Test 1:

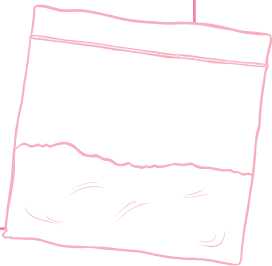
Milk

Test 2:

Milk and cream

#### Controlled conditions (things that stay the same):

- ✓ Sugar type and amount
- ✓ Method
- ✓ Freezing time



### Ask

What questions/pātai do you have about fat and how it impacts creaminess?

### Predict

What do you think will happen?

We think test 1 will be

We think test 2 will be

Use these words to help: smooth, icy, thick, soft, thin, hard, creamy.

Why do you think this?

# Activity 4.1: Sensory detectives

## Investigate how your five senses impact flavour

Taste, sight and smell work together to tell your brain about flavours in food. Let's test it out.

### Experiment

Make it fair! To make this a fair test, only 1 thing can change. We call this a **variable**.

#### Variable (thing that will change):

✓ Senses

Test 1:

Taste only

Test 2:

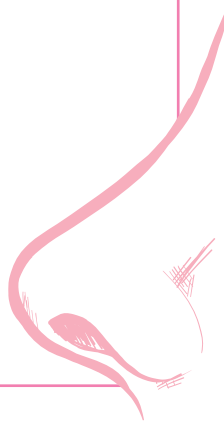
Taste and sight only

Test 3:

All senses

#### Controlled conditions (things that stay the same):

- ✓ Flavours
- ✓ Containers



### Ask

What questions/pātai do you have about senses and how they impact flavour?

Test

Do your experiment!

- ✓ Mix ingredients in bowl
- ✓ Pour 1/3 cup onto frozen cold plate
- ✓ Let it set for 5 minutes
- ✓ Scrape and test

What do you notice?

Test 1

Test 2

Drip test

Drips off spoon:

- ☐ Quickly  
☐ Slowly

Drips off spoon:

- ☐ Quickly  
☐ Slowly

Feel

- ☐ Soft  
☐ Hard

- ☐ Soft  
☐ Hard

Scoopability

- ☐ Easy to scoop  
☐ Hard to scoop

- ☐ Easy to scoop  
☐ Hard to scoop

Suggested roles:

Sensory Scientist:

Observes experiment and records results

Flavour Chemist:

Measures and mixes ingredients

Texture Technician:

Spreads mixture on cold plate

Hygiene Hero:

Manages health and safety



Explain

What did you learn?

Your results:

What does this mean?

Was your prediction correct?

- ☐ Yes ☐ No

Do you need to change anything for next time?

Test

Do your experiment!

- ✓ Mix ingredients in small bag
- ✓ Place ice and salt in large bag
- ✓ Place small bag into large bag
- ✓ Shake and test

What do you notice?

Test 1

Test 2

Feel

- ☐ Smooth  
☐ Rough

- ☐ Smooth  
☐ Rough

Thickness

- ☐ Thin  
☐ Thick

- ☐ Thin  
☐ Thick

Creaminess

- ☐ Very icy  
☐ Slightly icy  
☐ Slightly creamy  
☐ Very creamy

- ☐ Very icy  
☐ Slightly icy  
☐ Slightly creamy  
☐ Very creamy

Suggested roles:

Sensory Scientist:

Observes experiment and records results

Flavour Chemist:

Measures and mixes ingredients

Texture Technician:

Shakes bag

Hygiene Hero:

Manages health and safety



Explain

What did you learn?

Your results:

What does this mean?

Was your prediction correct?

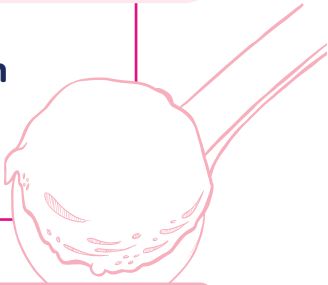
- ☐ Yes ☐ No

Do you need to change anything for next time?

# Activity 3.1: Light as air

## Investigate how air impacts the scoopability of ice cream

Look carefully at the two samples of frozen cream – only one thing is different.  
Can you work out which would be more scoopable?



### Observe

What do you notice about each cream sample?

Weigh each sample

Sample 1 weight (g):

Sample 2 weight (g):

Cut each sample in half.  
What do you notice?

Use these words to help:  
soft, hard, lots of holes,  
completely solid.

### Think

What do you think this means?

The sample that weighed more/  
less (circle one) has more air.

We think this because...

What do your other observations  
tell you about air?

### Reflect

Which sample would be  
the most scoopable?

☐ Sample 1

☐ Sample 2

Why?

**The science:** Lots of air bubbles create a softer, lighter texture. This makes ice cream more scoopable.

# Activity 3.2: Cold plate creations

## Test how air makes ice cream scoopable!

While it may be invisible, air has a big impact on ice cream's scoopability.  
Explore for yourself by making two ice creams on a cold plate!

### Experiment

Make it fair! To make this a fair test, only 1 thing can change. We call this a **variable**.

Variable (thing that will change):

☒ Air

Test 1:

Unwhipped cream

Test 2:

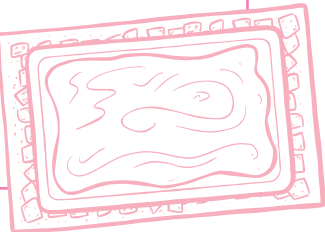
Whipped cream

Controlled conditions  
(things that stay the same):

☒ Sugar type and amount

☒ Method

☒ Freezing time



### Ask

What questions/pātai do you have about  
air and how it impacts scoopability?

### Predict

What do you think will happen?

We think test 1 will be

We think test 2 will be

Use these words to help: soft, hard, light, dense,  
crumbly, smooth, scoopable.

Why do you think this?