

Summary of learning goals

- Students learn to use a column graph to display data so they can draw conclusions and make inferences. They use a dataset to make informed decisions and consider the ways in which they can best respond as responsible citizens.

Australian Curriculum: Mathematics (Year 2)

ACMSP048: Identify a question of interest based on one categorical variable. Gather data relevant to the question.

ACMSP049: Collect, check and classify data.

ACMSP050: Create displays of data using lists, table and picture graphs and interpret them.

Summary of lessons

Who is this sequence for?

- Students who have had previous experience constructing picture graphs.
- This sequence has strong connections to the cross-curriculum priority of sustainability.

Lesson 1: Recording Rubbish

Students conduct an audit of the rubbish they find in their playground. They use a range of categories to sort and display the data, then interpret the data and make simple inferences.

Lesson 2: Reducing Rubbish

Students learn about different ways of recycling and composting. They sort collected rubbish according to whether it can be recycled, composted or if it needs to go into the bin. Students create a graph based on the data and make inferences.

Lesson 3: Put it in the Bin

Students audit the bins in different areas of the playground. They compare the number of bins to the amount of general rubbish and recyclable rubbish found in the different areas. They are asked to consider if the school rubbish bins are in the right place.

Reflection on this sequence

Rationale

This sequence focuses on developing the fundamental understanding of variation in data through a meaningful context.

By sorting the rubbish they collect from different areas of the school playground, students learn to classify their data and consider whether their categories represent all the data they have collected. Comparing each other's graphs, students can appreciate the extent of the variation between the number of pieces of rubbish in each category, depending on where the rubbish was collected. Students compare their column graphs and use the data to justify the placement of rubbish bins in their school playground.

The focus on variability is what distinguishes statistics from mathematics.



reSolve mathematics is purposeful

- The sequence builds students' understanding of data variation.
- The context of rubbish in the playground is personally significant to students. This context is extended to a real-world issue, as students are asked to consider recycling and the ways in which they can help their school reduce waste.



reSolve tasks are inclusive and challenging

- Students are asked to make inferences and draw conclusions of varying complexity based on the data presented.



reSolve classrooms have a knowledge-building culture

- This sequence relies on collaborative problem-solving.

Recording Rubbish

Y2

About this lesson

Students conduct an audit of the rubbish they find in their playground. They use a range of categories to sort and display the data, then interpret the data and make simple inferences.

Australian Curriculum: Mathematics (Year 2)

ACMSP048: Identify a question of interest based on one categorical variable. Gather data relevant to the question.

ACMSP049: Collect, check and classify data.

ACMSP050: Create displays of data using lists, table and picture graphs and interpret them.

Mathematical purpose

- To use a column graph to display data, draw conclusions and make inferences.

Learning intention

- To learn about the types of rubbish in our playground.



Time

A lesson of approximately 1 hour.



Vocabulary

- category
- survey
- variation



Resources

- school map
- suitable equipment for students to collect rubbish (gloves, containers, etc.)
- Student Sheet 1 – Playground Rubbish Graph (one per student)

Playground rubbish

Introduce the context of rubbish and consider the sort of rubbish found in the playground. Ask the students to think about the areas that are commonly untidy.

Pose the question: *What sort of rubbish is left in our playground?*

Explain to the students that they will be collecting the rubbish in the playground to help them answer the question. Consider an appropriate time of the day to collect rubbish (e.g. after morning tea or lunch).

Data collection



Resources: Using a simple map of the school, allocate playground areas to individuals or groups, making sure that the whole playground area is covered. Ensure that students have gloves and suitable containers and have them collect the rubbish found in their allocated area.

Representing the data

Ask the students to classify their rubbish based on its properties; for example:

- paper, plastic and foil
- cling wrap, food wrappers, drink containers and left-over food.

Ask students to look at their classifications and consider:

- *Do your categories represent all your pieces of rubbish?*
- *Do any items of rubbish fit into more than one category? Into which category will you put these items?*

Have students create a picture graph based on their sorting. A single piece of rubbish will represent one piece of data. This can be done by placing items of rubbish in columns. Look at the placement of the rubbish, ensuring rows and columns are aligned so the data can be easily read. Identify and name the different categories.



Possible student response:

The categories used to sort rubbish in the graph shown at right:

- cardboard/paper
- cardboard with plastic coating
- foil
- plastic bottles
- plastic cling wrap
- food.

Cardboard/ paper	Cardboard with plastic	Foil	Bottles	Cling wrap	Food



Teacher note:

- Once the picture graph has been created, students can dispose of their perishable rubbish. Non-perishable rubbish should be kept, as it will be used in the next lesson.



Resources: Have students transfer their picture graph to a column graph, using [Student Sheet 1 – Playground Rubbish Graph](#). Students can colour in the boxes to represent individual pieces of rubbish.

Draw students' attention to the variation that can be seen between the number of items in each category, and to the variation that can be seen in the graphs created by different students.

Looking at the data

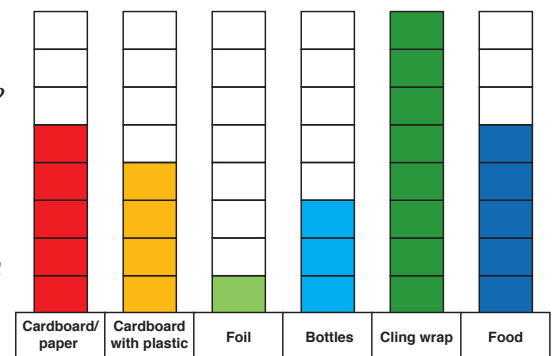
- Pose the questions:**
- Do all categories have the same number of pieces of rubbish?
 - What type of rubbish has the largest number/the smallest number?
 - What part of the playground has the most rubbish?

Ask some specific questions about the dataset(s); for example:

- Why do you think there is variation between the number of items in each category?
- Why do you think that some types of rubbish are more common than others?
- Why might a particular category have the smallest number?
- Compare the different categories used in students' graphs. Do they have the same shape? What makes the graphs different?
- Do some parts of the playground have more cling wrap than others? Which areas have more paper?
- Why are some parts of the playground messier than others?

Playground Rubbish Graph

This rubbish was collected from the oval.



Reflection

Ask the students to make some simple inferences based on the data; for example:

- Could you use the data to predict **how much rubbish** or **what type of rubbish** would be found in a week/term/year?
- Did the **place** where the rubbish was found create differences in the data collected?
- Would you expect different results if we collected the data at a different time of year (e.g. in winter instead of summer)?
- In what ways would you expect the data to change if we looked at schools in a different part of Australia? Or a different part of the world?

Where to next?

In Lesson 2: Reducing Rubbish, the second activity in the sequence, students categorise rubbish based on whether it should be recycled, composted or thrown away.

Playground Rubbish Graph

Name: _____

This rubbish was collected from _____.

Reducing Rubbish

Y2

About this lesson

Students learn about different ways of recycling and composting. They sort collected rubbish according to whether it can be recycled, composted or if it needs to go into the bin. Students create a graph based on the data and make inferences.

Australian Curriculum: Mathematics (Year 2)

ACMSP048: Identify a question of interest based on one categorical variable. Gather data relevant to the question.

ACMSP049: Collect, check and classify data.

ACMSP050: Create displays of data using lists, table and picture graphs and interpret them.

Mathematical purpose

- To construct a graph to make inferences about a dataset and use the dataset to plan a campaign.

Learning intention

- What do we do with all of this rubbish?



Time

A lesson of approximately 1 hour.



Vocabulary

- category
- compost
- recycle
- REDcycle
- variation



Resources

- Previously collected rubbish and/or graphs
- Student Sheet 1 – Recycling Graph (one per student)

Recycling and composting

Discuss how much of our rubbish can either be composted or recycled. What do students know about what can be composted and recycled?

- Look at the facilities that your school offers for recycling and composting (e.g. recycling bins, worm farm).

T

Teacher notes:

- Planet Ark provides information on what materials can be composted and what is recycled in your area; see: www.recyclingnearyou.com.au
- Although most councils will not accept soft plastics, such as cling wrap and plastic bags, these can be recycled at REDcycle locations. Many large supermarkets have drop-off zones. To find out where locations are near your school, enter your postcode at <http://www.redcycle.net.au/>.
- Other notes on recycling:
 - ◇ Although disposable coffee cups are not recyclable, their lids are.
 - ◇ Remove the caps from plastic bottles before placing them both in the recycling.
 - ◇ Foil can be recycled when scrunched into a tight ball.
 - ◇ Plastic wrapping that is dirty from food scraps cannot be recycled.
 - ◇ As a general rule, meat and dairy products cannot be composted.
 - ◇ For further information on what can and cannot be recycled, see:
 - <https://www.domain.com.au/living/12-household-items-you-can-recycle-but-probably-arent-20170214-gucb2/>
 - <http://www.abc.net.au/news/2017-05-24/what-plastics-can-i-recycle-war-on-waste/8548658>

What can we recycle, REDcycle or compost?

Review the rubbish that was collected in the previous lesson. Have the students sort the rubbish into four categories:

- rubbish
- recycling
- REDcycle
- composting.

Look at items that might need to be separated (e.g. coffee cups and lids, bottles and caps). Create a graph of the different ways in which items can be disposed. Refer to the graph at right for an example based on the products that can be recycled in Canberra, ACT.



Resources: Have students transfer their picture graphs to a column graph, using [Student Sheet 1 – Recycling Graph](#).

Rubbish	Recycle	REDcycle	Compost

Looking at the data

- Pose the questions:**
- *Do all categories have the same number of pieces of rubbish?*
 - *What type of rubbish has the largest number/the smallest number?*
 - *What part of the playground has the most rubbish?*

Look beyond the data

Ask some specific questions about the datasets; for example:

- *Why do you think there is **variation** between the number of rubbish pieces in each category?*
- *Can most of our rubbish be recycled in some way?*
- *Why might a particular category have the smallest number?*
- *Compare the different categories used in students' graphs. Do the graphs have the same shape? What makes the graphs different?*
- *How much rubbish in our bins do you think can actually be recycled or composted?*

Informing the community

Have the students inform the school community about what can and cannot be recycled. Some ideas include:

- creating posters to put up around the school
- writing an article for the school newsletter
- presenting at a school assembly, showing graphs and explaining the different ways in which students can recycle better at school.

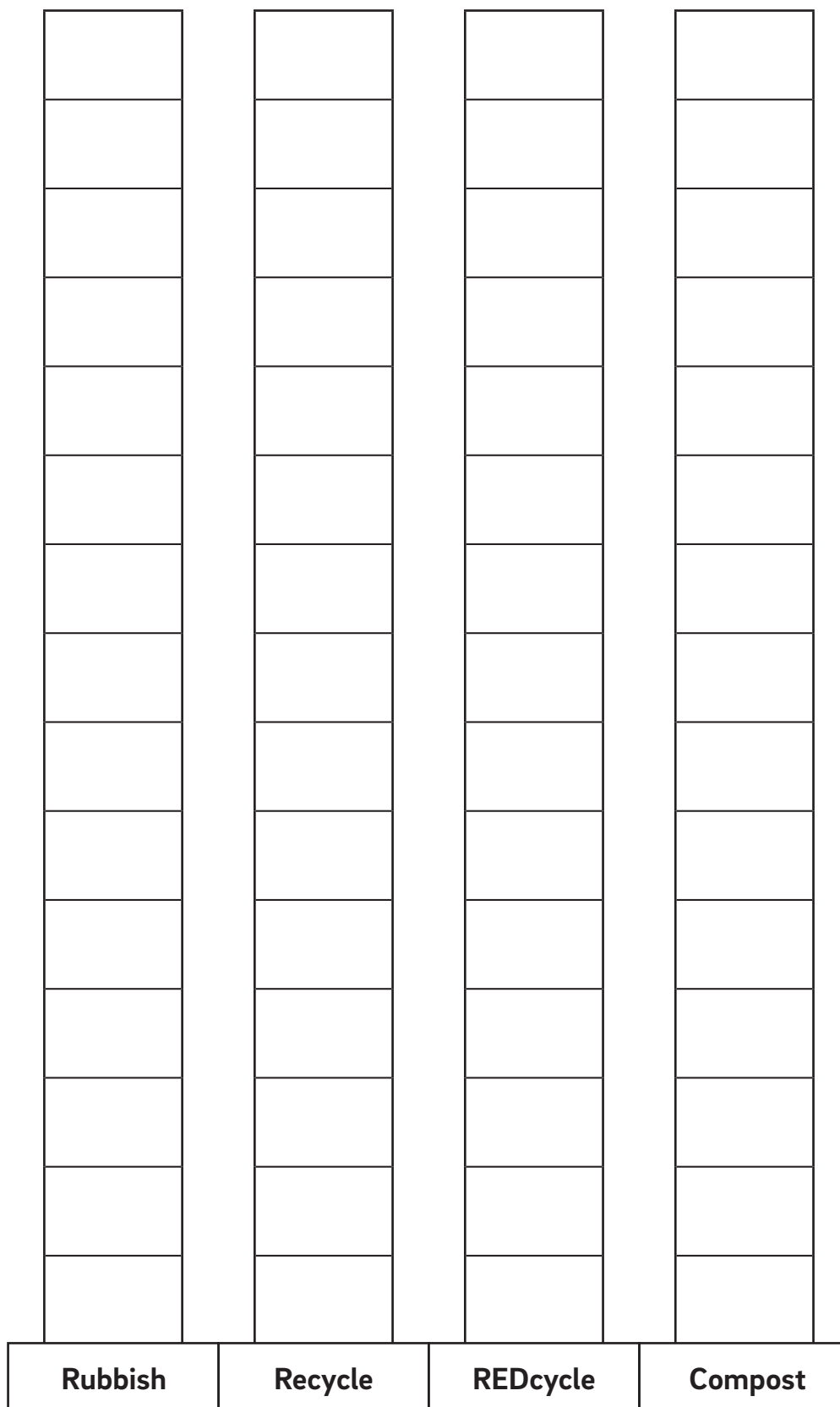
Where to next?

In Lesson 3: Put it in the Bin, the third activity in this sequence, students audit the different types of rubbish found in each playground bin and consider: *Are our rubbish bins in the right place?*

Recycling Graph

Name: _____

This rubbish was collected from _____.



Put it in the Bin

Y2

About this lesson

Students audit the bins in different areas of the playground. They compare the number of bins to the amount of general rubbish and recyclable rubbish in the different areas. They are asked to consider if the school rubbish bins are in the right place.

Australian Curriculum: Mathematics (Year 2)

ACMSP048: Identify a question of interest based on one categorical variable. Gather data relevant to the question.

ACMSP049: Collect, check and classify data.

ACMSP050: Create displays of data using lists, table and picture graphs and interpret them.

Mathematical purpose

- To use data to make informed decisions.

Learning intention

- Are the school rubbish bins in the right place?

**Time**

A lesson of approximately 1 hour.

**Vocabulary**

- audit

**Resources**

- school maps (one per student)
- Student Sheet 1 – Rubbish Bin Audit (one per student)
- Student Sheet 2 – Rubbish Bin Graph (one per student)

Auditing rubbish bins



Resources: Re-use the simple map of the school used in Lesson 1: Recording Rubbish, reminding students from which playground areas they collected their rubbish.

Explain that during this lesson they will be auditing the rubbish bins in their area. They will need to record the number of general rubbish bins and recycling bins, and they should also record if there are composting facilities in their allocated area.



Resources: Student Sheet 1 – Rubbish Bin Audit can be used to record their data.
Student Sheet 2 – Rubbish Bin Graph can be used to create a column graph of the number of bins.

Asking questions about our bins

Two questions are asked in this section. You may choose to do one or both questions.

1. Review the graphs created in Lesson 1. Compare the amount of rubbish in a section of the playground and the number of bins in this section. Consider the question: *Are our rubbish bins in the right place?*

Discuss with the students:

- *Do the messiest sections of the playground have lots of bins or just a few?*
- *Do the sections of the playground that have the most bins have the least amount of rubbish?*
- *If the school were to buy some new bins, where should they be placed?*

2. Look back at the graphs created in Lesson 2. Compare the amount of general rubbish and recyclable rubbish in a section of the playground and the number of general or recycling bins in this section. Consider the question: *Do we have the right sort of bins in the different parts of the playground?*

Discuss with the students:

- *If the school were to buy 10 new recycling bins, where in the playground should they be placed?*

Responding to the data

Ask students to use a map of the school to mark where the bins should be placed in the playground. Students can determine the place for general rubbish bins and where recycling bins would be best located. The general bins could be marked in one colour and the recycling bins could be marked in a different colour. Have students present their thinking to the class.

A letter could be written to the school principal or the maintenance team with suggested placement of bins.

Rubbish Bin Audit

Name: _____

The area of the playground where this audit was conducted: _____.

General rubbish bins	Recycling bins	Composting bins

Rubbish Bin Graph

Name: _____

This rubbish was collected from _____.

