Multi-step measurement problems

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. An open-top box is 1 m long, 0.6 m wide and 0.4 m high. Find its material area, ignoring thickness. [3 marks]

Base 0.6; long walls $2(1 \times 0.4) = 0.8$; short walls $2(0.6 \times 0.4) = 0.48$. Total 1.88 m².

Answer: 1.88 m²

2. A cylinder has internal radius 0.4 m and height 1 m. Find its capacity to one decimal place. [3 marks]

$V = \pi(0.4^2)(1) = 0.16\pi$ m³ $= 160\pi$ L ≈ 502.7 L.

Answer: 502.7 L

3. A solid consists of a 5 cm by 4 cm by 3 cm prism with a complete cylinder of radius 1 cm and height 2 cm fixed on top. The solids do not overlap. Find the total volume. [3 marks]

Prism volume $= 5 \times 4 \times 3 = 60$ cm³.

Cylinder volume $= \pi(1^2)(2) = 2\pi$ cm³. Add because there is no overlap.

Answer: $60 + 2\pi$ cm³

4. Each closed box is 20 cm by 10 cm by 5 cm. Find the total cardboard area for 500 boxes in square metres, ignoring joins and waste. [3 marks]

One box: $2(200 + 100 + 50) = 700$ cm².

$500(700) = 350000$ cm² $= 35$ m².

Answer: 35 m²

5. A rectangular tank is 80 cm by 50 cm by 40 cm internally. How many litres does it hold when three-quarters full? [3 marks]

Full volume $= 160000$ cm³ $= 160$ L.

Three-quarters of 160 L is 120 L.

Answer: 120 L

6. A closed cylindrical container has radius 2 m and height 3 m. Painting costs 4 dollars per square metre. Find the cost to the nearest cent, ignoring waste. [3 marks]

Area $= 2\pi(2^2) + 2\pi(2)(3) = 20\pi$ m².

Cost $= 4(20\pi) = 80\pi \approx 251.33$ dollars.

Answer: 251.33 dollars