



## Measures

- Converting between measurements of area
- Converting between measurements of volume
- Finding the least and greatest length of a measurement
- Solving problems using compound units
- Converting between compound units

Keywords

You should know

explanation 1a

explanation 1b

explanation 1c

- 1** The length of a garden is given as 18 m correct to the nearest metre.

  - a** What is the least possible length of the garden?
  - b** What is the greatest possible length of the garden?
- 2** The length of a pencil is given as 7.6 cm correct to the nearest millimetre.

  - a** What is the greatest possible length of the pencil?
  - b** What is the least possible length of the pencil?
- 3** The length of a road is given as 45 km correct to the nearest kilometre.

  - a** What is the maximum possible length of the road?
  - b** What is the minimum possible length of the road?
- 4** The weight of a baby is given as 4.3 kg correct to one decimal place.

  - a** What is the least possible weight of the baby?
  - b** What is the greatest possible weight of the baby?
- 5** Jack measures the length and width of a rectangle.  
He gives the length as 6.5 cm and the width as 4.3 cm.  
Both measurements are given correct to the nearest millimetre.

  - a** What is the least possible length and width?
  - b** What is the greatest possible length and width?

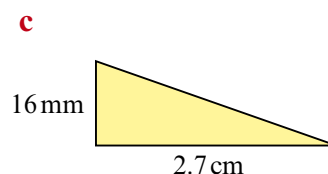
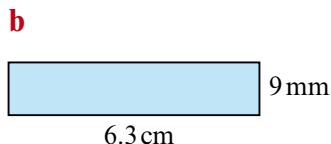
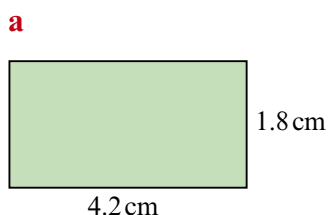
## explanation 2a

## explanation 2b

**6** Work out the area of each shape.

**i** Give your answer in square centimetres ( $\text{cm}^2$ ).

**ii** Give your answer in square millimetres ( $\text{mm}^2$ ).



**7** Convert these areas to square millimetres.

**a**  $5 \text{ cm}^2$

**b**  $2.3 \text{ cm}^2$

**c**  $68 \text{ cm}^2$

**d**  $0.6 \text{ cm}^2$

**8** Convert these areas to square centimetres.

**a**  $700 \text{ mm}^2$

**b**  $80 \text{ mm}^2$

**c**  $6320 \text{ mm}^2$

**d**  $8 \text{ mm}^2$

**9** Rajesh says: ' $3 \text{ m}^2$  is the same as  $300 \text{ cm}^2$ .'

Rajesh is wrong. Explain why.

**10** Convert these areas to square centimetres.

**a**  $5 \text{ m}^2$

**b**  $2.8 \text{ m}^2$

**c**  $0.9 \text{ m}^2$

**d**  $0.056 \text{ m}^2$

**11** Convert these areas to square metres.

**a**  $40\,000 \text{ cm}^2$

**b**  $6700 \text{ cm}^2$

**c**  $300 \text{ cm}^2$

**d**  $345\,600 \text{ cm}^2$

**12** Convert these areas to the units given in brackets.

**a**  $5 \text{ cm}^2$  ( $\text{mm}^2$ )

**b**  $9 \text{ m}^2$  ( $\text{cm}^2$ )

**c**  $2 \text{ km}^2$  ( $\text{m}^2$ )

**d**  $700 \text{ mm}^2$  ( $\text{cm}^2$ )

**e**  $8200 \text{ cm}^2$  ( $\text{m}^2$ )

**f**  $89\,000\,000 \text{ m}^2$  ( $\text{km}^2$ )

**g**  $0.67 \text{ cm}^2$  ( $\text{mm}^2$ )

**h**  $0.053 \text{ km}^2$  ( $\text{m}^2$ )

**i**  $25 \text{ mm}^2$  ( $\text{cm}^2$ )

**j**  $95 \text{ cm}^2$  ( $\text{m}^2$ )

**k**  $1 \text{ km}^2$  ( $\text{cm}^2$ )

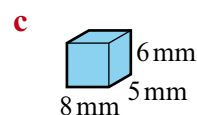
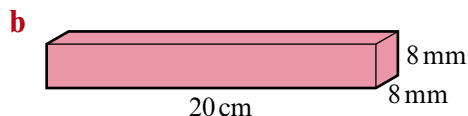
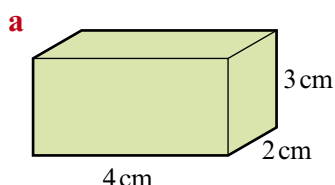
**l**  $6 \text{ m}^2$  ( $\text{mm}^2$ )

## explanation 3

**13** Work out the volume of each of these solids.

**i** Give your answers in cubic centimetres.

**ii** Give your answers in cubic millimetres.



**14** Convert these volumes into cubic millimetres.

**a**  $8\text{ cm}^3$

**b**  $23.5\text{ cm}^3$

**c**  $0.04\text{ cm}^3$

**d**  $4.35\text{ cm}^3$

**15** Convert these volumes into cubic centimetres.

**a**  $60\,000\text{ mm}^3$

**b**  $250\,000\text{ mm}^3$

**c**  $8000\text{ mm}^3$

**d**  $780\text{ mm}^3$

**16** A large fish tank is in the shape of a cuboid. It has a length of 1.2 m, width of 40 cm and height of 55 cm. Work out the volume of the fish tank.

**a** Give your answer in cubic metres.

**b** Give your answer in cubic centimetres.

**17** Convert these volumes into cubic centimetres.

**a**  $4\text{ m}^3$

**b**  $0.024\text{ m}^3$

**c**  $12\text{ m}^3$

**d**  $603.2\text{ m}^3$

**18** Convert these volumes into cubic metres.

**a**  $7\,000\,000\text{ cm}^3$

**b**  $56\,000\text{ cm}^3$

**c**  $680\text{ cm}^3$

**d**  $723\,000\,000\text{ cm}^3$

**19** Convert these volumes to the units given in brackets.

**a**  $5\text{ m}^3$  ( $\text{cm}^3$ )

**b**  $450\text{ mm}^3$  ( $\text{cm}^3$ )

**c**  $67\,000\text{ cm}^3$  ( $\text{m}^3$ )

**d**  $0.4\text{ cm}^3$  ( $\text{mm}^3$ )

**e**  $0.009\text{ m}^3$  ( $\text{cm}^3$ )

**f**  $2\text{ km}^3$  ( $\text{m}^3$ )

**g**  $34\,000\,000\text{ m}^3$  ( $\text{km}^3$ )

**h**  $1\text{ m}^3$  ( $\text{mm}^3$ )

## explanation 4a

## explanation 4b

- 20** An aeroplane travels 2500 km in 5 hours. Work out its average speed.
- 21** Jackie walks 9 km in 1 hour and 20 minutes. Work out her average speed. Give your answer in kilometres per hour.
- 22** A cyclist takes  $1\frac{3}{4}$  hours to travel a distance of 63 km. What is her average speed?
- 23** A cyclist travels at a steady speed of 16 km/h. How far will she travel in 1 hour and 15 minutes?
- 24** A man walks at 5 km/h. He walks 12.5 km. How long does the walk take him?
- 25** Alan goes out for the day. He catches the train to a village that is 30 miles away and then cycles back. The average speed of the train is 50 miles per hour. It takes Alan 2 hours and 30 minutes to cycle home.
- a** Work out the time taken by the train. Give your answer in minutes.
  - b** Work out Alan's speed while cycling.
  - c** Work out Alan's average speed for the entire journey, assuming that he stops at the village for half an hour. Give your answer correct to one decimal place.

## explanation 5

- 26**  $400\text{ cm}^3$  of beeswax has a mass of 384 g. Work out the density of beeswax.
- 27** A block of wood measures 15 cm by 10 cm by 10 cm. The block has a mass of 810 g.
- a** Work out the volume of the block of wood.
  - b** Work out the density of the wood.

- 28** Cubes of sugar have sides of length 1.5 cm. Fifty of these cubes have a mass of 143 g. Work out the density of sugar. Give your answer correct to three significant figures.
- 29** A stone has a mass of 320 kg. The density of the stone is  $2500 \text{ kg/m}^3$ . Work out the volume of the stone.
- 30** A piece of copper has a volume of  $0.07 \text{ m}^3$ . Copper has a density of  $8930 \text{ kg/m}^3$ . Work out the mass of the copper.
- 31** The density of lead is  $11\,340 \text{ kg/m}^3$ . A cube made from lead has lengths of side 15 cm. Work out the mass of the cube.

**explanation 6**

- 32** A metal bar is in the shape of a cuboid measuring 20 cm by 12 cm by 10 cm. The metal bar has a mass of 21.432 kg. Work out the density of the metal.
- a** Give your answer in grams per cubic centimetre.
  - b** Give your answer in kilograms per cubic metre.
- 33** A kitchen worktop is in the shape of a cuboid. It is 2.4 m long, 59 cm wide and 3 cm deep. The worktop is made of granite and has a mass of 114.3 kg. Work out the density of granite. Give your answer in kilograms per cubic metre, correct to three significant figures.
- 34** An athlete runs 100 m in 9.6 seconds. Work out his average speed.
- a** Give your answer correct to two significant figures in metres per second.
  - b** Give your answer correct to two significant figures in kilometres per hour.
- 35** A cyclist covers 6500 m in 20 minutes. Work out his average speed.
- a** Give your answer in metres per minute.
  - b** Give your answer in kilometres per hour.
- 36** Jane runs 3.5 miles in 25 minutes. Work out her average speed in miles per hour.