

Using Length, Area and Volume in Calculations

Maths

Level 2

Exam-style practice · 4 questions · 30 marks · Calculator allowed

Remember

Read the whole question first and decide which measure each part needs: **length** for edges (fencing, skirting, edging); **area** for surfaces (paint, turf, tiles, carpet); **volume** for filling (concrete, water, soil, boxes).

Same units throughout – convert before you calculate. **Round up** for packs, tins, panels.

Round money to the nearest penny only at the end.

Lay out the working in steps with a label for each: 'Area of lawn = ...', 'Number of rolls = ...'. Method marks are awarded per step.

Project 1 – The patio (8 marks)

1. A rectangular patio is to be 6 m by 4 m. (a) Paving slabs are 60 cm by 60 cm and cost £4.75 each. How many slabs are needed, and what do they cost? (b) The patio needs a 10 cm deep concrete base. Concrete costs £110 per m³. What does the base cost? (c) An edging strip goes round three sides (not the house side). It costs £3.20 per metre, sold in whole metres. What does the edging cost? (d) What is the total cost? (8 marks)

Project 2 – The bedroom (8 marks)

2. A bedroom is 4.5 m long, 3.6 m wide and 2.4 m high. (a) Carpet costs £18.50 per m² and is sold in whole square metres. What does it cost? (b) The four walls need two coats of paint. A door (2 m × 0.8 m) and a window (1.4 m × 1.2 m) are not painted. Paint covers 11 m² per litre and comes in 2.5-litre tins at £22. How many tins, and what cost? (c) Skirting board goes round the room except the doorway, at £5.40 per metre. What does it cost? (8 marks)

Project 3 – The raised bed (7 marks)

3. A raised vegetable bed is 3 m long, 1.2 m wide and 45 cm deep, made from timber sleepers. (a) What volume of soil is needed to fill it? (b) Topsoil is sold in 0.75 m^3 bulk bags at £68 each. How many bags, and what cost? (c) The bed is lined inside on the base and four sides with membrane at £2.10 per m^2 . What area of membrane is needed, and what does it cost? (7 marks)

Project 4 – The fish tank (7 marks)

4. A fish tank is 100 cm long, 40 cm wide and 50 cm high. (a) It is filled to 5 cm below the top. How many litres of water does it hold? (b) The water needs treating with 5 ml of conditioner per 10 litres. A 250 ml bottle costs £8.99. How many full fills does one bottle treat? (c) The tank sits on a stand. The water alone has a mass of 1 kg per litre and the empty tank weighs 24 kg. The stand is rated for 250 kg. Is it safe? (7 marks)

Using Length, Area and Volume in Calculations – Answers

Level 2 · Working shown so you can check your method, not just the final number.

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Project 1

1. (a) Along: $600 \div 60 = 10$; across: $400 \div 60 = 6.67 \rightarrow 7$ rows. $70 \text{ slabs} \times 4.75 = \text{£}332.50$. (Dividing areas gives $66.7 \rightarrow 67$, but slabs are not cut and rejoined; accept 67 slabs = £318.25 with the method shown.) (b) Volume = $6 \times 4 \times 0.1 = 2.4 \text{ m}^3 \times 110 = \text{£}264$. (c) Three sides = $6 + 4 + 4 = 14 \text{ m} \times 3.20 = \text{£}44.80$. (d) Total = **£641.30** (or £627.05 with 67 slabs).

Project 2

2. (a) $4.5 \times 3.6 = 16.2 \rightarrow 17 \text{ m}^2 \times 18.50 = \text{£}314.50$. (b) Walls: $2 \times (4.5 \times 2.4) + 2 \times (3.6 \times 2.4) = 21.6 + 17.28 = 38.88 \text{ m}^2$. Minus door 1.6 and window 1.68 = 35.6 m^2 . Two coats = $71.2 \text{ m}^2 \div 11 = 6.47 \text{ litres} \div 2.5 = 2.6 \rightarrow \text{3 tins} = \text{£}66$. (c) Perimeter $16.2 \text{ m} - 0.8 \text{ m door} = 15.4 \text{ m} \times 5.40 = \text{£}83.16$.

Project 3

3. (a) $3 \times 1.2 \times 0.45 = 1.62 \text{ m}^3$. (b) $1.62 \div 0.75 = 2.16 \rightarrow \text{3 bags} = \text{£}204$. (c) Base 3.6 m^2 ; long sides $2 \times (3 \times 0.45) = 2.7$; short sides $2 \times (1.2 \times 0.45) = 1.08$. Total $7.38 \text{ m}^2 \times 2.10 = \text{£}15.50$.

Project 4

4. (a) $100 \times 40 \times 45 = 180,000 \text{ cm}^3 = \text{180 litres}$. (b) $180 \div 10 \times 5 = 90 \text{ ml per fill}$. $250 \div 90 = 2.78 \rightarrow \text{2 full fills}$. (c) $180 \text{ kg} + 24 \text{ kg} = 204 \text{ kg}$. **Yes**, safe – 46 kg under the limit.

Where Level 2 students lose marks on this topic

- Using the tank's full height (50 cm) when it is filled to 45 cm.
- Rounding 2.16 bags down to 2 – you would be 0.12 m^3 short.
- Losing track of which unit each figure is in halfway through a long question. Write the unit after every number.