

A Converting Units

- 5 Write these lengths in order of size, starting with the smallest.

$$\begin{array}{llll} 0.03 \text{ m} & 2.9 \text{ cm} & 32 \text{ mm} & 0.00002 \text{ km} = 0.02 \text{ m} \\ 3 \text{ cm} & & 3.2 \text{ cm} & = 2 \text{ cm} \end{array}$$

$$\underline{0.00002 \text{ km}}, \underline{2.9 \text{ cm}}, \underline{0.03 \text{ m}}, \underline{32 \text{ mm}} \quad [2]$$

smallest

- 5 Change 12 millimetres into metres.

$$\begin{aligned} 12 \text{ mm} &= 1.2 \text{ cm} \\ &= 0.012 \text{ m} \end{aligned} \quad \underline{0.012} \text{ m} \quad [1]$$

- 4 Change 62 000 millimetres into kilometres.

$$\begin{aligned} 62\,000 \text{ mm} &= 62 \text{ m} \\ &= 0.062 \text{ km} \end{aligned} \quad \underline{0.062} \text{ km} \quad [1]$$

- 7 The scale of a map is 1 : 125 000.
On a map, the length of an island is 9.4 cm.

Calculate the actual length of the island, giving your answer in kilometres.

$$\begin{aligned} &1 : 125\,000 \\ \times 9.4 \quad \swarrow &9.4 : 1175\,000 \quad \swarrow \times 9.4 \\ 1175\,000 \text{ cm} &= 11750 \text{ m} \\ &= 11.75 \text{ km} \end{aligned} \quad \underline{11.75} \text{ km} \quad [2]$$

- 4 The distance from town A to town B on a map is 3.5 cm.
The scale on the map is 1 : 250 000.

Find the actual distance, in kilometres, from town A to town B.

$$\begin{aligned} &1 : 250\,000 \\ \times 3.5 \quad \swarrow &3.5 : 875\,000 \quad \swarrow \times 3.5 \\ 875\,000 \text{ cm} &= 8750 \text{ m} \\ &= 8.75 \text{ km} \end{aligned} \quad \underline{8.75} \text{ km} \quad [2]$$

7 Change $457\,000\text{ cm}^2$ into m^2 .

$$1\text{ m} = 100\text{ cm}$$

$$1\text{ m}^2 = 100^2\text{ cm}^2 \\ = 10\,000\text{ cm}^2$$

$$457\,000 \div 10\,000 = 45.7$$

$$\underline{\quad 45.7 \quad} \text{ m}^2 \text{ [1]}$$

4 Change 270 mm^2 into m^2 .

$$1\text{ m} = 1000\text{ mm}$$

$$1\text{ m}^2 = 1000^2\text{ mm}^2 \\ = 1\,000\,000\text{ mm}^2$$

$$270 \div 1\,000\,000 = 0.00027$$

$$\underline{\quad 0.00027 \quad} \text{ m}^2 \text{ [1]}$$

4 Change 0.2 m^2 into cm^2 .

$$1\text{ m} = 100\text{ cm}$$

$$1\text{ m}^2 = 100^2\text{ cm}^2 \\ = 10\,000\text{ cm}^2$$

$$0.2 \times 10\,000 = 2000$$

$$\underline{\quad 2000 \quad} \text{ cm}^2 \text{ [1]}$$

5 Convert 0.17 m^2 into cm^2 .

$$0.17 \times 10\,000 = 1700$$

$$\underline{\quad 1700 \quad} \text{ cm}^2 \text{ [1]}$$

4 Change 600 cm^3 into m^3 .

$$1\text{ m} = 100\text{ cm}$$

$$1\text{ m}^3 = 100^3\text{ cm}^3 \\ = 1\,000\,000\text{ cm}^3$$

$$600 \div 1\,000\,000 = 0.0006$$

$$\underline{\quad 0.0006 \quad} \text{ m}^3 \text{ [1]}$$

- 5 (a) Convert 780 cm^2 into m^2 .

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ m}^2 = 100^2 \text{ cm}^2$$

$$= 10000 \text{ cm}^2$$

- (b) Convert 0.037 m^3 into cm^3 .

$$1 \text{ m} = 100 \text{ cm}$$

$$1 \text{ m}^3 = 100^3 \text{ cm}^3$$

$$= 1000000 \text{ cm}^3$$

$$780 \div 10000 = 0.078$$

$$\underline{\hspace{1cm} 0.078 \hspace{1cm}} \text{ m}^2 \text{ [1]}$$

$$\underline{\hspace{1cm} 37000 \hspace{1cm}} \text{ cm}^3 \text{ [1]}$$

$$0.037 \times 1000000 = 37000$$

- 14 A map has a scale of $1 : 200000$.

Find the area, in square kilometres, of a lake that has an area of 12.4 cm^2 on the map.

LSF: $1 \text{ cm} : 200000 \text{ cm}$

$$1 \text{ cm} : 2000 \text{ m}$$

$$1 \text{ cm} : 2 \text{ km}$$

ASF: $1^2 \text{ cm}^2 : 2^2 \text{ km}^2$

$$1 \text{ cm}^2 : 4 \text{ km}^2$$

$$\begin{array}{l} 1 \text{ cm}^2 : 4 \text{ km}^2 \\ \times 12.4 \quad \downarrow \quad \times 12.4 \\ 12.4 \text{ cm}^2 : 49.6 \text{ km}^2 \end{array}$$

$$\underline{\hspace{1cm} 49.6 \hspace{1cm}} \text{ km}^2 \text{ [2]}$$

- 13 On a map, a lake has an area of 32 cm^2 .
The scale of the map is $1 : 24000$.

Calculate the actual area of the lake.
Give your answer in km^2 .

LSF: $1 \text{ cm} : 24000 \text{ cm}$

$$1 \text{ cm} : 240 \text{ m}$$

$$1 \text{ cm} : 0.24 \text{ km}$$

ASF: $1^2 \text{ cm}^2 : 0.24^2 \text{ km}^2$

$$1 \text{ cm}^2 : 0.0576 \text{ km}^2$$

$$\begin{array}{l} 1 \text{ cm}^2 : 0.0576 \text{ km}^2 \\ \times 32 \quad \downarrow \quad \times 32 \\ 32 \text{ cm}^2 : 1.8432 \text{ km}^2 \end{array}$$

$$\underline{\hspace{1cm} 1.8432 \hspace{1cm}} \text{ km}^2 \text{ [2]}$$

- 20 A lake has an area of 3 km^2 .
On a map the area of the lake is 18.75 cm^2 .

Find the scale of the map in the form $1 : n$.

ASF: $18.75 \text{ cm}^2 : 3 \text{ km}^2$
 $\div 3 \rightarrow 6.25 \text{ cm}^2 : 1 \text{ km}^2$

LSF: $\sqrt{6.25 \text{ cm}} : \sqrt{1 \text{ km}}$
 $2.5 \text{ cm} : 1 \text{ km}$
 $2.5 \text{ cm} : 1000 \text{ m}$
 $2.5 \text{ cm} : 100\,000 \text{ cm}$
 $\div 2.5 \rightarrow 1 : 40\,000$ $\div 2.5$
 $1 : 40\,000$ [3]

- 11 A warehouse has a floor area of 800 m^2 .
The plan of the warehouse is drawn to a scale of $1 : 50$.

Calculate the floor area on the plan.
Give your answer in square centimetres.

LSF: $1 \text{ cm} : 50 \text{ cm}$
 $1 \text{ cm} : 0.5 \text{ m}$
 ASF: $1^2 \text{ cm}^2 : 0.5^2 \text{ m}^2$
 $1 \text{ cm}^2 : 0.25 \text{ m}^2$

$800 \div 0.25$
 $\downarrow$
 $1 \text{ cm}^2 : 0.25 \text{ m}^2$
 $\times 3200 \rightarrow 3200 \text{ cm}^2 : 800 \text{ m}^2$ $\times 3200$

3200 cm^2 [3]

- 3 $1 \text{ m}^2 = 10^n \text{ cm}^2$

Find the value of n .

LSF: $1 \text{ m} = 100 \text{ cm}$
 ASF: $1^2 \text{ m}^2 = 100^2 \text{ cm}^2$
 $1 \text{ m}^2 = 10\,000 \text{ cm}^2$
 $1 \text{ m}^2 = 10^4 \text{ cm}^2$

$n = 4$ [1]

9 Change 300 m/min to km/h.

$$\begin{aligned} & 300 \text{ m every minute} \\ & = 18000 \text{ m every hour} \quad \downarrow \times 60 \\ & = 18 \text{ km every hour} \end{aligned}$$

.....18..... km/h [2]