

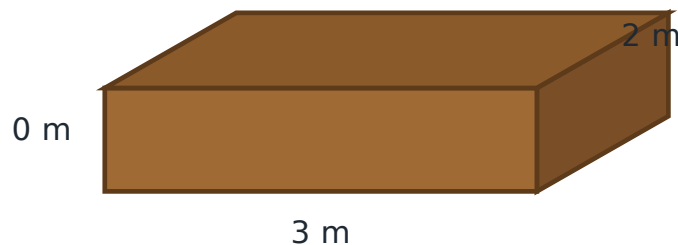
Extension & Challenge — Modelling with Measurement & Geometry

Part A — Volume, Capacity & Cost

Designing real objects links volume (space inside, in m^3), capacity (how much it holds, in litres) and cost. A useful conversion: $1 m^3 = 1000 L$.

Worked example. A box is $2 \times 1 \times 0.5 m$, so volume $= 1 m^3 = 1000 L$. If a bag holds $25 L$, you need $1000 \div 25 = 40$ bags.

Design Task: Filling a Garden Bed



$$\text{Volume} = 3 \times 2 \times 0 = 2 m^3 = 1800 L$$

$$1800 \div 30 = 60 \text{ bags of soil}$$

Design task: working out how much soil fills a garden bed.

- 1 A garden bed is $3 m$ long, $2 m$ wide and $0.3 m$ deep. Find its volume in cubic metres.

Volume = _____ m^3

- 2 Convert that volume to litres. (Remember $1 m^3 = 1000 L$.)

Answer: _____ L

3 Soil is sold in 30 L bags. How many bags are needed to fill the bed?

Answer: _____ bags

4 Each bag of soil costs \$8. What is the total cost to fill the bed?

Answer: _____

5 A second bed is the same width and depth but **twice** as long. Without redoing all the working, explain how the volume and the number of bags change.

6 **Design challenge.** Design a rectangular garden bed with a volume as close as possible to 1 m^3 . Give its length, width and depth, and show the volume.

Part B — Measuring & Costing Real Spaces

Modelling a real job means choosing the right measure: perimeter for things that go around an edge (fencing, edging), and area for things that cover a surface (paving, paint). Watch your units and convert when needed.

Length conversions: $1\text{ m} = 100\text{ cm}$. Capacity: $1\text{ L} = 1000\text{ mL}$. Mass: $1\text{ kg} = 1000\text{ g}$.

Worked example. A 6 m by 4 m room has area 24 m^2 and perimeter 20 m. Carpet at $\$30/\text{m}^2$ costs $24 \times 30 = \$720$.

1 A rectangular yard is 8 m by 5 m . Find the perimeter, then the cost of fencing it at $\$15$ per metre.

2 The same yard is to be paved. Find its area, then the cost at $\$40$ per square metre.

3 Complete these conversions.

(a) $2.5\text{ m} = \underline{\hspace{2cm}}\text{ cm}$

(b) $3500\text{ mL} = \underline{\hspace{2cm}}\text{ L}$

(c) $1.2\text{ kg} = \underline{\hspace{2cm}}\text{ g}$

4 Estimate, then calculate. A tin of paint covers 10 m^2 . A wall is 4 m wide and 2.5 m high. Estimate, then work out how many tins are needed.

5 Reasoning. A square garden of side 6 m has a 1 m -wide path running all the way around the outside. What is the area of the path only?

6 Design and cost. Plan a rectangular vegetable plot no larger than 12 m^2 . State its dimensions, the length of edging it needs, and the cost of edging at \$6 per metre.
