

Summary of learning goals

- Students explore practical applications of measurement, in particular mass and dimensions.

Australian Curriculum: Mathematics (Year 4)

ACMMG084: Use scaled instruments to measure and compare lengths, masses, capacities and temperatures.

ACMMG290: Compare objects using familiar metric units of area and volume.

Summary of lessons

Who is this sequence for?

- Students should be competent with measuring using centimetres and millimetres.
- They should understand that volume is based on three dimensions and it describes the amount of space taken up by an object.

Lesson 1: Parcel in the Post

Students try to find the most cost-efficient way to package a variety of items to post domestically through Australia Post, using official Australia Post pricing documentation.

Reflection on this sequence

Rationale

Measurement is used all the time to record the different attributes of objects. These measurements can be meaningfully compared only when a standard unit is used. Using a standard, formal unit means that objects can be compared in any place and by anyone.

This sequence focuses on the power of metric units as a way to quantify attributes across Australia. It is important that students are provided with multiple experiences, so they can develop an understanding of the relative size of metric units. Estimation and practical tasks are particularly important in developing this understanding.



reSolve mathematics is purposeful

- This sequence draws on the real context of posting items to emphasise the importance and universal use of standard units for measurement.
- Students are encouraged to consider the measurements of all of an object's attributes and how this may affect postage costs within Australia.



reSolve tasks are inclusive and challenging

- The openness of this task allows access for all students while still maintaining the more challenging components of the task.



reSolve classrooms have a knowledge-building culture

- Students share their thinking and reasoning about different ways to post items. By listening to and making sense of the reasoning of others, they recognise multiple ways to approach and solve the task.

Parcel in the Post

Y4

About this lesson

Students try to find the most cost-efficient way to package a variety of items to post domestically through Australia Post, using official Australia Post pricing documentation.

Australian Curriculum: Mathematics (Year 4)

ACMMG084: Use scaled instruments to measure and compare lengths, masses, capacities and temperatures.

ACMMG290: Compare objects using familiar metric units of area and volume.

Mathematical purpose

- To explore practical applications of measurement, in particular mass and dimensions.

Learning intention

- To find the best ways to post different items.



Time

A lesson of approximately 1 hour.



Vocabulary

- cubic weight
- dimensions



Resources

- Students will need a collection of items to use, ideally collected from around the classroom, such as:
 - ◊ small compressible items (e.g. tea towels, beanies)
 - ◊ large compressible items (e.g. jacket, other bulky clothing items)
 - ◊ books (of varying sizes)
 - ◊ large but lightweight items of irregular shapes (e.g. cushions, toys)
 - ◊ small trinkets (e.g. keys, counters)
 - ◊ fragile items.
- envelopes and boxes in a range of different sizes
- Parcel Post charges for your area (one per student) from the Australia Post webpage [Parcel Post: pricing breakdown by state](#).
 - ◊ Alternatively, [Student Sheet 1 – Australia Post Prices](#) lists charges for posting a regular parcel from Sydney to Melbourne at time of publishing.

What have you posted?

Ask students about their experience posting parcels. Have they received parcels from within Australia? Internationally? What's the biggest parcel they've ever received in the mail? Have they ever posted a parcel?

Pose the questions: *What might be very cheap to post? What might be very expensive to post? What factors might determine the price of posting a parcel?*

How can I post this?



Resources: Provide students with items similar to those described in Resources, or have students collect appropriate items from around the classroom.

Explain that you want to find the cheapest way to post each item.

Give each student a copy of Parcel Post charges for your area as described in Resources, or copies of Student Sheet 1 – Australia Post Prices. Outline the four main postage options, sorted from most to least expensive:

- Small letter/postcard, maximum weight < 250 g, maximum size $130 \times 240 \times 5$ mm
- Large letter, maximum weight 500 g, maximum size $260 \times 360 \times 20$ mm
- Parcel under 1 kg, length less than 105 cm
- Parcel between 1 kg and 22 kg, charged based on actual weight or cubic weight (length \times width \times height \times 250 (measurements must be in metres) in kg), whichever is larger.

Explore the fourth option in detail with the class: when a parcel weighs over 1 kg, the weight alone is not enough information to determine the cost of postage. The item's dimensions are used in a formula ($l \times w \times h \times 250$) to calculate something called the **cubic weight**, which is a weight based on the size of the item. We compare the cubic weight to the actual weight of the parcel and use whichever is greater.

Ask: *Why might a large 1 kg package cost the same amount as a 5 kg package the same size? What about a small 10 kg parcel and a very large 1 kg parcel?*

Sort each item in the collection into one of these four categories. This is done by eye only. Any items that are debated (e.g. a book that may be a small or large letter) can be put in between two categories.

Discuss the easiest way to find the height of an item. Many post offices have letter gauges to check the dimensions of each letter size. Page 4 of the Australia Post leaflet Guide to bulk mail shows an image of various letter gauges (see: https://auspost.com.au/content/dam/auspost_corp/media/documents/guide-to-bulk-mail.pdf). Students might find it useful to make their own.

In pairs, students select items, measure the **dimensions** and discuss the best way to package it. They record their conclusions and the price of posting the item, then make a note of this on the class whiteboard. They return their item and take a new one.

Students should confirm each other's answers and try to find better options than the ones already on the whiteboard. Encourage them to think practically about packaging considerations; for example, could a cushion be vacuum packed to be posted? How might this change the dimensions of the parcel?

Reflection

As a class, review the notes on the whiteboard and agree on the best way to post each item.

Australia Post Prices

Regular letters

Letter type	Max. weight	Max. size	Price
Small letter/postcard	250 g	130 × 240 × 5 mm	\$1
Large letter	125 g	260 × 360 × 20 mm	\$2
Large letter	250 g	260 × 360 × 20 mm	\$3
Large letter	500 g	260 × 360 × 20 mm	\$5
Small Christmas card (Nov./Dec. only)	125 g	130 × 240 × 5 mm	\$0.65
Large Christmas card (Nov./Dec. only)	125 g	260 × 360 × 20 mm	\$1.30

Parcel Post

For parcels over 1 kg, find the **cubic weight** by multiplying length × width × height × 250 (measurements must be in metres) in kg. Use cubic weight or actual weight, whichever is greater.

Regular Parcel Post Sydney to Melbourne

Weight	Charge	Weight	Charge
Up to 500 g	\$7.95	Over 6 kg to 7 kg	\$21.55
Over 500 g to 1 kg	\$14.65	Over 7 kg to 8 kg	\$22.70
Over 1 kg to 2 kg	\$15.80	Over 8 kg to 9 kg	\$23.85
Over 2 kg to 3 kg	\$16.95	Over 9 kg to 10 kg	\$25.00
Over 3 kg to 4 kg	\$18.10	Over 10 kg to 11 kg	\$26.15
Over 4 kg to 5 kg	\$19.25	Over 11 kg to 12 kg	\$27.30
Over 5 kg to 6 kg	\$20.40	Over 12 kg to 23 kg	\$28.45