Answers - Converting units, area, perimeter and volume

Year: Year 6

Answer to Question 1

a. 3.5 × 1 000 = **3 500 m**.
b. 2 400 ÷ 1 000 = **2.4 kg**.
c. 450 ÷ 100 = **4.5 m**.
d. 3.2 × 1 000 = **3 200 ml**.
e. 0.6 × 100 = **60 cm**.

Answer to Question 2

a. 12 × 2.5 = **30 cm**.
b. 15 miles = 3 × 5 miles, so 3 × 8 = **24 km**.
c. 5 × 2.2 = **11 pounds**.
d. 10 × 4.5 = **45 litres**.
e. 40 miles = 8 × 5 miles, so 8 × 8 = **64 km**.

Answer to Question 3

a. The perimeter is the distance all the way round: two lengths and two widths. $P = 2 \times 12 + 2 \times 7 = 24 + 14 =$ **38 cm**.
b. A square has four equal sides: $P = 4 \times 8.5 = 34$. Think of it as $4 \times 8 = 32$ plus $4 \times 0.5 = 2$. Answer: **34 cm**.
c. Add one length and one width, then double: $3.5 + 2.4 = 5.9$ and $2 \times 5.9 =$ **11.8 m**.
d. A regular hexagon has 6 equal sides: $6 \times 6.5 = 36 + 3 =$ **39 cm**.

Answer to Question 4

a. $A = 12 \times 7 =$ **84 cm²**.
b. Whole rectangle: $10 \times 6 = 60$ cm². Corner: $4 \times 3 = 12$ cm². Area left: $60 - 12 =$ **48 cm²**.
c. $A = 9 \times 9 =$ **81 cm²**.
d. Width = area ÷ length = 54 ÷ 9 = **6 cm**.

Answer to Question 5

a. The area of a triangle is half of base × height: $\frac{1}{2} \times 8 \times 6 = \frac{1}{2} \times 48 =$ **24 cm²**. It is half of the 8 cm by 6 cm rectangle around it.
b. A parallelogram can be cut and rearranged into a rectangle, so area = base × perpendicular height: $9 \times 5 =$ **45 cm²**.
c. $11 \times 4 = 44$, and half of 44 is 22. Answer: **22 cm²**.
d. Work backwards: $\frac{1}{2} \times 12 = 6$, so $6h = 30$ and $h = 30 \div 6 =$ **5 cm**. Check: $\frac{1}{2} \times 12 \times 5 = 30$.

Answer to Question 6

a. $V = 5 \times 4 \times 3 =$ **60 cm³**.
b. $V = 6 \times 6 \times 6 =$ **216 cm³**.
c. Base area = 8 × 5 = 40 cm². Height = 120 ÷ 40 = **3 cm**.
d. $V = 50 \times 30 \times 40 = 60\,000$ cm³. 60 000 ÷ 1 000 = **60 litres**.

Answer to Question 7

a. 1.5 × 1 000 = **1 500 ml**.
b. 1 500 ÷ 250 = **6 glasses**.
c. 20 × 2 = 40 glasses. 40 × 250 = 10 000 ml = **10 litres**.
d. 10 ÷ 2 = **5 cartons**.

Answer to Question 8

a. 5 × 1 000 = **5 000 m**.
b. 5 000 ÷ 400 = **12.5 laps**.
c. He still has 1.5 km = 1 500 m to run. 1 500 ÷ 400 = 3.75, so **3.75 laps** (almost 4 laps).
d. 5 ÷ 1.6 = 3.125, so about **3.1 miles**.

Answer to Question 9

a. 130 km/h ÷ 8 × 5 = 16.25 × 5 = 81.25, so about **81 miles per hour**.
b. 290 km ÷ 1.6 = 181.25 miles. For each 40 miles the car uses 4.5 litres, so for 181.25 miles it uses 181.25 ÷ 40 × 4.5 = **20.4 litres** (to 1 decimal place).
c. 20.4 × £1.50 = **£30.60**.
d. 120 ÷ 8 × 5 = 15 × 5 = **75 miles**.

Answer to Question 10

a. $A = 4.5 \times 3.2 =$ **14.4 m²**.
b. 14.4 × £12.50 = **£180**.
c. $P = 2 \times (4.5 + 3.2) = 2 \times 7.7 =$ **15.4 m**.
d. 15.4 − 0.9 = 14.5 m. 14.5 ÷ 2.4 = 6.04..., so he needs **7 lengths** (6 lengths would be just short).

Answer to Question 11

a. Whole lawn: 12 × 8 = 96 m². Pond: 3 × 3 = 9 m². Grass: 96 − 9 = **87 m²**.
b. 87 ÷ 30 = 2.9, so he needs **3 kg**.
c. 3 × £6.50 = **£19.50**.
d. Perimeter: 2 × (12 + 8) = **40 m**. Cost: 40 × £8.40 = **£336**.

Answer to Question 12

a. Half of the base is $2.4 \div 2 = 1.2$, so $A = 1.2 \times 3.5 =$ **4.2 m²** ($1 \times 3.5 = 3.5$ and $0.2 \times 3.5 = 0.7$).
b. Two equal sails: $2 \times 4.2 =$ **8.4 m²**.
c. $8.4 \times 18 = 8 \times 18 + 0.4 \times 18 = 144 + 7.2 = 151.2$. The cloth costs **£151.20**.
d. Half of the base is 1.5, so $1.5h = 6.3$ and $h = 6.3 \div 1.5 =$ **4.2 m**. Check: $1.5 \times 4.2 = 6.3$.

Answer to Question 13

a. Volume of a cuboid = length × width × height: $60 \times 30 = 1\,800$ and $1\,800 \times 35 = 63\,000$ cm³. As 1 000 cm³ = 1 litre, that is **63 litres**.
b. The water stops 5 cm below the 35 cm top: 35 − 5 = **30 cm**.
c. Use the water height: $60 \times 30 \times 30 = 54\,000$ cm³ = **54 litres**.
d. Divide the water by the amount for one fish: 54 ÷ 4.5 = 12 (because 12 × 4.5 = 54). She can keep at most **12 fish**.

Answer to Question 14

a. 20 × 15 × 10 = **3 000 cm³**.
b. 60 × 45 × 30 = **81 000 cm³**.
c. 81 000 ÷ 3 000 = **27 boxes**.
d. Along the length: 60 ÷ 20 = 3. Along the width: 45 ÷ 15 = 3. Along the height: 30 ÷ 10 = 3. So 3 × 3 × 3 = **27 boxes**, which agrees.

Answer to Question 15

a. $V = 25 \times 10 \times 1.2 =$ **300 m³**.
b. 300 × 1 000 = **300 000 litres**.
c. 300 000 ÷ 1 500 = 200 minutes = **3 hours 20 minutes**.
d. Area = 25 × 10 = 250 m². Cost = 250 × £14 = **£3 500**.
e. The outer rectangle is (25 + 4) m by (10 + 4) m = 29 m by 14 m. Area = 29 × 14 = 406 m². The path area is 406 − 250 = **156 m²**.
f. 156 × £22 = **£3 432**.

Answer to Question 16

a. A: 4 × 4 = 16. B: 8 × 2 = 16. C: 16 × 1 = 16. All are **16 m²**.
b. A: 2 × (4 + 4) = **16 m**. B: 2 × (8 + 2) = **20 m**. C: 2 × (16 + 1) = **34 m**.
c. **Rectangle A** (the square) needs the least fencing (16 m). **Rectangle C** needs the most (34 m).
d. 34 − 16 = 18 m more. 18 × £9.50 = **£171**.
e. Half the perimeter is 12 m, so length + width = 12: 1 by 11 (area 11), 2 by 10 (20), 3 by 9 (27), 4 by 8 (32), 5 by 7 (35) and 6 by 6 (36). The greatest area is **36 m²**, the 6 m by 6 m square.

Answer to Question 17

a. Split the room into a bottom rectangle that is 10 m wide and 3.5 m high, and a top rectangle that is 6 m wide and 1.5 m high. Areas: 10 × 3.5 = 35 m² and 6 × 1.5 = 9 m². Total = 35 + 9 = **44 m²**. (Check: the 10 m by 5 m rectangle is 50 m², minus the missing corner 4 m by 1.5 m = 6 m², gives 44 m².)
b. 44 × £18 = **£792**.
c. The left side is 5 m and the bottom is 10 m. The top edges are 6 m and 4 m, which add to 10 m, and the right edges are 1.5 m and 3.5 m, which add to 5 m. Perimeter = 5 + 10 + 6 + 1.5 + 4 + 3.5 = **30 m**.
d. The rug has an area of 3 × 2 = 6 m². 6/44 = $\frac{3}{22}$ of the floor.

Answer to Question 18

a. $A = 40 \times 25 =$ **1 000 m²**.
b. $A = \frac{1}{2} \times 40 \times 18 =$ **360 m²**.
c. 1 000 + 360 = **1 360 m²**.
d. 1 360 ÷ 10 000 = **0.136 hectares**.
e. 1 360 ÷ 100 = 13.6, so the farmer needs **14 bags**. Cost: 14 × £12.50 = **£175**.

Answer to Question 19

a. $V = 2 \times 1.5 \times 1 =$ **3 m³**.
b. 3 × 1 000 = **3 000 litres**.
c. 3 000 ÷ 0.5 = 6 000 minutes. 6 000 ÷ 60 = **100 hours**.
d. $\frac{3}{4}$ of 3 000 = **2 250 litres**.
e. 2 250 ÷ 12 = 187.5, so **187 full buckets**.

Answer to Question 20

a. Length + width = 30 ÷ 2 = 15, so the width is 15 − 9 = **6 cm**. Area = 9 × 6 = **54 cm²**.
b. Side = 30 ÷ 4 = **7.5 cm**. Area = 7.5 × 7.5 = **56.25 cm²**.
c. 56.25 − 54 = **2.25 cm²**.
d. $V = 7.5 \times 7.5 \times 4 =$ **225 cm³**.