What is a ratio?

A **ratio** is a way to compare two or more quantities. It lets you know how much each quantity is as part of the whole. Ratios are usually shown as two or more numbers separated by a colon, for example 8 : 5 means 8 to 5 and 3 : 2 : 1 means 3 to 2 to 1

Uses of ratio

Ratios can be used to divide a quantity into parts. Ratio is also used to **scale** amounts, for example in **plan drawings**, **scale models** or **maps**, where really big numbers can be converted to much smaller representations that are still accurate.

Rewarding Learning

How to use scale given as a ratio to calculate dimensions

Scales for plan drawings, models and maps are usually given as **1:n**, for example 1:50
To calculate the actual length from the scaled length, **multiply** the scaled length by **n**.
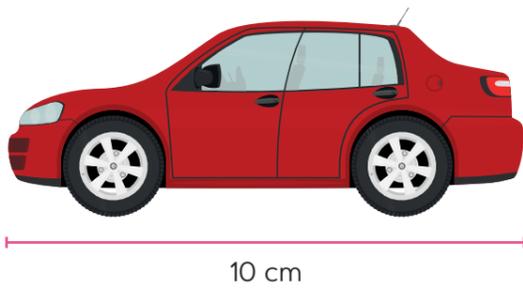To calculate the scaled length from the actual length, **divide** the actual length by **n**.

Models

A model car is **10 cm** long. The scale of the model to the actual car is **1:43**
What is the length of the actual car?

To calculate the actual length from the scaled length, **multiply** the scaled length by **43**

10 cm

10 cm ✖ 43 = 430 cm = 4.3 m

The actual length of the car is **4.3 m**

Scale drawings

A speaker measuring **300 mm by 140 mm** is to be drawn using the scale **1:5**
What will be the dimensions of the speaker on the plan?

To calculate the scaled length from the actual length, **divide** the actual length by **5**
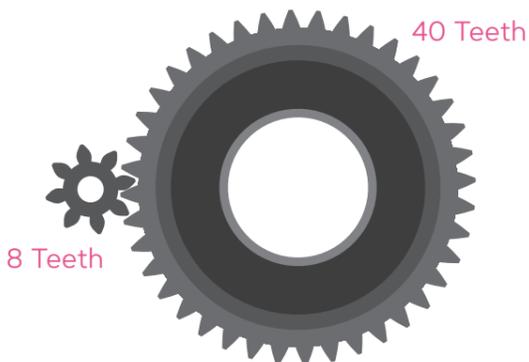
28 mm

60 mm

300 ÷ 5 = 60
140 ÷ 5 = 28
The dimensions on the plan will be **60 mm by 28 mm**

How to calculate and use gear ratios

If the driver gear with 8 teeth revolves at 20 rpm, how fast does the driven gear with 40 teeth revolve?

40 Teeth

8 Teeth

gear ratio $= \dfrac{\text{driven gear}}{\text{driver gear}}$

driven gear	:	driver gear
40	**:**	**8**
5	**:**	**1**

That means the driver gear will need to revolve five times for every one revolution of the driven gear, i.e. five times faster. Therefore:

20 rpm ÷ 5 = 4 rpm
The driven gear will revolve at **4 rpm**

Level 6

Work out dimensions using scale.

What is a ratio?

A **ratio** is a way to compare two or more quantities. It lets you know how much each quantity is as part of the whole. Ratios are usually shown as two or more numbers separated by a colon, for example 8 : 5 means 8 to 5 and 3 : 2 : 1 means 3 to 2 to 1

Uses of ratio

Ratios can be used to divide a quantity into parts. Ratio is also used to **scale** amounts, for example in **plan drawings**, **scale models** or **maps**, where really big numbers can be converted to much smaller representations that are still accurate.

cea
Rewarding Learning

How to use scale given as a ratio on a map

How to use scale given as a ratio on a map
Scales for maps are usually given as **1 : n**, for example **1 : 2500**
Large scale maps use ratios such as **1 : 1250, 1 : 2500 and 1 : 10 000**
Small scale maps use ratios such as **1 : 25 000 and 1 : 50 000**

A ratio has no units.

If a distance on a map is measured in cm, then a ratio of **1 : 100 000** means **1 cm = 100 000 cm**.

This can be changed into m and then km:

÷ 100   ÷ 1000

100 000 cm = 1000 m = 1 km
1 : 100 000 is equivalent to **1 cm = 1 km**.

It follows that **1 : 50 000** is equivalent to **1 cm = ½ km**.
- To calculate the actual distance, measure the distance on the map in cm and **divide by 2**
- To calculate a distance to be drawn on a map, **multiply** the actual distance in km **by 2**

Similarly, a ratio of **1 : 25 000** is equivalent to **1 cm = ¼ km**.
- To calculate the actual distance, measure the distance on the map in cm and **divide by 4**
- To calculate a distance to be drawn on a map, **multiply** the actual distance in km **by 4**

Example
The distance on a map between Bangor and Helen's Bay is **12 cm**.
The scale used on the map is **1 : 50 000**
Calculate the actual distance between Bangor and Helen's Bay.
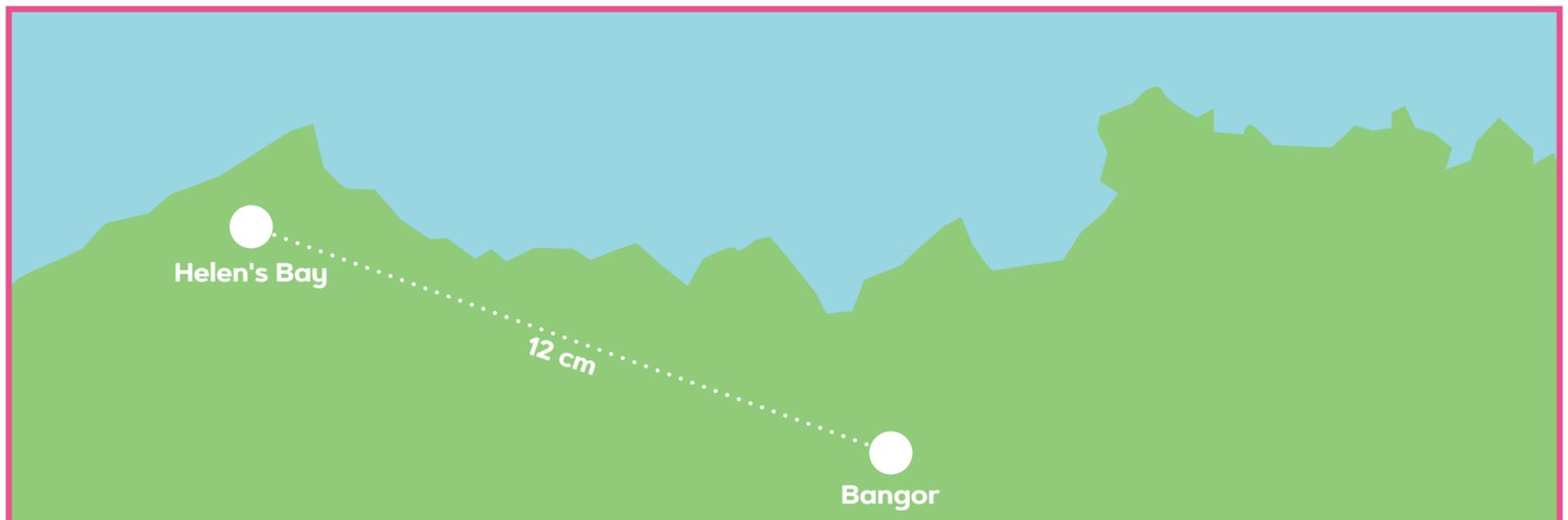
Method 1
12 × 50 000 = 600 000

÷ 100   ÷ 1000

600 000 cm = 6000 m = **6 km**

Method 2
1 : 50 000 is equivalent to **1 cm = ½ km**.

To calculate the actual distance, **divide** the distance on the map **by 2**
12 ÷ 2 = 6

Therefore, the actual distance from Bangor to Helen's Bay is **6 km**.

Level 6

Work out dimensions using scale.