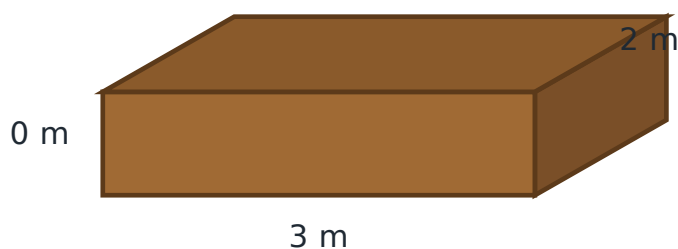


Modelling with Measurement & Geometry — Project Brief & Planning Sheet

Part A — Real-world design tasks

This lesson **applies** measurement and geometry to real design problems using the full [modelling cycle](#). Quantities must be interpreted sensibly in context — you cannot buy half a bag of soil.

Design Task: Filling a Garden Bed



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

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

From dimensions to a materials order.

Worked example. A garden bed $3 \text{ m} \times 2 \text{ m} \times 0.3 \text{ m}$ holds $3 \times 2 \times 0.3 = 1.8 \text{ m}^3 = 1800 \text{ L}$ of soil. At 30 L per bag: $1800 \div 30 = 60$ bags.

Convert all measurements to the same unit *before* calculating, and remember $1 \text{ m}^3 = 1000 \text{ L}$.

Use the **four modelling stages** (Analyse → Represent → Solve → Interpret & communicate) for each design task.

Task 1 – Fill the garden bed. A bed is $3\text{ m} \times 2\text{ m} \times 0.3\text{ m}$. Soil is sold in 30 L bags. Represent the volume calculation and the number of bags. Solve, then interpret: bags are sold whole — how many must be bought?

Task 2 – Tiling a courtyard. A courtyard is 4 m by 3 m . Tiles are $1\text{ m} \times 1\text{ m}$ and cost $\$12$ each. How many tiles are needed? What is the total cost? Could you reduce waste? Justify a decision.

Task 3 – Plan a journey. You leave home at $09:15$, travel $2\text{ h } 40\text{ min}$ to a campsite, set up for 45 min , then hike for $1\text{ h } 30\text{ min}$. Build an itinerary in 24-hour time. What time does the hike finish? Communicate your plan clearly.

Task 4 – Design challenge. Design something real (a sandpit, an aquarium, a vegetable patch). State the dimensions, the maths you used (area/volume/conversion/duration), and explain why your answer is reasonable.
