Practical design models

6 questions | 14 marks

Equivalent correct methods earn the corresponding marks.

1. Cut 2 cm squares from a 24 by 18 cm card. Find folded tray volume. [2 marks]

Base 20 by 14; height 2.

$V = 560$.

Answer: 560 cm³

2. A box measures 40 by 25 by 12 cm internally. Find capacity. [2 marks]

$V = 12000$ cm³ $= 12$ L.

Answer: 12 L

3. A cylinder has internal radius 1 m and usable height 1.5 m. Give exact litre capacity. [2 marks]

$V = 1.5\pi$ m³; multiply by 1000.

Answer: 1500π L

4. Compare closed boxes 10 by 10 by 20 cm and 10 by 5 by 40 cm. Both hold 2000 cm³. Which uses less material? [3 marks]

Their areas are 1000 and 1300 cm².

Answer: The 10 by 10 by 20 box.

5. A design needs 2.4 m² plus 10% waste. Material costs 18 dollars per m². Find the continuous-area cost. [2 marks]

$\text{Area} = 2.64$ m².

$2.64 \times 18 = 47.52$.

Answer: 47.52 dollars

6. A model uses outside dimensions but ignores 3 mm walls. Does it overestimate or underestimate usable capacity? Explain. [3 marks]

Walls reduce the internal dimensions and occupy some outside volume.

Answer: Overestimate.