

# Food waste

Curriculum guide



# Year 5 Food Waste Unit Introduction



# Introduction

The waste hierarchy prioritises waste management practices that favour waste avoidance over resource reuse or recycling.

**The WasteSorted Schools (WSS) Program delivers targeted education strategies for the avoidance and recovery of waste in the school context. It supports schools in Western Australia (WA) to implement waste avoidance and recovery practices and foster positive waste attitudes and behaviours in students and the wider school communities. This is in line with the objectives of WA's *Waste Avoidance and Resource Recovery Strategy 2030*.**

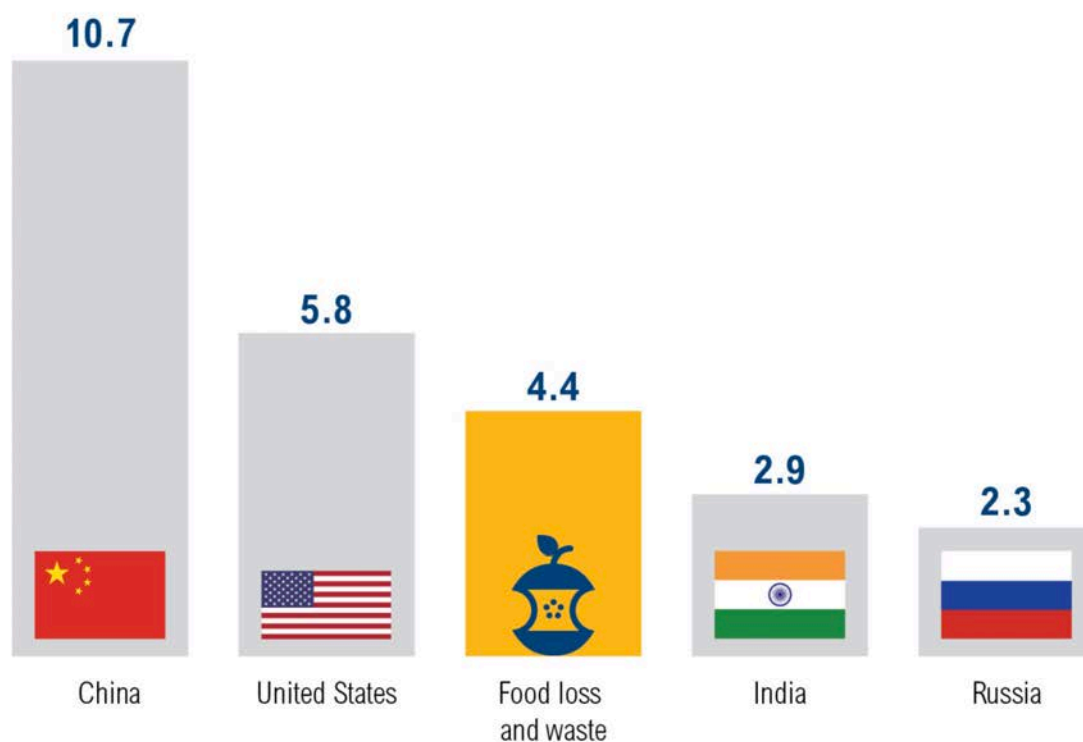
The *Waste Avoidance and Resource Recovery Strategy 2030* (waste strategy) includes objectives to **avoid** waste, **recover** more value and resources from waste and **protect** the environment. The waste hierarchy prioritises waste management practices that favour waste avoidance over resource reuse or recycling. This requires all Australians to work together and undertake meaningful actions to avoid and reduce food waste. Education is an important strategy to increase awareness of waste avoidance and to support food waste avoidance behaviours.

There are significant impacts on our environment when food is wasted. These include the resources used to grow food, such as soil and water. Energy used to process, package and transport food to our homes is also wasted. The estimated cost of food waste to the Australian economy is \$20 billion each year (*National Food Waste Strategy 2017*).

Avoidable food waste disposed of to landfill has environmental impacts such as the production of methane and carbon dioxide, which are harmful greenhouse gas emissions. It is estimated that 7.6 million tonnes of carbon dioxide was generated from food waste in 2014-15 over the life of its decay (*National Food Waste Strategy 2017*). If global food waste was a country, it would be the third-largest emitter of greenhouse gases after China and the United States. Reducing the amount of food waste disposed of to landfill over time will reduce the impact of greenhouse gas emissions on our environment.



If food loss and waste were its own country, it would be the third-largest greenhouse gas emitter.



GT CO<sub>2</sub>E (2011/12)\*

\* Figures reflect all six anthropogenic greenhouse gas emissions, including those from land use, land-use change, and forestry (LULUCF). Country data is for 2012 while the food loss and waste data is for 2011 (the most recent data available). To avoid double counting, the food loss and waste emissions figure should not be added to the country figures.

Source: CAIT. 2015; FAO. 2015. *Food wastage footprint & climate change*. Rome: FAO.



[What's Food Loss and Waste Got to Do with Climate Change? A Lot, Actually.](#)

Craig Hanson, Brian Lipinski, Johannes Friedrich, Clementine O'Connor and Keith James 11/12/15

In WA schools, three kilograms of avoidable food waste (edible food that has been discarded) is discarded per student per year. This extrapolates to a total of 3 million whole pieces of fruit, 1.3 million packaged food items, such as muesli bars, and 3.5 million whole sandwiches discarded each year in schools across the state.

*(Tackling Avoidable Food Waste in Western Australian Schools, 2016)*

In a survey of 503 WA households, the average household disposed of 11 cups or 2.5 litres of food per week. This is higher than the national average. Thirty per cent of households reported that they could not tell if food had gone bad by smelling, seeing, or tasting it, so they disposed of it. Only 50 per cent of household managers understood the difference between best before and use by dates. This lack of understanding is contributing to how Western Australians are wasting food. *(Food Waste Western Australian Households Attitudes and Behaviours Benchmark Study, 2019).*

## Waste Strategy 2030 Targets

### Avoid

*Western Australians generate less waste.*

- 🎯 **2025** – 10% reduction in waste generation per capita
- 🎯 **2030** – 20% reduction in waste generation per capita

### Recover

*Western Australians recover more value and resources from waste.*

- 🎯 **2025** – Increase material recovery to 70%
- 🎯 **2030** – Increase material recovery to 75%
- 🎯 **From 2020** – Recover energy only from residual waste

### Protect

*Western Australians protect the environment by managing waste responsibly.*

- 🎯 **2030** – No more than 15% of waste generated in Perth and Peel regions is landfilled
- 🎯 **2030** – All waste is managed and/or disposed to better practice facilities

## United Nations Sustainable Development Goal (SDG) 12.3



Reducing food waste will help WA meet the targets set by the Waste Authority by 2030, to 'become a sustainable, low-waste circular economy in which human health and the environment are protected from the impacts of waste'. Organic material, including food waste, is a priority area, as it represents a loss of valuable organic material which could otherwise be recovered for productive use.

Reducing food waste will also help countries meet Target 12.3 of the United Nations (UN) Sustainable Development Goals – halving food waste by 2030. This agenda was adopted by the UN to ensure sustainable consumption and production patterns for future generations.



The following video provides a good overview and introduction to the issues surrounding food waste.

[Food Wastage Footprint \(3 min\)](#)



## Unit overview

This unit is aligned to the Western Australian Curriculum. Lessons can be used independently or together as a unit across the learning areas of Humanities and Social Sciences (HASS), Mathematics, English and Science. Using an inquiry-based and integrated approach to learning, students explore the issues of food waste at home and at school. As an assessment option in English, students will create a food waste cookbook to educate their school community about what they have learned.

Subject	Main curriculum links and activity descriptions
<b>HASS</b>	<p><b>Economics and Business: Wants, resources and choices</b></p> <p>Students learn about the larger environmental, social and economic issues around food waste. This includes household food waste and introduces food rescue.</p>
<b>Mathematics</b>	<p><b>Number and Algebra</b></p> <p>Students learn about the amount of food thrown out at school and use mathematical sentences (+ - / x) to create an infographic to share with the school community.</p>
<b>English</b>	<p><b>Interpreting, Analysing and Evaluating; Creating Texts</b></p> <p>Students learn about food waste solutions by creating recipes for a class cookbook based on edible food waste at school.</p>
<b>Science</b>	<p><b>Chemical Sciences</b></p> <p>Students learn about greenhouse gases (methane) and how the gases are produced by decomposing fruit, by conducting an experiment. This highlights the environmental impact of food waste.</p> <p>Note: The results from the experiment may not be known for about two weeks. This timing needs to be considered if you plan to use the results in other learning areas as part of the food waste unit.</p>

**NAPLAN:** Persuasive writing – ‘Why we should buy inglorious fruit and vegetables’ or another food waste topic of choice.

## Using food waste lessons across the curriculum

This unit is designed to be used as a cross-curricular activity. All learning areas will look at the topic of food waste using a variety of resources and gathering information. Each subject area can be done in isolation, but the lessons will have a greater impact if the topic is incorporated as a unit. There are opportunities for using information across lessons and a suggested timeline. For example, it is a good idea to start the science experiment early on so the results have more impact and can be related to the other learning areas.



	English	Mathematics	Science	HASS
English		Use the food waste calculations in the cookbook introduction.	Use the findings from the science experiment to support incorporating fruit recipes in the food waste cookbook.	Use the information from the videos for the food waste cookbook introduction.
Mathematics	Use the language and terms from the cookbook on the food waste infographic.		Use the findings from the science experiment in the food waste infographic.	Use the information from the videos in the food waste infographic.
Science	Use English skills to develop a hypothesis and write a scientific report.	Use the food waste calculations or waste audit results in the science experiment.		Use the information from the videos to support the conclusion in science.
HASS	Use the food waste cookbook vocabulary and word wall.	Use the food waste calculations.	Use the findings from the science experiment.	



# Humanities and Social Sciences



# Humanities and Social Sciences

## Making food waste history

### Year 5 Western Australian Curriculum links

Knowledge and understanding	<b>ECONOMICS AND BUSINESS</b> Wants, Resources and Choices	<p>Due to scarcity, choices need to be made about how limited resources are used (e.g. using the land to grow crops or to graze cattle) (ACHASSK119)</p> <p>Resources can be natural (e.g. oil), human (e.g. workers), or capital (e.g. machinery), and how these are used to make goods and services to satisfy the needs and wants of present and future generations (ACHASSK120)</p> <p>The factors that influence purchase decisions (e.g. age, gender, advertising, price) and how these decisions affect resource use (ACHASSK121)</p> <p>Strategies for making informed consumer and financial decisions (e.g. budgeting, comparing prices, saving for the future) (ACHASSK121)</p>
	<b>QUESTIONING AND RESEARCHING</b>	<p>Identify current understandings, consider possible misconceptions and identify personal views on a topic (e.g. KWL chart, concept map) (WAHASS50)</p> <p>Locate and collect information and/or data from a range of appropriate primary sources and secondary sources (e.g. museums, media, library catalogues, interviews, internet) (WAHASS52)</p> <p>Record selected information and/or data using a variety of methods (e.g. use graphic organisers, paraphrase, summarise) (WAHASS53)</p> <p>Use ethical protocols when gathering information and/or data (e.g. acknowledge the work of others, reference work appropriately, obtain permission to use photographs and interviews) (WAHASS54)</p>
Humanities and Social Sciences skills	<b>ANALYSING</b>	<p>Use criteria to determine the relevancy of information (e.g. consider accuracy, reliability, publication date, usefulness to the question) (WAHASS55)</p> <p>Interpret information and/or data collected (e.g. sequence events in chronological order, identify cause and effect, make connections with prior knowledge) (WAHASS56)</p> <p>Identify different points of view/perspectives in information and/or data (e.g. analyse language, identify motives) (WAHASS57)</p> <p>Translate collected information and/or data to a variety of different formats (e.g. create a timeline, draw maps, convert a table of statistics into a graph) (WAHASS58)</p>
	<b>EVALUATING</b>	<p>Draw and justify conclusions, and give explanations, based on the information and/or data in texts, tables, graphs and maps (e.g. identify patterns, infer relationships) (WAHASS59)</p> <p>Use decision-making processes (e.g. share opinions and personal perspectives, consider different points of view, identify issues, develop possible solutions, plan for action, identify advantages and disadvantages of different options) (WAHASS60)</p>
	<b>COMMUNICATING AND REFLECTING</b>	<p>Present findings, conclusions and/or arguments, appropriate to audience and purpose, in a range of communication forms (e.g. written, oral, visual, digital, tabular, graphic, maps) and using subject-specific terminology and concepts (WAHASS61)</p> <p>Develop a variety of texts, including narratives, descriptions, biographies and persuasive texts, based on information collected from source materials (WAHASS62)</p> <p>Reflect on learning, identify new understandings and act on findings in different ways (e.g. suggest additional questions to be investigated, propose a course of action on an issue that is significant to them) (WAHASS63)</p>

The lessons in Humanities and Social Sciences (HASS) can also serve as the basis for **Mathematics Statistics and Processes**, where students pose survey questions, gather data, interpret and display results.

Mathematics	
Statistics and Probability	<p><b>DATA REPRESENTATION AND INTERPRETATION</b></p> <p>Pose questions and collect categorical or numerical data by observation or survey (<a href="#">ACMSP118</a>)</p> <p>Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies (<a href="#">ACMSP119</a>)</p> <p>Describe and interpret different data sets in context (<a href="#">ACMSP120</a>)</p>
Number and algebra	<p><b>MONEY AND FINANCIAL MATHEMATICS</b></p> <p>Create simple financial plans (<a href="#">ACMNA106</a>)</p>





## Achievement standard

Students identify the imbalance between wants and resources, and the impact of scarcity on resource allocation. They identify that, when making choices, people use strategies to inform their purchasing and financial decisions.



## Background

Wasting food has a significant impact on our precious resources. When we waste food, we waste the resources used to grow our food, such as water, soil and energy. All the energy used to process, package and transport food to our homes is also wasted. The estimated annual cost of food waste to the Australian economy is \$20 billion (National Food Waste Strategy 2017).



## Aim

Students learn about the larger environmental, social and economic issues around food waste. These lessons focus mostly on household waste and begin to explore food rescue.

## Overview

### 1. Inglorious fruits and vegetables

Students learn that supermarkets throw away perfectly good fruit and vegetables based on appearance, and how consumers can be convinced to buy them to prevent them going to landfill.

### 2. What a waste of resources

Students learn about the resources needed to grow, harvest, and sell food and how these limited resources are also wasted when food is thrown away.

### 3. How much food waste is thrown away?

Students learn just how much food is being thrown out in Australia and the financial impacts. This shows how stopping food waste also saves money.

### 4. Make food waste history

Students learn about the actions they can take to stop wasting food, as well as the resources used in food production.

### 5. Rap about reducing food waste

Students create a food waste rap that includes what they have learned about food waste, the resources that are wasted and the impacts on the environment. Students use the rap to persuade people to make the right choice to stop wasting food.

### 6. Make a pledge to stop wasting food

Students explore the scarcity of food that exists for some while there is an abundance for others and reasons it is thrown out, then make a pledge to stop food waste based on what they have learned.

# Lesson 1

## Inglorious fruits and vegetables

### Learning objective

Students learn that supermarkets throw away perfectly good fruit and vegetables based on appearance, and how consumers could be convinced to buy them to avoid going to landfill.

### Activities

1. As a class, watch [Inglorious Fruits and Vegetables](#) (2:30 minutes)
2. Discuss the following questions:
  - a) What types of food were thrown away?
  - b) Why was the food thrown away?
  - c) Where does it go? (landfill). Discuss this question again after the Science experiment about methane is completed.
  - d) How do purchasing decisions affect the use of resources?
3. Make a class list of the strategies that were used to convince people to buy the strange-looking food (a special aisle, marketing, cheaper costs).
4. Research and discuss any local initiatives that provide 'inglorious' food in your area (such as the Woolworths Odd Bunch or Coles' I'm Perfect initiatives). What strategies do these supermarkets use to sell this food? Add to the class list.
5. Discuss the catchy names that are given to the different fruits and vegetables, such as 'Zany Zucchini's', 'Misshaped Mandarins', 'Playful Pears' etc.
6. Students create a concept map, spider diagram or fishbone graphic organiser on why food is thrown out based on appearance.
7. Students create their own 'inglorious' fruit or vegetable and a plan for selling it.

#### Ideas to consider:

- What is your 'inglorious' fruit or vegetable?
  - What catchy name will you give your 'inglorious' fruit or vegetable?
  - Who will be buying your product?
  - How does age, gender and advertising influence purchasing decisions?
  - What strategies will you use to make people buy your product? Refer to the class list for ideas.
8. Students create a poster to market their inglorious fruit or vegetable.



### Taking it further

- > Students interview their own families about their food purchasing habits to gather information. (Secondary source – interviews [WAHASS52](#)).
- > Students visit a supermarket with their parents, or go on a class excursion, and compare the prices of 'inglorious' foods to regular priced food. They create a weekly shopping budget and calculate how much money they will save buying these foods.
- > In English, students create a persuasive text to convince people to buy their 'inglorious foods' (See the English lesson for a template).
- > Watch the [War on Waste](#) videos.

# Lesson 2

## What a waste of resources

### Learning objective

Students learn about the resources needed to grow, harvest, and sell food and how these limited resources are also wasted when food is thrown away.

### Activities

1. Watch the first section of [Food wastage footprint](#) (up to 1:22 minutes). The rest of the video will be viewed at the end of the lesson.
2. Discuss the following questions:
  - a) Why is food thrown away? Discuss reasons why food is bought or made and then thrown out.
  - b) How much of the food that the world produces each year is wasted?
  - c) What other resources are wasted when we throw away food? (Water, energy, transport, money and time. Water is scarce in Australia).
3. Research and list some problems with landfill. Refer to the methane experiment students are doing in science and the impacts on climate change.
4. In small groups, brainstorm what food you most commonly throw out at home and at school.
5. List the resources that go into growing, harvesting and selling that food. Discuss how the resources are wasted and cannot be used for future generations. Is this fair? Why or why not?
6. Students create a mind map to show the relationship between wasting food and wasting resources.



**Popplet** is a good app to use with iPads. **Mindmaps** and **MindMeister** are good apps for collaboration.

7. As a class, watch the rest of the video (1:22 – 3:15) and discuss some of the solutions to food waste.

Have you ever:

- put leftovers in the fridge only to rediscover them a week later with fuzz growing on them?
- bought fresh fruit only to see it's forgotten and become shrivelled and unappetising?
- made dinner for everyone only to find plans have changed and it only gets half eaten?

We need to think about the food we waste.



### Taking it further

- > Show the video [Just Eat It - Field Waste - Celery](#) (1:03 minutes) about harvesting celery to further explore what happens along the supply chain and what is wasted before the product even gets to the shelf.

# Lesson 3

## How much food is thrown away?

### Learning objective

Students learn just how much food is being thrown out and the financial impacts. They make the connection that stopping food waste also saves money.

### Activities

1. Watch [Stop Food Waste](#) (1:03 minutes) about how we buy too much food. It is set to music and shows images of how we shop too much and prepare too much.
2. Discuss the video and list the problems with each situation.
3. Watch [Food waste = money waste](#) (1:23 minutes) to make the connection between food and money.
4. Students review their school lunches. How much money are parents throwing out when school lunches are thrown away? This will be explored further in maths.
5. Students make a video or iMovie highlighting the financial waste when lunches are thrown out. Include estimated figures of money wasted. They may also like to include the following facts:
  - The average Western Australian household wastes **4.04kg** of food per week. (*Food Waste, November 2021*)
  - Food waste costs Western Australian households more than **\$37** per week – that's **\$1,933** worth of food each year!
  - **One fifth or 20%** of the yearly grocery budget is wasted on average. That's like throwing out **1 in every 5** bags of food you buy!
  - At least **54%** of this food waste is avoidable.
  - Australians collectively throw out **7.3 million tonnes** of food each year. (*Food Innovation Australia, 2021*)
  - The Australian economy loses **\$36.6 billion** each year due to food waste with households alone contributing \$19.3 billion.

Note: this may span a few lessons depending on how long it takes to make the iMovie.



**One fifth or 20%**  
of the yearly grocery budget is wasted on average.



### Taking it further

- > Students use the stats above to create their own [Kahoot](#) and test the class!
- > Explore other activities relating to lunch waste in the [Waste-free lunch toolkit](#).
- > Students collect data on food that is thrown out at home for the duration of one week using the [Love Food Hate Waste worksheet](#). Calculate how much money this has cost their family. Students create a family food budget to eliminate this waste.
- > Watch other videos from the [Leanpath blog](#) about food waste. Note that Video 1 is not G rated.

# Lesson 4

## Make food waste history

### Learning objective

Students learn about the choices they have and actions they can take to stop wasting food and resources.

### Activities

1. Watch [Waste Aware UK Make Food history](#) (2:55 minutes).
2. Discuss the video and brainstorm steps to reducing food waste at home:
  - a) Plan ahead.
  - b) Store correctly – freeze, store fruit and vegetables properly.
  - c) Cook what you need.
  - d) Recycle what you can't eat (compost, worm farm, Bokashi). Note: this is from the UK and includes a food waste pick-up service that not all schools have.
3. Investigate the alternatives to throwing away food scraps – worm farms, compost bins, keeping chickens or supplying local farms with food scraps.
4. Divide the class into groups to further explore each solution.
5. Create a PowerPoint presentation showing tips on how to stop food waste and why certain choices need to be made to save resources. Include alternatives to throwing out edible food. This information can also be used in English when creating the food waste cookbook.
6. Groups could present to the rest of class or at a school assembly.



### Taking it further

- > Students plan their own weekly school lunch menu so that they are only packing foods they will eat at school. Write a shopping list and calculate the total cost to eliminate food waste.
- > Students make a plan to be a food boss by completing the [Love Food Hate Waste worksheet](#).
- > Find out what Australia is doing to fight food waste by watching [No time to waste: Halving Australia's food waste by 2030](#) by the Fight Food Waste Cooperative leading food waste action in Australia through research and innovation, industry and government collaboration, policy development and consumer behaviour change.



# Lesson 5

## Rap to reduce food waste

### Learning objective

Students create a food waste rap that includes what they have learned about why food is thrown out, resources that are wasted and the impact on the environment. Students use the rap to persuade people to make the right choice to stop wasting food.

### Activities

1. Watch one of the following videos for inspiration.

“Don’t Waste” - [Lammas school](#), a rap created by students at Lammas School in London, who organised [Eat My Words](#), an event filled with spoken word, poetry and music to get the message about food waste across in an entertaining way.

If Ed Sheeran’s “Shape of You” was about food waste, a cover of the popular song with lyrics changed to food waste issues.

2. Brainstorm food waste vocabulary. Use words from the information collected in English lesson 2.
3. Ask students to think about the issues around food waste and discuss:
  - a) What resources are wasted?
  - b) What are the impacts?
  - c) How can they communicate the message?
4. Write and perform a rap about food waste summing up all they have learned. Other suggested ways to do this include a song, poem, drama skit, news report, debate or persuasive argument.
5. Use the rap as an assembly item and perform to the rest of the school. The rap could be given to the music teacher if your school collaborates with specialist teachers. ([ACAMUM089](#))

**Tips on how to guide students to write a rap can be found at [flocabulary.com](https://www.flocabulary.com).**



### Taking it further

- > Find out about other events or campaigns around the world that raise awareness of food waste.
- > Take your performance to your local community and encourage others in your area to stop food waste.

# Lesson 6

## Pledge to stop food waste

### Learning objective

Students make a pledge based on what they have learned from watching the BTN clip. This can include looking at the scarcity of food that exists for some while there is an abundance for others that is eventually wasted.

### Activities

1. Watch the BTN video [Food Rescue](#) (3:36 minutes).
2. Discuss the following questions:
  - a) What are some of the issues raised in this story?
  - b) What kind of food is being collected?
  - c) How many tonnes is collected each month and how many people does that feed?
  - d) Why is it being collected?
  - e) Where is it taken?
  - f) What ideas did the students in the story have for preventing food waste?
3. Students make a pledge of one thing they can do in their own lives to stop food waste. The pledge can relate to school lunches as well as actions students can take at home.
4. Make a class tree of pledges that can be displayed in the classroom window to show others in the school how you are taking action to stop food waste.



### Taking it further

- > Students ask their families to make a pledge, which can be added to the class tree.
- > Check whether the school canteen has edible leftovers. If so, contact a local Foodbank or other charity to discuss how extra food could be donated.
- > Visit local shops, such as a bakery, to identify how leftover produce is used.
- > Organise a food drive with OzHarvest.
- > Further research the social impacts of food rescue and food scarcity around the world. There are lots of videos available online, including this one [What's the deal with food security?](#) by The Do Something Foundation.

# Mathematics



# Mathematics

## Collecting data for a school food waste infographic

### Year 5 Western Australian Curriculum links

Number and Algebra	NUMBER AND PLACE VALUE	<p>Identify and describe factors and multiples of whole numbers and use them to solve problems (<a href="#">ACMNA098</a>)</p> <p>Use estimation and rounding to check the reasonableness of answers to calculations (<a href="#">ACMNA099</a>)</p> <p>Solve problems involving multiplication of large numbers by one or two-digit numbers using efficient mental and written strategies, and appropriate digital technologies (<a href="#">ACMNA100</a>)</p> <p>Solve problems involving division by a one-digit number, including those that result in a remainder (<a href="#">ACMNA101</a>)</p> <p>Use efficient mental and written strategies and apply appropriate digital technologies to solve problems (<a href="#">ACMNA291</a>)</p>
	MONEY AND FINANCIAL MATHEMATICS	<p>Create simple financial plans (<a href="#">ACMNA106</a>)</p>
Measurement and Geometry	USING UNITS OF MEASUREMENT	<p>Choose appropriate units of measurement for length, area, volume, capacity and mass (<a href="#">ACMMG108</a>)</p>
Statistics and Probability	DATA REPRESENTATION AND INTERPRETATION	<p>Pose questions and collect categorical or numerical data by observation or survey (<a href="#">ACMSP118</a>)</p> <p>Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies (<a href="#">ACMSP119</a>)</p> <p>Describe and interpret different data sets in context (<a href="#">ACMSP120</a>)</p>

### English

Literacy	TEXTS IN CONTEXTS	<p>Show how ideas and points of view in texts are conveyed through the use of vocabulary, including idiomatic expressions, objective and subjective language, and that these can change according to context (<a href="#">ACELY1698</a>)</p>
	INTERPRETING, ANALYSING, EVALUATING	<p>Use comprehension strategies to analyse information, integrating and linking ideas from a variety of print and digital sources (<a href="#">ACELY1703</a>)</p>
	CREATING TEXTS	<p>Use a range of software including word processing programs with fluency to construct, edit and publish written text, and select, edit and place visual, print and audio elements (<a href="#">ACELY1707</a>)</p>



## Achievement standard

Students identify and describe factors and multiples. They solve simple problems involving the four operations using a range of strategies. Students check the reasonableness of answers using estimation and rounding. They identify and explain strategies for finding unknown quantities in number sentences involving the four operations.



## Background

On average each student in WA throws out about three kilograms of edible food each year. **Edible food waste refers to food that is thrown away which is still deemed fit for human consumption.** Each year 3 million pieces of whole fruit are thrown out at school, while 3.5 million whole sandwiches also end up in landfill. Add to that the 1.3 million unopened packaged foods such as muesli bars and crackers, and the results are astounding. Students are often in a rush to get out and play at lunch time and recess, so they have one bite out of an apple and then throw it in the bin.

(Data based on waste audits conducted by the WasteSorted Schools Program). See *Background references* at the end of these lessons.

Behaviour change research tells us that only focusing on the problem does not lead to change in behaviour. We must also provide solutions to empower change. Hence, these activities also draw on knowledge gained in the HASS lessons to incorporate solutions in the infographics.



## Aim

Students learn about the amount of food thrown out at school and use mathematical sentences (+ - / x) to create an infographic to share with the school community.

## Overview

### 1. How much food is thrown away?

Students start collecting statistics on edible food waste and looking at solutions. It is also an introduction to data and infographics.

### 2. How much food is thrown away at school and how much does it cost?

Students use waste audit picture(s) to collect data on how much food is thrown out at school and the cost involved. They complete a worksheet to calculate data on either bananas, apples, sandwiches or packaged foods.

### 3. Making an infographic

Students work in one food waste group (e.g. bananas) and communicate data visually by creating an infographic to show how much food is thrown out at school and possible solutions.

### 4. Sharing with the school community

Students work in expert groups to share their knowledge on each type of edible food waste. Using the data they have collected, they collaborate on the creation of a combined infographic to share with the school community.

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For these activities we recommend conducting your own food waste audit at school, taking photos and using this information instead of



the photo provided. Doing your own food waste audit will make the information more relevant to the students and relatable to what is happening at your school. It will also provide students with other curriculum-linked maths activities such as graphing and analysing results. Use the WasteSorted Schools *Waste Audit toolkit* to conduct your own audit and use the edible food waste data for these activities.

# Lesson 1

## How much food is thrown away?

### Learning objective

Students gather some data on how much food is thrown out at home and at school. They learn how information is presented as an infographic.

### Activities

1. As a class watch the BTN video [Food Waste](#) (3:06 minutes). This is a good way to review the issues of edible food waste and some possible solutions. It also looks at how data is presented and provides an example of an infographic. The end leads into waste from school lunches, which is the focus of the maths lessons.
2. As a class discuss:
  - a) What were some of the food waste statistics shared in the video?
  - b) How were they presented to engage the audience?
  - c) What were the four possible solutions to food waste provided? Were any of these the same as solutions you researched in the HASS lessons?
3. Students use the food waste infographic and the information below it on the following website to answer the questions on the *Infographics* worksheet.

#### Foodwise food waste fast facts

Note: This infographic could be shared with the class in many different ways: displayed on a smartboard; viewed on individual devices; or sections printed out and displayed as posters around the classroom for students to go on an information hunt around the room.



# Lesson 2

## How much food is thrown away at school and how much does it cost?

### Learning objective

Students calculate data on how much food is thrown out at school and the cost involved.

### Activities

1. Look at the photo of the food thrown out at school. Are students surprised? Is this a problem? Why?
2. Divide the class into four groups according to the type of food on the *Food waste calculations* worksheets, i.e. apples, bananas, sandwiches, and packaged foods. Give each student the relevant worksheet to do their own set of calculations.
3. Students review the data they have collected and decide which statistics would be effective on an infographic to display at school or publish in the school newsletter.
4. As a class, estimate how much food is thrown out at your school per day?

**If you did your own food waste audit at school then you will need one photo of the edible food that was thrown away as per the image in the *Food waste calculations* worksheets provided.**



### Taking it further

- > Students take a photo of the food waste thrown out at home and see which is the most common item? They can use extrapolation to calculate how much of this item their family would throw away in one week or one year and how much it would cost.

# Lesson 3

## Making an infographic

### Learning objective

Students communicate data visually by creating an infographic to show how much food is thrown out at school and possible solutions.

### Activities

1. Group students in pairs or small groups based on the type of edible food waste they did the calculations for. E.g. students that did the banana calculations will work together.
2. In their groups, students complete the worksheet *Making an Infographic* in which they choose three statistics and a solution and find suitable images for an infographic.
3. Students work with their group to create a simple infographic on their type of food waste.
4. Display the infographics around the classroom. As a class discuss which ones are effective in engaging the audience and why.



### Taking it further

- > Students search for other infographics. What sorts of topics are represented in infographics? Can the students find any in their daily lives – at school, in the community, at the shops, on adverts?





# Lesson 4

## Sharing with the school community

### Learning objective

Students work in expert groups to share their knowledge on each type of edible food waste. They use the data they have collected to create an infographic to be shared with the school community.

### Activities

1. Organise the students into groups of four so that each group has one person from the banana, apple, sandwich and packaged food groups.
2. Students share with each other the data they collected on their type of edible food waste.
3. Students also share their solution(s) to the food waste. Are any of these the same?
4. As a group, students create an infographic about food waste using at least four statistics, two solutions and images.

#### Ideas to consider:

- What makes an infographic engaging for the audience?
  - Which information, facts, and data are essential? Which aren't?
  - What colours and layout work best in sharing the information?
  - What graphs and graphics best convey information and data to the viewer?
  - What is the best order, or flow, of information?
5. Share infographics with the class.
  6. Consider putting them on the school website or include in the school newsletter. Be sure to include parents in the discussion on the amount of food thrown away and different ways of packing lunches.
  7. As a class, discuss what other changes could be made to reduce food being thrown away at school such as a 'play first eat later' policy or students taking leftover food home.

Note: this activity may span several lessons.

### Websites on how to make an infographic, apps and examples

There are many examples of infographics for food waste online. Below are just a few examples.

[Infographics as a creative assessment](#)

[Reducing food waste one slice at a time](#)

[World Wildlife Fund Reduce Your Food Footprint](#)

### Background references

[Tackling Avoidable Food Waste in Western Australian Schools](#) (Waste Wise Schools, 2016)

[Perth school students ditching tonnes of untouched food each year](#) (Graeme Butler, The West Australian, Monday 4 September 2017 6:54PM)



### Taking it further

- > Investigate food waste statistics for Western Australia in the Waste Authority Report *Food waste: In-home research on food waste in Western Australian households November 2021*.

# Infographics

Name: \_\_\_\_\_

1. What is an infographic?

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2. Record one statistic on food waste that includes:

a percentage	
a weight	
a fraction (or ratio)	
an age	
money	

3. The NSW Environmental Protection Authority surveyed households about food waste. How many households were surveyed?

4. On average, what is the value of food thrown out by each household surveyed?

5. How many households are there in Australia?

6. Write a number expression in the space below to show how to calculate the value of food thrown out by all Australian households.

×  =

**Extrapolation is when we estimate based on a trend we see. For example, in this calculation we estimate the value of food wasted in the whole of Australia using a survey of just 1200 households. Lots of statistics and data in the real world are based on extrapolation.**

7. The value of food wasted was calculated as \$8.04 billion. Why do you think this number was rounded to \$8 billion for the infographic?

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8. Compare the Foodwise infographic to this one on the [OZ Harvest Website](#).

Are any of the statistics the same?

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Which infographic do you prefer to look at and read – FoodWise or OzHarvest? Why?

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## Challenge questions!

9. Study the infographic on plastic below. Compare this to the food waste infographic.

What is similar?

What is different?

10. The plastic infographic identifies some solutions like banning plastic bags and introducing a container deposit scheme. Research the government's response to plastic.

Is there a plastic bag ban in WA? \_\_\_\_\_

When was it introduced? \_\_\_\_\_

What is a container deposit scheme? Is there one in WA? \_\_\_\_\_

When was it introduced? \_\_\_\_\_

Has the WA government banned any other types of plastics? \_\_\_\_\_





4. Did you include the weekend in your calculation? Why not?

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5. How many weeks are usually in a term at school?

6. How many bananas would these students throw out in one term?

**Show your working.**

7. How many bananas would these students throw out in one school year?

**Show your working.**

**Hint:**  
How many terms are there in a year?

8. Compare your calculation to your estimate of the number of bananas thrown out in one year. Was your estimation close?

---

9. What unit would you use to measure the weight

a) of one banana? \_\_\_\_\_

b) of the bananas thrown out at this school in a year? \_\_\_\_\_

10. Estimate how much one banana weighs.

11. Weigh a banana (or ask your teacher for the answer).

How much does a banana weigh?



**EXTENSION:** Weigh ten bananas and find the average weight of a banana.

12. What would be the weight of the bananas thrown out in

a) one day?  grams  kilograms

b) one school year?  grams  kilograms

How many grams in a kilogram? \_\_\_\_\_ g = 1 kilogram

13. The price of bananas is shown in the image.

**Bananas**  
\$3.50 per 1kg



a) How much would the bananas that were thrown away in one year by this school have cost?

b) Do you think this is a waste of money? \_\_\_\_\_

## Challenge questions!

14. There were 400 students at this school. On average, how many bananas does each person throw out in one school year?

**Show your working.**

15. There were 476,110 students enrolled in school in Western Australia in 2022. Use your answer to Q14 to calculate the number of bananas thrown away by all students in WA in one year.

**Show your working.**

16. Round your answer to the nearest

a) thousand

b) hundred thousand

17. How much would the bananas have cost that were thrown away in one year by all WA students? Hint: You will need to know the weight of bananas in kilograms to calculate this.

**Show your working.**

18. Round your answer to the nearest

a) thousand dollars

b) hundred thousand dollars

19. If we took a food waste photo at this school on a different day, would we get a different answer to all these questions? Why or why not?

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**20.** Write down one piece of data that you have calculated that you thought was the most interesting.

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**>> You could use this in your infographic. <<**

**21.** Do students at your school throw away edible fruit like bananas? If so, what could you do to encourage students at your school to eat their bananas or take them home?

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**22.** WasteSorted Schools used the results from 100 audits and calculated that school students in WA throw away 3 million pieces of fruit per year.

a) Why do you think your answer is different? \_\_\_\_\_

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b) Do you think your answer is more or less accurate than WasteSorted Schools? Why?

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**23.** What could you do to make the banana data calculations more accurate?

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4. Did you include the weekend in your calculation? Why not?

---

5. How many weeks are usually in a term at school?

6. How many apples would these students throw out in one term?

**Show your working.**

7. How many apples would these students throw out in one school year?

**Show your working.**

**Hint:**  
How many terms are there in a year?

8. Compare your calculation to your estimate of the number of apples thrown out in one year. Was your estimation close?

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9. What unit would you use to measure the weight

a) of one apple? \_\_\_\_\_

b) of the apples thrown out at this school in one year? \_\_\_\_\_

10. Estimate how much one apple weighs.

11. Weigh an apple (or ask your teacher for the answer).

How much does an apple weigh?



**EXTENSION:** Weigh ten apples and find the average weight of an apple.

12. What would be the weight of the apples thrown out in

- a) one day?  grams  kilograms
- b) one school year?  grams  kilograms

How many grams in a kilogram? \_\_\_\_\_ g = 1 kilogram

13. The price of apples is shown in the image.



**Apples**  
\$6.00 per 1kg

- a) How much would the apples that were thrown away in one year by this school have cost?
- b) Do you think this is a waste of money? \_\_\_\_\_

## Challenge questions!

14. There were 400 students at this school. On average, how many apples does each person throw out in one school year?

**Show your working.**

15. There were 476,110 students enrolled in school in Western Australia in 2022. Use your answer to Q14 to calculate the number of apples thrown away by all students in WA in one year.

**Show your working.**

16. Round your answer to the nearest

a) thousand

b) hundred thousand

17. How much would the apples have cost that were thrown away in one year by all WA students?  
Hint: You will need to know the weight of apples in kilograms to calculate this.

**Show your working.**

18. Round your answer to the nearest

a) thousand dollars

b) hundred thousand dollars

19. If we took a food waste photo at this school on a different day, would we get a different answer to all these questions? Why or why not?

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---

**20.** Write down one calculation that you thought was the most interesting.

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**>> You could use this in your infographic. <<**

**21.** Do students at your school throw away edible fruit like apples? If so, what could you do to encourage students at your school to eat their apples or take them home?

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**22.** WasteSorted Schools used the results from 100 audits and calculated that school students in WA throw away 3 million pieces of fruit per year.

a) Why do you think your answer is different? \_\_\_\_\_

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b) Do you think your answer is more or less accurate than WasteSorted Schools? Why?

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**23.** What could you do to make the apple data calculations more accurate?

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# Food waste calculations: Sandwiches

Name: \_\_\_\_\_

You will use a photo from one school to estimate how many sandwiches are thrown out by all students in WA. That's another example of extrapolation.



This photo shows edible food thrown out in one day at a school. This food was all found in the bin!

1. **Estimate** how many sandwiches the students at this school throw out in one school year. (Just count the sandwiches, not the rolls or hot dog bun).
2. How many sandwiches did the students throw out in one day?
3. Imagine the students from this school throw sandwiches away like this every day. How many sandwiches would these students throw out in one week?

**Show your working.**

4. Did you include the weekend in your calculation? Why not?

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5. How many weeks are usually in a term at school?

6. How many sandwiches would these students throw out in one term?

**Show your working.**

7. How many sandwiches would these students throw out in one school year?

**Show your working.**

**Hint:**  
How many terms are there in a year?

8. How many slices of bread would this be?

9. Compare your calculation to your estimate of the number of sandwiches thrown out in one year. Was your estimation close?

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10. Use this image to answer these questions:

a) How many slices of bread are in this loaf?

b) Would you use the crust to make sandwiches?

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c) How many sandwiches could you make from this loaf of bread?

**Nutrition Information**

Servings per package: 7(12 slices + 2 crust)  
Serving size: 74g (2 slices)

Nutrition	Avg Qty Per Serving	Avg Qty Per 100g
Energy	837kJ	1130kJ
Protein	6.7g	9.1g
Fat, total	1.5g	2.0g
– saturated	0.2g	0.3g
Carbohydrate	38.0g	51.4g
– sugars	12.4g	16.8g
Sodium	215mg	290mg



11. How many loaves of bread would you need to make all the sandwiches thrown away in one year at this school?

**Show your working.**

12. The price of a loaf of bread is shown in the image.

**Bread**  
\$2.80



- a) How much would the bread in the sandwiches have cost that were thrown away in one year by this school?

- b) Do you think this is a waste of money? \_\_\_\_\_

## Challenge questions!

13. There were 400 students at this school. On average, how many sandwiches does each person throw out in one school year?

**Show your working.**

14. There were 476,110 students enrolled in school in Western Australia in 2022. Use your answer to Q13 to calculate the number of sandwiches thrown away by all students in WA in one year.

**Show your working.**

15. Round your answer to the nearest

a) thousand

b) hundred thousand

16. How many loaves of bread were thrown out by all students in WA in one year?

Hint: You will need to know how many slices of bread were thrown out in a year to calculate this.

**Show your working.**

17. How much would the bread in the sandwiches have cost that were thrown away in one year by all WA students?

**Show your working.**

18. Round your answer to the nearest

a) thousand dollars

b) hundred thousand dollars

19. If we took a food waste photo at this school on a different day, would we get a different answer to all these questions? Why or why not?

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20. Write down one calculation that you thought was the most interesting.

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>> You could use this in your infographic. <<

21. Do students at your school throw away edible food like sandwiches? If so, what could you do to encourage students at your school to eat their sandwiches or take them home?

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22. WasteSorted Schools used the results from 100 audits and calculated that school students in WA throw away 1.5 million sandwiches per year.

a) Why do you think your answer is different? \_\_\_\_\_

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b) Do you think your answer is more or less accurate than WasteSorted Schools? Why?

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23. What could you do to make the sandwich data calculations more accurate?

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# Food waste calculations: Packaged foods

Name: \_\_\_\_\_

You will use a photo from one school to estimate how much packaged food is thrown out by all students in WA. That's another example of extrapolation.



This photo shows edible food thrown out in one day at a school. This food was all found in the bin!

## Part A. Muesli bar calculations

1. **Estimate** how many muesli bars the students at this school throw out in one school year.
2. How many muesli bars did the students throw out in one day?
3. Imagine the students from this school throw muesli bars away like this every day. How many packaged items would these students throw out in one week?

**Show your working.**

4. Did you include the weekend in your calculation? Why not?

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5. How many weeks are usually in a term at school?

6. How many muesli bars would these students throw out in one term?

**Show your working.**

7. How many muesli bars would these students throw out in one school year?

**Show your working.**

**Hint:**  
How many terms are there in a year?

8. Compare your calculation to your estimate of the number of muesli bars thrown out in a year. Was your estimation close?

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9. What unit would you use to measure the weight

a) of one muesli bar? \_\_\_\_\_

b) of the muesli bars thrown out at this school in one year? \_\_\_\_\_

10. Estimate how much one muesli bar weighs.

11. Weigh a muesli bar (or ask your teacher for the answer).

How much does a muesli bar weigh?



**EXTENSION:** Weigh ten muesli bars and find the average weight of a muesli bar.

12. What would be the weight of the muesli bars thrown out in

- a) one day?  grams  kilograms
- b) one school year?  grams  kilograms

How many grams in a kilogram? \_\_\_\_\_ g = 1 kilogram

## Part B. Packaged item calculations

13. Looking at other packaged items, including fruit cups and tuna tins, how many packaged items did the students throw out in one day?

14. Do you think the biscuits are home-made or from a packet? Did you count them in the packaged items thrown away?

---

15. Imagine the students from this school throw packaged items away like this every day. How many packaged items would these students throw out in one week?

**Show your working.**

16. How many packaged items would these students throw out in one term?

17. How many packaged items would these students throw out in one school year?

18. Use your answer to Q7 and 17 to work out the total number of packaged items the students throw away in one year.

**Show your working.**

19. The price of each packaged item is shown in the picture. Show your working out for each calculation below.



**Muesli Bars Chewy Choc**  
**6pk 185g**  
\$3.20



**Canned Tuna**  
**95g**  
\$2.00



**Fruit in Jelly**  
**4x120g**  
\$2.50

a) If 6 muesli bars cost \$3.20, how much does one muesli bar cost?

b) How much would the muesli bars that were thrown away in one year by this school cost?

c) How much would the tuna that was thrown away in one year by this school have cost?

d) How much would the fruit cups that were thrown away in one year by this school have cost? Hint: You will need to know the cost of one fruit cup. The cost in the picture is for 4.

e) What is the total value of all packaged foods thrown out by this school in one year?

f) Do you think this is a waste of money? \_\_\_\_\_

## Challenge questions!

**20.** There were 400 students at this school. On average, how many packaged items does each person throw out in one school year?

**Show your working.**

**21.** There were 476,110 students enrolled in school in Western Australia in 2022. Use your answer to Q20 to calculate the number of packaged items thrown away by all students in WA in one year.

**Show your working.**

**22.** Round your answer to the nearest

a) thousand

b) hundred thousand

**23.** If we took a food waste photo at this school on a different day, would we get a different answer to all these questions? Why or why not?

---

---

**24.** Write down one calculation that you thought was the most interesting.

---

---

**>> You could use this in your infographic. <<**



**25.** Do students at your school throw away packaged items like muesli bars? If so, what could you do to encourage students at your school to eat them or take them home?

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**26.** WasteSorted Schools used the results from 100 audits and calculated that school students in WA throw away 1.5 million packaged items per year.

a) Why do you think your answer is different? \_\_\_\_\_

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b) Do you think your answer is more or less accurate than WasteSorted Schools? Why?

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---

**27.** What could you do to make the packaged food data calculations more accurate?

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# Making an infographic

Name: \_\_\_\_\_

**Note: You will take this sheet with you when you move to work with your expert group.**

1. I am an expert in \_\_\_\_\_.  
(choose one: bananas, apples, sandwiches or packaged food)
2. From your research, choose three statistics about food waste thrown out by students in WA that include:

<b>total numbers</b>	
<b>weight</b>	
<b>costs involved</b>	

3. Search for images that you could use on an infographic for your topic and statistics. Look for suitable images in food magazines, supermarket catalogues, online or create your own. If searching online, save the images to your device or onto a USB. Make a note of the image and where you found it in the table below.

<b>Image</b>	<b>Source</b>

# English



### Year 5 Western Australian Curriculum links

Literacy	INTERPRETING, ANALYSING AND EVALUATING	<p>Identify and explain characteristic text structures and language features used in imaginative, informative and persuasive texts to meet the purpose of the text (<a href="#">ACELY1701</a>)</p> <p>Navigate and read texts for specific purposes applying appropriate text processing strategies, for example predicting and confirming, monitoring meaning, skimming and scanning (<a href="#">ACELY1702</a>)</p> <p>Use comprehension strategies to analyse information, integrating and linking ideas from a variety of print and digital sources (<a href="#">ACELY1703</a>)</p>
	CREATING TEXT	<p>Plan, draft and publish imaginative, informative and persuasive print and multimodal texts, choosing text structures, language features, images and sound appropriate to purpose and audience (<a href="#">ACELY1704</a>)</p>
Language	TEXT STRUCTURE AND ORGANISATION	<p>Understand how texts vary in purpose, structure and topic as well as the degree of formality (<a href="#">ACELA1504</a>)</p> <p>Understand that the starting point of a sentence gives prominence to the message in the text and allows for prediction of how the text will unfold (<a href="#">ACELA1505</a>)</p> <p>Investigate how the organisation of texts into chapters, headings, subheadings, home pages and subpages for online texts and according to chronology or topic can be used to predict content and assist navigation (<a href="#">ACELA1797</a>)</p>
	EXPRESSING AND DEVELOPING IDEAS	<p>Understand how <b>noun</b> groups/phrases and <b>adjective</b> groups/phrases can be expanded in a variety of ways to provide a fuller description of the person, place, thing or idea (<a href="#">ACELA1508</a>)</p> <p>Understand the use of vocabulary to express greater precision of meaning, and know that words can have different meanings in different contexts (<a href="#">ACELA1512</a>)</p>
	PHONICS AND WORD KNOWLEDGE	<p>Understand how to use knowledge of known words, base words, prefixes and suffixes, word origins, letter patterns and spelling generalisations to spell new words (<a href="#">ACELA1513</a>)</p>

### Mathematics

Statistics and Probability	DATA REPRESENTATION	<p>Pose questions and collect categorical or numerical data by observation or survey (<a href="#">ACMSP118</a>)</p> <p>Construct displays, including column graphs, dot plots and tables appropriate for data type, with and without the use of digital technologies (<a href="#">ACMSP119</a>)</p> <p>Describe and interpret different data sets in context (<a href="#">ACMSP120</a>)</p>
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## Achievement standard

Students use language features to show how ideas can be extended. They develop and explain a point of view about a text, selecting information, ideas and images from a range of resources. Students create imaginative, informative and persuasive texts for different purposes and audiences. When writing, they demonstrate understanding of grammar using a variety of sentence types. They select specific vocabulary and use accurate spelling and punctuation. They edit their work for cohesive structure and meaning.



## Background

We're not using our food as wisely as we could, and it costs households money. It impacts the environment and contributes to climate change. There are steps everyone can take to reduce household and school food waste. Instead of throwing leftover food away, one solution is to use it to cook something delicious.

A cookbook is an example of an informative text, which has the primary purpose to provide information and can include instructions and directions. Students will learn the text structure and language features of a procedural text while exploring the important issues surrounding food waste.

Recipes focus on the types of edible fruit and vegetables thrown out during recess and lunch at school. This typically includes bananas, apples, oranges or any food that may have been slightly bruised or damaged. Students use the knowledge and information gained from the HASS and Maths lessons in this unit.



## Aim

Students learn about food waste solutions by creating recipes for a class cookbook using avoidable food waste.

## Overview

### 1. Why write a food waste cookbook?

Introduce the writing structure of informative text and explore different types of cookbooks, focusing on the introduction.

### 2. What's in a cookbook introduction?

Students collect information for the introduction to the cookbook explaining why throwing food away is a problem and how a food waste cookbook will reduce the amount of edible food going to landfill.

### 3. Writing a great introduction

Students have become food waste experts based on what they have learned so far. They use their knowledge to create an informative text by writing the introduction to the food waste cookbook.

### 4. Text structure of a recipe

Students review and sequence recipes to learn about the text structure of a procedure.

### 5. Language features of a recipe

Students learn about the language features of a recipe and create a word bank of nouns, verbs, adverbs, adjectives and sequence adverbs.

### 6. Don't throw it in the bin!

Students look at recipes using fruits and vegetables to get inspired to create their own food waste recipe.

### 7. Publish a class food waste cookbook

Students finish writing their recipe and collate them all together to produce the class food waste cookbook.

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These lessons draw on the knowledge of food waste and commonly discarded food types gained in the HASS and Maths lessons. Consider commencing these after lessons 1 and 2 or when both subjects have been completed.

# Lesson 1

## Why write a food waste cookbook?

### Learning objective

Students are introduced to the writing structure of a cookbook as an informative text, focusing on the introduction.

### Activities

1. Watch the video [Life of a strawberry](#) (1:52 minutes).
2. Discuss the following questions:
  - a) Why were the strawberries thrown out?
  - b) What do you think are some other commonly thrown out fruit and vegetables and why they are thrown out. At home? At school?
  - c) What else can be done with some fruit and vegetables that have gone a bit soft or are bruised? (Cook with them).
  - d) Other than the internet how can we find a recipe? Who has used a cookbook?



### Discussion points:

#### Why do we throw away so much food at home?

- We forget about food we have in the fridge.
- We don't check the cupboard or fridge before going shopping.
- We're not planning our meals as much as we could.
- We don't use our food before the use-by or best-before dates.
- We buy or cook more than we need.
- We don't know how to use leftovers.

#### Why do students throw away so much food at school?

- They do not have enough time to eat.
- They do not like the food that is packed.
- Too much food is packed.
- The fruit is bruised or not stored properly.

3. In pairs, students look through one cookbook (hardcopy or online). Ask them to find the introduction. With their partner, complete the *Finding information in a cookbook introduction* worksheet to discover the purpose of a cookbook introduction.
4. As a class brainstorm ideas and describe the purpose and features of a cookbook introduction:
  - Give the target audience information, facts and data.
  - Write as an 'expert' using the third person.
  - Use technical words related to the topic.
  - Provide a logical sequence of ideas.



### Taking it further

- > Students have a look at cookbooks at home and bring in a favourite or one with a great introduction.



# Lesson 2

## What's in a cookbook introduction?

### Learning objective

Students collect information on food waste to include in the cookbook introduction.

### Activities

1. Watch one or two of these videos to introduce some food waste recipe ideas: [Eating Garbage](#).
2. As a class discuss the food that was being used up and what would have happened to the food if it had not been used in cooking.
3. Thinking about cookbook introductions, discuss what kind of information should be included in a food waste cookbook introduction.

#### Ideas to consider:

- What are the environmental and social impacts of food waste?
  - How is money wasted?
  - What is the role of food rescue?
  - Why should we use uneaten fruit and vegetables rather than send them to landfill?
4. Students work individually or in pairs to gather information about the issue of food waste in Australia for their cookbook introduction. Below are some suggested websites for research. Include any others that you are familiar with.

[Food waste facts](#) Queensland Government

[Fight climate change by preventing food waste](#) World Wildlife Fund (WWF)

[Jamie Oliver's food waste tips will make your cooking even better](#) Huffington Post

Note: Students can also use the information collected in the HASS and Maths lessons.

5. Students record the information they have gathered on the *Collecting information about food waste* worksheet.



Jamie Oliver's  
FOOD WASTE TIPS



### Taking it further

- > Create a spelling unit based on important vocabulary gathered during this lesson.
- > Students watch other recipe videos from [Eating Garbage](#) and find one they could try at home.

# Lesson 3

## Writing a great introduction

### Learning objective

Students write and edit their own introduction to the class food waste cookbook.

### Activities

1. Watch the TED talk [Stop wasting food: Selina Juul](#) (8 minutes in total but can stop at 4:12).
2. Tell students that they are now ready to write a cookbook introduction. As a class discuss the importance of the following language features in an informative text:
  - Audience (who will be reading the text)
  - Structure (how is the text organised)
  - Ideas (facts and details)
  - Description (the way the information is described – aspects/stages of the topic)
  - Vocabulary (types of words used)
  - Cohesion (and, but, before, during, etc.)
  - Paragraphs (groups ideas)
  - Spelling
3. Students use the information they collected in the previous lesson to write an introduction to the class cookbook. They must use the following text structure.
  - **Title:** How or why question.
  - **Introduction:** Opening statement, identify topic and significance of topic.
  - **Body:** Each paragraph addresses a different issue.
  - **Conclusion:** Final statement about the topic of food waste.
4. Students write a draft, peer edit and then write the final copy of an introduction.
5. They can also look for images to include in the final copy.



### Taking it further

- > Find other TED talks by individuals on food waste and what they are doing about it.



# Lesson 4

## Text structure of a recipe

### Learning objective


Students review and sequence recipes to learn the structure of a procedure.

## Activities

1. Read aloud a recipe for a simple [chocolate fudge cake](#). As a class discuss what kind of text it is. Why do they think it's a **procedure**?
2. Explain that a procedure contains step-by-step instructions for a task and includes:
  - title
  - purpose
  - list of materials or ingredients
  - steps required – numbered
  - a conclusion
  - possibly an image or picture.
3. Discuss these components and ask the students to identify the type of procedure it is (**a recipe**).
4. Ask the students, "Why is the title important? What does it tell us about the recipe?"
5. Divide the class into small groups. Give each group a copy of a recipe from [Love Food Hate Waste](#), or a recipe of your choice, that has been pre-cut into sentence strips.
6. Students work together to put the recipe in order following a graphic organiser displayed on the board: title, purpose, ingredients, method, conclusion.
7. Optional: Students create a digital recipe of the one they put together and include an image. They could use the Pic Collage app.

**BASIC CHOCOLATE FUDGE CAKE**

INGREDIENTS	METHOD
<ul style="list-style-type: none"><li>• 250G UNsaltED BUTTER, CHOPPED</li><li>• 300G DARK/COOL CHOCOLATE, CHOPPED</li><li>• 2 TABLESPOONS DUTCH COCOA, SIFTED</li><li>• ½ CUP (125ML) MILK</li><li>• 4 EGGS</li><li>• 1 CUP (250G) CASTER (SUPERFINE) SUGAR</li><li>• ½ CUP (85G) BROWN SUGAR</li><li>• 1 CUP (180G) PLAIN (ALL-PURPOSE) FLOUR</li></ul>	<ol style="list-style-type: none"><li>1 Place the butter and chocolate in a medium saucepan over low heat and stir until melted and smooth. Add the cocoa and milk and stir to combine. Set aside to cool slightly.</li><li>2 Place the egg and both the sugars in the bowl of an electric mixer and whisk on high speed for 12-15 minutes or until pale, thick and creamy.</li><li>3 Add the chocolate mixture to the egg mixture and whisk, scraping down the sides of the bowl, until just combined. Reduce the speed to low, add the flour and whisk until just combined.</li><li>4 Preheat oven to 160°C (325°F).</li><li>5 Lightly grease a 22cm round springform cake tin and line with non-stick baking paper.</li><li>6 Pour the cake mixture into the tin and bake for 1 hour - 1 hour 10 minutes or until set. Allow to cool completely in the tin.</li><li>7 Remove the cake from the tin to serve. <b>Serves 8-10</b></li></ol> <p>* The cake is ready when it feels set to the touch. If tested, a wooden skewer will not come out clean - the cake will set with a fudgy centre as it cools.</p>



TAGS: BASICS, BASICS TO BRILLIANCE, CAKES, CHOCOLATE, DARK CHOCOLATE

**Genre:** Recipe

**Text features:**

Contains step-by-step instructions on the procedure of making a food, dish or drink and a list of ingredients required.



## Taking it further

- > Explore other procedure texts using lesson ideas from [Baking a Banana Cake](#), [Classroom Literacy ideas](#).

# Lesson 5

## Language features of a recipe

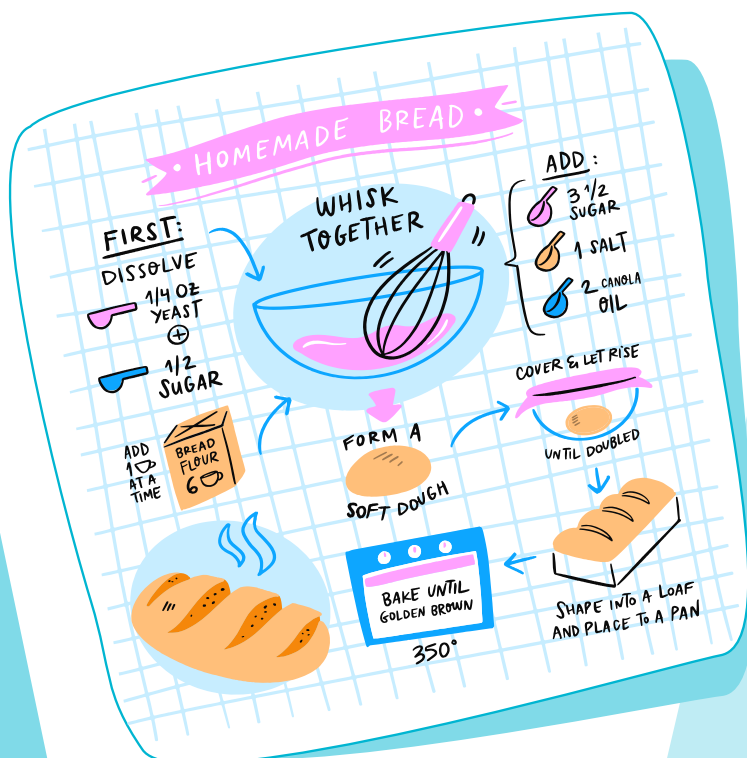
### Learning objective

Students learn about the language features of a recipe including nouns, verbs, adverbs and adjectives, and the importance of using sequencing words when writing a procedure.

### Activities

1. Display the chocolate cake recipe from Lesson 4 on the board.
2. Discuss the types of words used in the 'Method' section. Why is word choice so important?
3. Discuss the importance of choosing nouns, verbs, adverbs and adjectives that help the reader to follow the procedure. (Audience)
4. As a class identify the following words used in the procedure:
  - a) nouns, such as 'butter', 'milk' and 'flour'
  - b) verbs, such as 'stir', 'whisk', 'grease' and 'pour'
  - c) adverbs, such as 'lightly'
  - d) adjectives, such as 'smooth', 'pale' and 'creamy'.
5. Students create their own word bank as these words are identified. They could set this up as a table with headings (see below). This will be useful for students to refer to later.

Verbs	Adverbs	Nouns	Adjectives	Sequence adverbs
Beat	Slowly	Eggs	Softened	Next



**Genre:** Recipe

### Language features:

Contains nouns (flour, milk, eggs), verbs (mix, pour), adverbs (gradually, gently, quickly), and adjectives (mashed, softened) in the procedure. Contains two headings (Ingredients and Method). May include an image.

**Audience:** People who like to cook.

# Lesson 5

## Language features of a recipe (continued)

6. Discuss the importance of the sequence when following a procedure.
7. Prompt students to identify words that indicate sequence or time, such as 'preheat the oven', 'alternating', 'until' and 'before'.
8. Ask students for more sequencing adverbs, such as 'first', 'then', 'next', 'before', 'after' and 'finally'. Add these to their word bank.
9. Brainstorm appropriate conclusions for the procedure, such as 'Enjoy!' or 'Best chocolate cake ever!' or 'Bon Appetit!'
10. Optional: Students create their own cooking verbs slideshow using photos from their cooking sessions, like this one, [Cooking Action Verbs](#). They could also look through other recipes to find more cooking verbs, see examples in the table below.

Cooking verbs. How could adverbs enhance these? E.g. 'slice thinly' and 'pour slowly'.

bake	fold	chop	mix	blend	beat
stir	slice	cream	mince	crush	refrigerate
chill	fry	sauté	whisk	boil	crush
coat	pour	combine	simmer	reduce	shred
strain	add	puree	whip	peel	grate
remove	toast	cover	steam	drain	broil



### Taking it further

- > Search for words for old style measurements and strange cooking terms (extracts from old Country Women's Association cookbooks would make great examples).
- > Students write each other instructions on how to make a jam sandwich and then try it out. The outcome is to be explicit. See the idea in this [video](#).

# Lesson 6

## Don't throw it in the bin!

### Learning objective

Students research and plan a recipe that uses a common type of fruit or vegetable thrown out at school.

### Activities

1. Review with students the most common fruits and vegetables thrown out at school. Include information and data from lessons in HASS and Maths on bananas, apples, carrots and so on.
2. Ask each student to choose one fruit or vegetable and research recipe ideas using the following websites. Students could also be creative in finding recipe ideas, such as asking for family favourites.

Foodwise

Spoon University

Love food hate waste

OzHarvest

You could choose only banana recipes: [21 Delicious Recipes to Make with Overripe Bananas](#)

3. Provide students time to 'think, pair, share' with a classmate to talk about their recipe ideas.
4. Each student chooses a recipe they want to include in the class food waste cookbook. Discuss as a class so everyone has a different recipe.
5. Students complete the worksheet *Planning a recipe* to plan ideas for their chosen recipe.

This lesson draws on information gathered from your school food waste audit and Maths lessons 1 and 2.



### Taking it further

- > Students take their recipe home to bake and test, make any changes or improvements and add these to the planning worksheet.
- > Set up a "My [School Name] Rules" activity, where pairs of students are judged by the principal or teachers.

# Lesson 7

## Write a recipe

### Learning objective

Students write their food waste recipe including text structure and language features of a procedural text.

### Activities

1. Using their planning worksheet, students write a draft of their recipe.
2. Students work with a partner to edit and refine their recipe.
3. Each student writes a final copy of their recipe and includes an image.
4. Collate the recipes and choose one introduction or write one together as a class.
5. Finalise and publish the class food waste cookbook. This can be done electronically.

**The recipe can be used as an assessment.**



**Provide students with the assessment rubric on page 65, detailing requirements such as title, purpose, ingredients, procedural steps, conclusion, and use of language features in their word choices.**

**Celebrate your achievement by making one of the recipes for a special snack.**



### Taking it further

- > Students design a cover for the cookbook.
- > Sell the cookbook within the school community, with proceeds going to a charity such as Foodbank.
- > Conduct a MasterChef activity using the recipes.
- > Create some of the recipes for a shared lunch with your class.

# Finding information in a cookbook introduction

Name: \_\_\_\_\_

Who is the expert writing this cookbook and what topic are they writing about?

---

---

---

Three facts I have learned from this cookbook introduction:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Technical words used in the introduction

Main ideas

# Collecting information about food waste

Name: \_\_\_\_\_

(Environmental impacts, money, food rescue and social impacts)

Sequence adverbs		Important vocabulary
First	Although	
Second	Finally	
Next	Last	
Also	To begin with	
Furthermore	For instance	
Because	In contrast	
Therefore	In other words	
Eventually	As a result	
Besides	In fact	
Additionally	As an illustration	
And	For example	
Another	In addition	
But	Especially	
However	Equally important	
Facts	Supporting Details	
1.	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	
2.	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	
3.	<ul style="list-style-type: none"> <li>•</li> <li>•</li> <li>•</li> </ul>	

# Planning a recipe

Name: \_\_\_\_\_

<b>Title</b>	
<b>Purpose</b>	
<b>Ingredients</b>	
<b>Method</b>	
<b>Servings</b>	
<b>Conclusion</b>	
<b>Image</b>	



# Recipe assessment task judging standards

## YEAR 5 ENGLISH ASSESSMENT POINTERS WRITING AND CREATING

	<b>A</b> <b>Excellent achievement</b>	<b>B</b> <b>High achievement</b>	<b>C</b> <b>Satisfactory achievement</b>	<b>D</b> <b>Limited achievement</b>	<b>E</b> <b>Very low achievement</b>
<b>Text structure</b>	Creates appropriately structured written text, experimenting with stylistic features for a specific purpose and audience.	Creates written text, using appropriate text structure for a specific purpose and audience.	Creates written text for a specific purpose and audiences.	Creates simple written text for a specific purpose.	Does not meet the requirements of a D grade.
<b>Language features</b>	Selects and uses a range of sophisticated and effective vocabulary to extend ideas and meet the purpose of the text.  Uses a variety of sentence types for effect, and uses a range of word groups/phrases, conjunctions and connectives to create cohesive texts.	Selects and uses a range of specific vocabulary to extend ideas and meet the purpose of the text.  Uses a variety of sentence types for effect, and uses simple word groups/phrases, conjunctions and connectives to create cohesive texts.	Selects and uses a range of vocabulary in an attempt to extend ideas and meet the purpose of the text.  Uses a variety of sentence types, and uses simple word groups/phrases, conjunctions and connectives to create cohesive texts.	Uses familiar vocabulary in an attempt to extend ideas.  Uses mostly simple and compound sentences and simple, repetitive vocabulary.	Does not meet the requirements of a D grade.
<b>Spelling</b>	Spells familiar words and uses phonic and spelling knowledge to spell less familiar and new words, with accuracy.	Spells familiar words accurately and uses phonic and spelling knowledge to attempt less familiar and new words, with greater accuracy.	Spells familiar words accurately and uses phonic and spelling knowledge to attempt less familiar and new words.	Spells some common words accurately and uses phonic knowledge to attempt less familiar words.	Does not meet the requirements of a D grade.
<b>Punctuation</b>	Uses boundary punctuation with consistency and accuracy and uses more complex punctuation to support meaning with greater accuracy.	Uses boundary punctuation with consistency and accuracy and attempts more complex punctuation to support meaning with some accuracy.	Uses boundary punctuation with consistency and accuracy and attempts more complex punctuation to support meaning.	Uses boundary punctuation and attempts some use of quotation marks and commas within sentences.	Does not meet the requirements of a D grade.
<b>Editing</b>	Develops criteria, including cohesive structure and meaning, to edit and revise their work.	Edits and revises their work for cohesive structure and meaning.	Edits their work for cohesive structure and meaning.	Makes simple edits to their work.	Does not meet the requirements of a D grade.

# NAPLAN

## Writing a persuasive text



The general topic of food waste can also be used as a persuasive writing topic. This links to what students are learning in HASS and can be added onto the *Inglorious Fruits and Vegetables* lesson.

## Supermarkets should sell 'inglorious' fruits and vegetables.

Planning a persuasive text helps students think of different arguments and come up with reasons to support them.

### Outline for persuasive text

#### **Title:**

Grabs the attention of the reader and uses strong emotive words.

#### **Introduction:**

Tells the reader what the topic is, why it is important and their point of view on the issue.

#### **Body:**

A series of paragraphs, each with a few sentences, the first being a topic sentence, and each presenting a new argument and reasons to support it.

#### **Conclusion:**

Sums up the main points in a few sentences and demands the reader agrees with you and takes some form of action.

### Ideas for starting

- Use a rhetorical question: Why do supermarkets throw away tonnes of fruits and vegetables?
- Start with a clear statement: Tonnes of perfectly edible fruits and vegetables are thrown away every year simply because they do not look good.
- Use emotive language: unfortunately, disastrous results, enraged...
- Use personal pronouns: I believe...

### Supporting evidence

- Facts and figures.
- Expert quotes.
- Appeal to the values and emotions of the reader.

### Persuasive devices

- Appeal to logic.
- Appeal to values and emotions.
- Use rhetorical questions.
- Use figurative language such as similes.
- Use comparison and contrast.
- Reference statements.
- Use modality (level or intensity of a verb can be changed: must, should, might).

## Vocabulary for persuasive writing

Positive	Negative	Words to join
Brilliant	Aggressive	And
Handy	Dreadful	So
Valuable	Terrible	If
Support	Ghastly	Since
Urgent	Unfair	However
Vital	Ineffective	Otherwise
Unique	Pressured	Although
Supportive	Awful	On the other hand
Dependable	Penalise	Because
Improve	Punishment	For example
Incredible	Deprive	As well as
Crucial	Frighten	Also
Certain	Atrocious	Firstly
Obvious	Spiteful	Finally
Confident	Irritate	But
Agree	Error	Given that
Absolutely	Conflict	As a result
Must	Irresponsible	While
Secure	Blunder	Nevertheless
Significant	Decline	Consequently

# Persuasive essay planner

Name: \_\_\_\_\_

## Paragraph 1 – Introduction

Attention grabbing beginning:

Description of issue:

Opinion statement:

## Paragraph 2

Reason #1:

Supporting evidence:

## Paragraph 3

Reason #2:

Supporting evidence:

## Paragraph 4

Reason #3:

Supporting evidence:

## Paragraph 5 – Conclusion

Restate opinion:

Summarise three reasons:

Call to action or closing statement:

# Science



# Science

## Food waste and methane gas

### Year 5 Western Australian Curriculum links

Science Understanding	CHEMICAL SCIENCES	Solids, liquids and gases have different observable properties and behave in different ways ( <a href="#">ACSSU077</a> )
Science as a Human Endeavour	USE AND INFLUENCE OF SCIENCE	Scientific knowledge is used to solve problems and inform personal and community decisions ( <a href="#">ACSHE083</a> )
Science Inquiry Skills	QUESTIONING AND PREDICTING	With guidance, pose clarifying questions and make predictions about scientific investigations ( <a href="#">AC SIS231</a> )
	PLANNING AND CONDUCTING	Identify, plan and apply the elements of scientific investigations to answer questions and solve problems using equipment and materials safely and identifying potential risks ( <a href="#">AC SIS086</a> )  Decide variables to be changed and measured in fair tests, and observe measure and record data with accuracy using digital technologies as appropriate ( <a href="#">AC SIS087</a> )
	PROCESSING AND ANALYSING DATA AND INFORMATION	Construct and use a range of representations, including tables and graphs, to represent and describe observations, patterns or relationships in data using digital technologies as appropriate ( <a href="#">AC SIS090</a> )
	EVALUATING	Reflect on and suggest improvements to scientific investigations ( <a href="#">AC SIS091</a> )
	COMMUNICATING	Communicate ideas, explanations and processes using scientific representations in a variety of ways, including multi-modal texts ( <a href="#">AC SIS093</a> )

### Mathematics

Statistics and Probability	DATA REPRESENTATION AND INTERPRETATION	Pose questions and collect categorical or numerical data by observation or survey ( <a href="#">AC MSP118</a> )  Construct displays, including column graphs, dot plots and tables, appropriate for data type, with and without the use of digital technologies ( <a href="#">AC MSP119</a> )
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## Achievement standard

Students follow instructions to pose questions for investigation and predict the effect of changing variables when planning an investigation. They use equipment in ways that are safe and improve the accuracy of their observations.



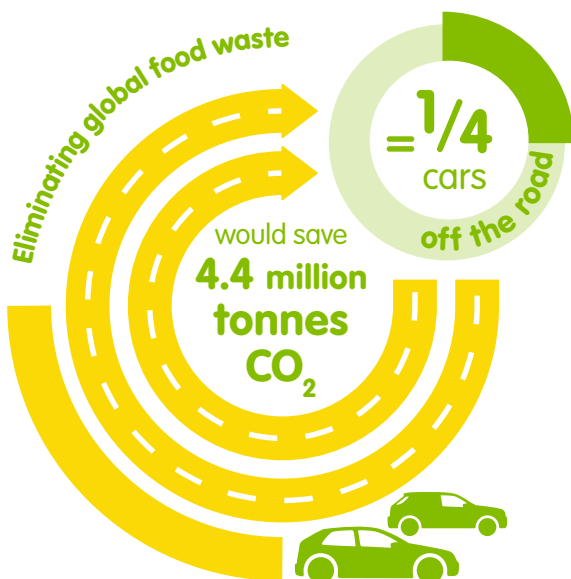
## Background

Food waste is food that is discarded or cannot be used. The causes of food waste are numerous and occur at all stages of the supply chain, including production, processing, retail and consumption. When food is wasted, the water and energy used on farms and the energy used to transport food from the supermarket to the fridge is wasted too.

When food waste is disposed of in landfill there are environmental impacts, such as the production of greenhouse gases like methane and carbon dioxide (CO<sub>2</sub>). When organic material, such as fruit or veggies, rot in landfill, it is known as 'anaerobic decomposition'. Anaerobic means there's no oxygen in the process. When the organic material breaks down without oxygen, methane and carbon dioxide gases are released.

Reducing the amount of food waste in landfill will reduce the impact of waste on our environment over time.

- It is estimated that 7.6 million tonnes of carbon dioxide was generated in 2014–15 from food waste decaying in landfill. (*National Food Waste Strategy 2017*)
- If global food waste was a country, it would be the third-largest emitter of greenhouse gases after China and the United States. (*Reducing Australia's Food Waste*)
- Based on the estimated 113,360 tonnes of avoidable food waste sent to landfill each year by Western Australian households, a potential of 215,384 tonnes of carbon dioxide equivalent (CO<sub>2</sub>e) is produced per year. (*Food waste: In home research - summary on food waste in WA households 2021 (Waste Authority WA)*)
- Eliminating global food waste would save 4.4 million tonnes of CO<sub>2</sub> a year, which is the equivalent of taking one-quarter of cars off the road. (*Food Waste Facts*)





## Aim

Students learn how decomposing fruit produces methane and carbon dioxide gases by conducting an experiment. They link their findings to the environmental impacts of food waste on climate change.

Note: The experiments are run over a few lessons and results may not be known for about two weeks. This timing needs to be considered if you plan to use the results in the other learning areas of the food waste unit.

## Overview

### 1. Solids, liquids and gases

Students explore the observable properties of food as it decomposes and discuss the difference between aerobic and anaerobic decomposition in relation to food waste being sent to landfill.

### 2. Exploring greenhouses gases

Introduction to methane as a greenhouse gas, as well as other greenhouse gases, their effects and why they are dangerous to the environment.

### 3. Planning an experiment

Students plan an experiment that will allow them to record the volume of gas being produced by different types of fruit decomposing in anaerobic conditions. They develop a hypothesis for what they think will happen.

### 4. Conducting an experiment

Students work in pairs or small groups to set up and conduct their experiment. They make observations and record data over several weeks.

### 5. Drawing a conclusion

Using the data they have collected, students draw a conclusion to answer their research question. They compare their results to their hypothesis and suggest reasons why their predictions were correct/incorrect. Students reflect on their experiment design and suggest possible improvements.



# Lesson 1

## Solids, liquids, gases

### Learning objective

Students explore the observable properties of food as it decomposes and identify properties of solids, liquids and gases.

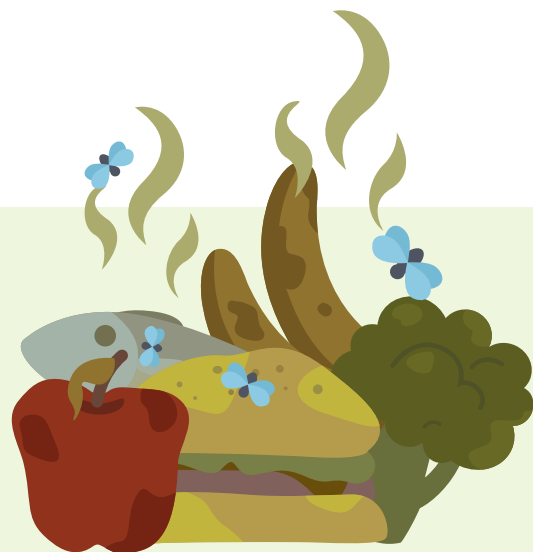
### Activities

1. Students watch the video [Fruit and Vegetable Decomposition, Time-lapse - YouTube](#) (1:37 minutes)
2. Discuss how the fruit and vegetables went through changes: solid when fresh, liquid when over ripe/decomposing, and gas which is released as the fruit decomposes.
3. Make a class list of the observable properties the food would have in each of these different states.



Food type: e.g. tomato	Observable properties
<b>Solid</b>	
<b>Liquid</b>	
<b>Gas</b>	

4. Working independently or in pairs/groups, students complete the *States of matter* worksheet.



# Lesson 2

## Exploring greenhouse gases

### Learning objective

Students are introduced to methane as a greenhouse gas, as well as other greenhouse gases, and learn about their effects and why they are dangerous to the environment. They discuss the difference between aerobic and anaerobic decomposition in relation to food waste being sent to landfill.

### Activities

1. Review what was discussed in the last lesson about the decomposition of food.
2. Explain to the students that all decomposing food produces gas, but where and how this happens affects the type of gas being produced. Discuss aerobic and anaerobic decomposition and identify which one relates to landfill.
3. Watch the video [Understanding the causes of climate change - ABC Education](#) (1:30 minutes)
4. Students research the gases mentioned in the video ( $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$ ) and answer the following questions:
  - a) What are they?
  - b) Where do they come from?
  - c) Why are they a problem?
5. Students share their answers in small groups or with the whole class.
6. As a class, discuss how you could conduct an experiment to determine how much methane is produced by different types of food as they decompose.

Food scraps that decompose **with** oxygen (aerobic) in a healthy composting environment release oxygen, water and a bit of carbon dioxide. Food that decomposes **without** oxygen (anaerobic), like in a landfill, produces harmful gases such as carbon dioxide ( $\text{CO}_2$ ), nitrous oxide ( $\text{N}_2\text{O}$ ) and methane ( $\text{CH}_4$ ). According to the [United States Environmental Protection Agency](#), methane is about 25 times more potent than carbon dioxide at trapping heat in our atmosphere and contributing to global warming.



### Things to think about

- > We can't wait weeks for food to decompose naturally, so how can we speed up the process? (Blend, puree, mash)
- > Methane is a gas – we can't see it and can't touch it, so how do we measure it?

# Lesson 3

## Planning an experiment

### Learning objective

Students plan a scientific investigation that involves posing a question, predicting an outcome and identifying variables to ensure a fair test.

### Activities

1. Review what was discussed in the last lesson about conducting an experiment to determine how much methane is produced by different types of food as they decompose.
2. As a class, discuss the following questions and reach a consensus on how the experiment should be conducted.
  - a) What is our research question?
  - b) What equipment will we need?
  - c) What are the variables?
  - d) What needs to be kept the same to ensure a fair experiment? (Weight of food, size of bottle, level of water, length of time)
  - e) Why is it important to have a control?
  - f) What procedure should we follow?
3. Students create their own hypothesis (prediction) about which food they think will produce the most methane.
4. Students write their hypothesis, variables, equipment and procedure in their science books or complete the *Science investigation* worksheet.

**Before beginning this lesson, consider sharing the following video to demonstrate how to conduct this experiment. Note: It shows results so stop at 4:17 to allow students to develop their own predictions.**

[Sustainability and the Methane Gas Landfill Experiment! - YouTube](#) (5:48 minutes)



# Lesson 4

## Conducting an experiment

### Learning objective

Students apply the elements of a scientific investigation to obtain an answer for their research question.

Resources required	Procedure
<ul style="list-style-type: none"><li>• At least three types of fruit or veggie (we recommend using bananas as one type as they produce large amounts of methane)</li><li>• Blender or potato masher</li><li>• 4 bottles per pair/group</li><li>• 4 balloons per pair/group</li><li>• Labels</li><li>• Duct tape</li><li>• Funnel</li><li>• Kitchen scales</li><li>• Water</li></ul>	<ol style="list-style-type: none"><li>1. Label the bottles with the food name and label one as the control.</li><li>2. Separately cut, mash or blend your food scrap.</li><li>3. Pour them into the labelled bottles, remembering to weigh each one to make sure it is the same in each bottle.</li><li>4. Pour water in the bottles until they are three-quarters full.</li><li>5. Place a balloon over the top of each bottle and seal with duct tape.</li><li>6. Place the bottles in a warm area.</li><li>7. Observe and record changes over a week or two.</li></ol>

### Activities

1. Review the experiment procedure from the previous lesson.
2. Working in pairs or groups, students follow the procedure to safely use equipment and set up their experiment.
3. Once they have completed the set-up, students create a table to record their observations or use the *Science investigation* worksheet provided.



### Observations

1. Students record their observations over several days/weeks until results are obvious.
2. They take photos or draw pictures to record the visible changes to the balloons.
3. Students can also record changes by measuring the height/width of the balloons.

# Lesson 5

## Drawing a conclusion

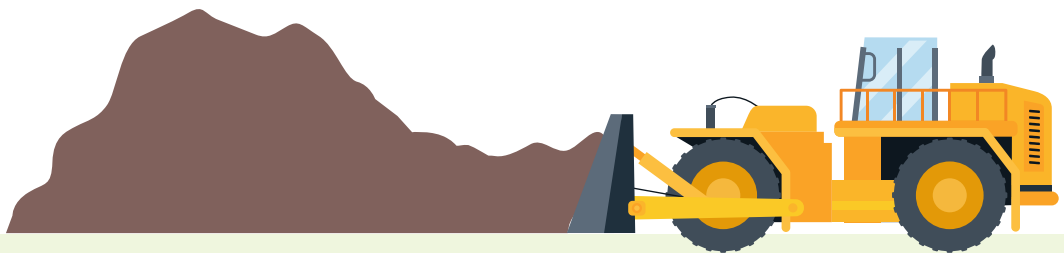
### Learning objective

Using the data they have collected, students draw a conclusion to answer their research question and compare their findings to their prediction.

### Activities

1. Using the data collected during their observations, students create a graph to represent their results.
2. They use this information to draw a conclusion and answer their research question.
3. As a class, discuss the following:
  - a) Whose predictions matched their results and what are some possible reasons for this?
  - b) Did all the groups get the same results and why might this be?
  - c) Was the design of the experiment fair?
  - d) How could the experiment be improved?
4. Students use the findings of their experiment to design a poster to display at school to educate others about how food waste creates methane gas and can be linked to climate change.

**If the students took photos of the balloons, use these to create a timelapse video.**



### Taking it further

- > A tour of a landfill site is a good way to teach students the importance of reducing waste. Students learn about correct waste sorting, waste avoidance, recycling and resource recovery while seeing an active landfill facility.

[Redhill Waste Management Facility](#)

[Millar Road Landfill and Recycling Facility](#)

# States of matter

Name: \_\_\_\_\_

Cut and paste the observable properties of solids, liquids and gases in the correct boxes below.

<b>Solid</b>			
<b>Liquid</b>			
<b>Gas</b>			

Often cannot be seen.	Keeps its own size and shape in any container.	Takes the shape of a container but not its size.
Able to be cut.	Has a definite mass and volume but no definite shape.	Can be poured.
Has no definite shape, mass or volume.	Takes the shape and size of any container.	Has a definite shape, mass and volume.

# Science investigation

Name: \_\_\_\_\_

## Research question:

---

---

## Hypothesis:

I think that \_\_\_\_\_ will produce the most amount of methane, because

---

---

To make the experiment fair, what variables are you going to:

change?	measure/observe?	keep the same?
Change only one thing	What will the change affect?	Which variables will you control?

Equipment	Method

## Observations:

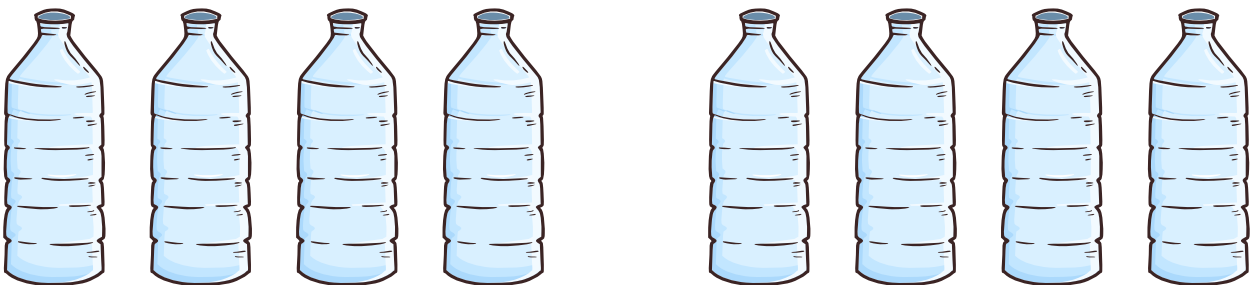
Control:	Day:	Day:	Day:	Day:	Day:
Balloon height					
Balloon width					

Control:	Day:	Day:	Day:	Day:	Day:
Balloon height					
Balloon width					

Control:	Day:	Day:	Day:	Day:	Day:
Balloon height					
Balloon width					

Control:	Day:	Day:	Day:	Day:	Day:
Balloon height					
Balloon width					

Label the bottles and draw the balloons to show what they looked like at the start and the end of the experiment.

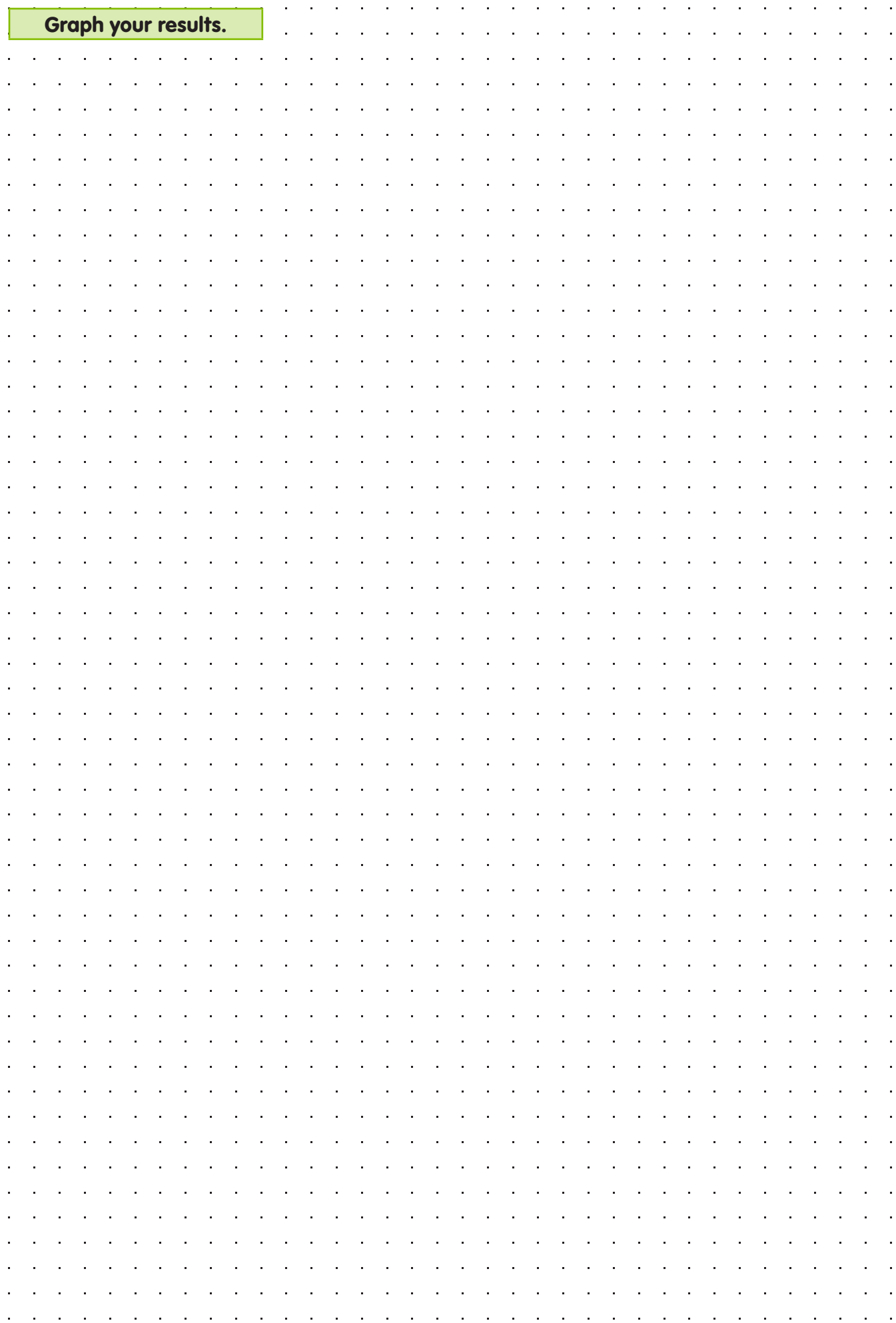


**Start**

**End**



**Graph your results.**



## Findings:

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## Conclusion:

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Did your results confirm your hypothesis? \_\_\_\_\_

Why do you think this was?

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What was something that surprised you about your results?

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What about this experiment do you think worked well?

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What would you change to improve this experiment?

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