Test answers - Perimeter, area and volume

Year: Year 7 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. Area of a triangle = $\frac{1}{2}\times$ base $\times$ perpendicular height $= \frac{1}{2} \times 14 \times 9 = 7 \times 9 =$**63 cm²**. (1 mark)
b. Area = length × width, so the length is $72 \div 6 = 12$ cm (1 mark). The perimeter adds all four sides: $2(12 + 6) = 2 \times 18 =$**36 cm** (1 mark).
c. Area of a trapezium = half the sum of the parallel sides × height: $\frac{1}{2}(7 + 13) \times 5 = \frac{1}{2} \times 20 \times 5 =$**50 cm²**. (1 mark)

Remember that area is measured in square units (cm²) and perimeter in ordinary length units (cm). In (b), check that $12 \times 6 = 72$ before working out the perimeter. The trapezium in (c) has the same area as a rectangle 10 cm by 5 cm.

Answer to Question 2 (4 marks)

a. Volume of a cuboid = length × width × height: $9 \times 6 \times 5 = 54 \times 5 =$**270 cm³**. (1 mark)
b. A cuboid has three pairs of identical faces: $9 \times 6 = 54$, $9 \times 5 = 45$ and $6 \times 5 = 30$ cm² (1 mark). The surface area is $2(54 + 45 + 30) = 2 \times 129 =$**258 cm²** (1 mark).
c. The new base has area $5 \times 6 = 30$ cm². Volume = base area × height, so the height is $270 \div 30 =$**9 cm**. (1 mark)

Notice that the second cuboid is the first one turned over: 5 cm, 6 cm and 9 cm are the same three dimensions, which is why the volume is unchanged. Check: $5 \times 6 \times 9 = 270$.

Answer to Question 3 (4 marks)

a. 1 m = 100 cm, so 1 m² = $100 \times 100 = 10\,000$ cm². Then $2.5 \times 10000 =$**25 000 cm²**. (1 mark)
b. 1 litre = 1 000 cm³, so divide by 1 000: $3500 \div 1000 =$**3.5 litres**. (1 mark)
c. 1 m³ holds exactly 1 000 litres, so $0.4 \times 1000 =$**400 litres**. (1 mark)
d. Use the same factor as in part (a): $0.3 \times 10000 =$**3 000 cm²**. (1 mark)

The most common mistake is multiplying by 100 for area. A square metre is 100 cm long and 100 cm wide, so the factor for area is 10 000. For volume the factor from m³ to cm³ is $100^3 = 1\,000\,000$.

Answer to Question 4 (4 marks)

a. The playground is a rectangle: $40 \times 25 =$**1 000 m²**. (1 mark)
b. The sandpit takes up $6 \times 4 = 24$ m², which does not need the safety surface. The area to cover is $1000 - 24 =$**976 m²**. (1 mark)
c. Each square metre costs £12, so the surface costs $976 \times 12 = 9760 + 1952 =$**£11 712**. (1 mark)
d. The fence goes round the outside of the playground: perimeter $2(40 + 25) = 130$ m. The cost is $130 \times 8 =$**£1 040**. (1 mark)

The sandpit sits in a corner inside the rectangle, so it does not change the perimeter. Estimate for (c): about 1 000 m² at £12 is about £12 000.

Answer to Question 5 (4 marks)

a. The tank is 45 cm high and the water stops 5 cm below the top, so the water is $45 - 5 =$**40 cm** deep. (1 mark)
b. The water forms a cuboid 80 cm by 35 cm by 40 cm: $80 \times 35 \times 40 = 112\,000$ cm³ (1 mark). Since 1 litre = 1 000 cm³, this is $112000 \div 1000 =$**112 litres** (1 mark).
c. When full the tank holds $80 \times 35 \times 45 = 126\,000$ cm³ = 126 litres. The bigger tank holds 200 litres, so it is $200 - 126 =$**74 litres** bigger. (1 mark)

Check (b): the base area is $80 \times 35 = 2\,800$ cm², and each centimetre of depth adds 2.8 litres. Forty centimetres give $40 \times 2.8 = 112$ litres.