Marking guide | Measurement

Measurement topic test 1

10 questions | 46 marks | 65 minutes

Core methods and practical decisions. Use a scientific calculator, show working and include units. Sketches are not to scale.

Equivalent correct methods earn the corresponding marks.

1. A workshop must measure a fence length of about 35 m and a wire diameter of about 3 mm. [4 marks]

(a) Choose an instrument and unit for the fence. [2 marks]

A tape has the required length range; metres give a useful scale.

Answer: A long tape measure, in metres.

(b) Choose an instrument for checking the wire to the nearest 0.1 mm and explain. [2 marks]

Its small divisions can distinguish the required tenths of a millimetre.

Answer: A suitable calliper or micrometer resolving at least 0.1 mm.

2. Convert the following measurements and show the conversion factor. [4 marks]

(a) Convert 7500 cm^2 to m^2. [2 marks]

$\frac{7500}{100^2} = 0.75.$

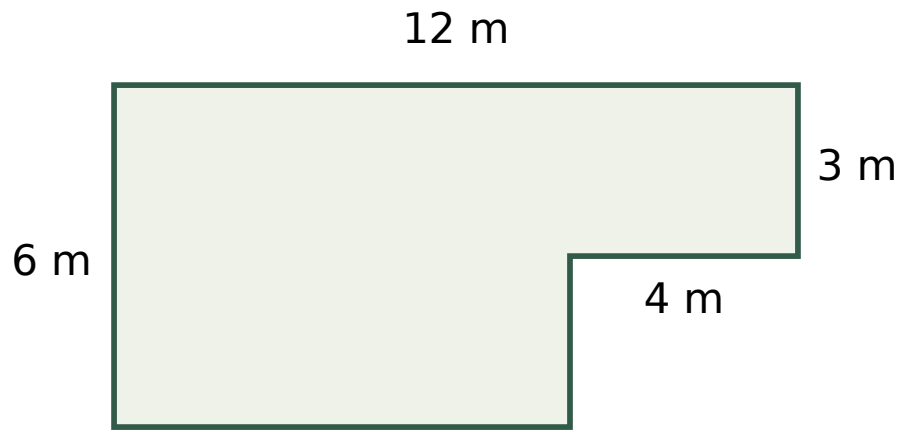
Answer: 0.75 m^2.

(b) Convert 65 L to cm^3. [2 marks]

$65 \times 1000 = 65\,000.$

Answer: 65,000 cm^3.

3. A 12 m by 6 m rectangle has a 4 m by 3 m corner removed. [5 marks]



Sketch not to scale

(a) Find the remaining area. [2 marks]

$12 \times 6 - 4 \times 3 = 72 - 12 = 60.$

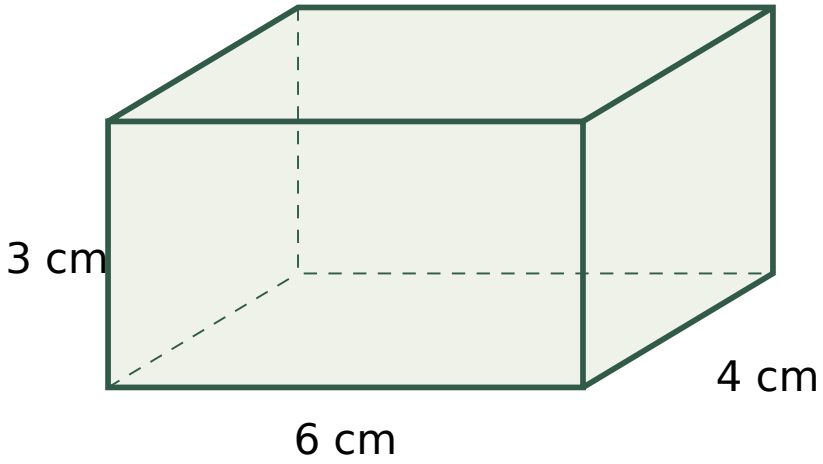
Answer: 60 m^2.

(b) Find the outside perimeter. [3 marks]

The removed edge lengths are replaced by equal notch lengths; $P = 2(12 + 6) = 36.$

Answer: 36 m.

4. An open-top box has internal length 6 cm, width 4 cm and height 3 cm. Ignore material thickness. [5 marks]



Sketch not to scale

(a) Find the base-and-wall material area. [3 marks]

$6 \times 4 + 2(6 \times 3) + 2(4 \times 3) = 84$.

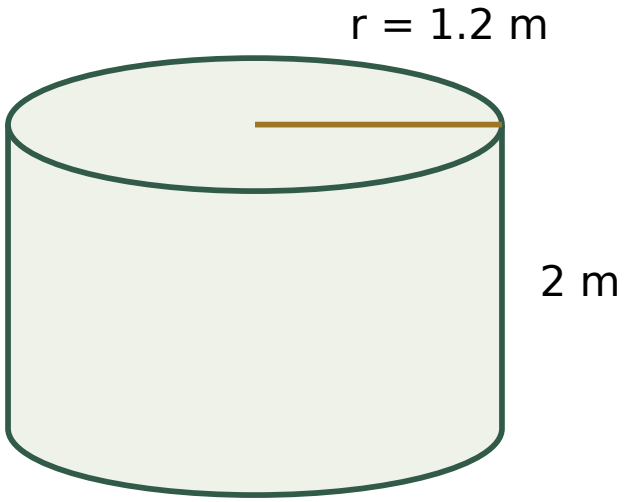
Answer: 84 cm^2.

(b) Find its capacity in millilitres. [2 marks]

$V = 6 \times 4 \times 3 = 72$ $\text{cm}^3 = 72$ mL.

Answer: 72 mL.

5. A cylindrical tank has internal radius 1.2 m and height 2 m. [5 marks]



Sketch not to scale

(a) Find its full capacity to the nearest litre. [3 marks]

$V = \pi(1.2)^2(2) = 2.88\pi$ m^3; capacity $= 2880\pi \approx 9047.79$ L.

Answer: 9048 L.

(b) Find the water volume when it is 75% full, to the nearest litre. [2 marks]

Use the unrounded capacity: $0.75 \times 2880\pi = 2160\pi \approx 6785.84$ L.

Answer: 6786 L.

6. A rectangular floor is 7.2 cm by 3.6 cm on a 1:250 plan. [4 marks]

(a) Find its real dimensions. [2 marks]

1 cm represents 2.5 m; $7.2 \times 2.5 = 18$, $3.6 \times 2.5 = 9$.

Answer: 18 m by 9 m.

(b) Find real floor area. [2 marks]

$18 \times 9 = 162$.

Answer: 162 m^2.

7. A car travels at a constant speed. [4 marks]

(a) Find the distance travelled at 90 km/h in 25 minutes. [2 marks]

$t = \frac{25}{60}$ h; $d = 90 \times \frac{25}{60} = 37.5$ km.

Answer: 37.5 km.

(b) Convert 54 km/h to m/s. [2 marks]

$\frac{54}{3.6} = 15$.

Answer: 15 m/s.

8. A room is 5 m by 4 m with walls 2.5 m high. Openings total 5 m^2. Only the walls need two coats. Paint covers 8 m^2/L and is sold in 4 L tins at AUD 40 each. [5 marks]

(a) Find the net wall area for one coat. [2 marks]

$2(5 + 4) \times 2.5 - 5 = 45 - 5 = 40$.

Answer: 40 m^2.

(b) Find the number of tins and total cost. [3 marks]

Two coats need $\frac{80}{8} = 10$ L. $\frac{10}{4} = 2.5$ tins, so buy 3. Cost $= 3 \times 40 = 120$.

Answer: 3 tins; AUD 120.

9. A measured length is 12.4 cm to the nearest 0.1 cm. A reference length is 12.5 cm. [4 marks]

(a) State the rounding interval for the recorded value. [2 marks]

Use half of 0.1 cm on either side.

Answer: $12.35 \le L < 12.45$ cm.

(b) Find percentage error relative to the reference. [2 marks]

$\frac{|12.4 - 12.5|}{12.5} \times 100 = 0.8\%$.

Answer: 0.8%.

10. A garden bed is 3.5 m by 2.4 m and needs soil 0.18 m deep. Add 10% for settling. Soil comes in 40 L bags. [6 marks]

(a) Calculate the required soil volume including settling allowance. [3 marks]

$3.5 \times 2.4 \times 0.18 = 1.512$ m^3; $1.512 \times 1.10 = 1.6632$ m^3.

Answer: 1.6632 m^3.

(b) Find a whole-bag order and state one model assumption. [3 marks]

Required capacity is 1663.2 L; $\frac{1663.2}{40} = 41.58$, so round up to 42. The model assumes level, uniform depth before settling.

Answer: 42 bags; for example, uniform depth.