

## What do I need to be able to do?

By the end of this unit you should be able to:

- Solve problems and explain direct proportion
- Use conversion graphs to make statements, comparisons and form conclusions
- Understand and use scale factors for length

## Keywords

- Proportion:** a statement that links two ratios
- Variable:** a part that the value can be changed
- Axes:** horizontal and vertical lines that a graph is plotted around
- Approximation:** an estimate for a value
- Scale Factor:** the multiple that increases/ decreases a shape in size
- Currency:** the system of money used in a particular country
- Conversion:** the process of changing one variable to another
- Scale:** the comparison of something drawn to its actual size.

## Direct Proportion

As one variable changes the other changes at the same rate.



4 cans of pop = £2.40

$\times 0.5$   
4 cans of pop = £2.40  
 $\rightarrow$  2 cans of pop = £1.20

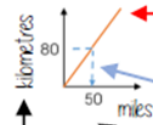
This is a multiplicative change  
4 cans of pop = £2.40  
 $\times 3$   
 $\rightarrow$  12 cans of pop = £7.20

Sometimes this is easiest if you work out how much one unit is worth first  
e.g. 1 can of pop = £0.60

This multiplier is the same in the same way that this would be for ratio

## Conversion Graphs

Compare two variables



Labelling of both axes is vital

This is always a straight line because as one variable increases so does the other at the same rate

To make conversions between units you need to find the point to compare – then find the associated point by using your graph  
Using a ruler helps for accuracy  
Showing your conversion lines help as a "check" for solutions

## Conversion between currencies



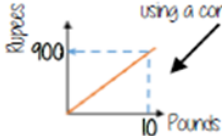
£1 = 90 Rupees

Currency is directly proportional

For every £1 I have 90 Rupees

$\times 10$   
£1 - 90 Rupees  
 $\rightarrow$  £10 - 900 Rupees

Currency can be converted using a conversion graph



Convert 630 Rupees into Pounds

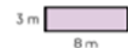
$\times 7$   
£1 - 90 Rupees  
 $\rightarrow$  £7 - 630 Rupees

## Ratio between similar shapes



Angles in similar shapes do not change  
e.g. if a triangle gets bigger the angles can not go above 180°

The two rectangles are similar.



Corresponding sides

$\times 15$   
3m : 45m  
 $\rightarrow$  8m : 120m

$\times 8$   
45m : 360m  
 $\rightarrow$  7m : 56m

Note: Simplify to the same ratio

## Understand Scale Factor

The two rectangles are similar.



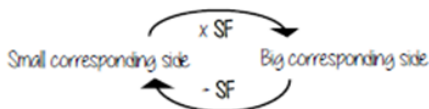
$3 \times 15 = 45$   
This is a multiplicative change

Use corresponding sides to calculate a scale factor

Missing length  
 $8 \times 15 = 120$

Scale factor can also be calculated by

$\frac{\text{Bigger corresponding side}}{\text{Smaller corresponding side}}$



## Draw and interpret scale diagrams

A picture of a car is drawn with a scale of 1:30

For every 1cm on my image is 30cm in real life.

The car image is 10cm

Image : Real life  
1cm : 30cm  
 $\times 10$   
 $\rightarrow$  10cm : 300cm

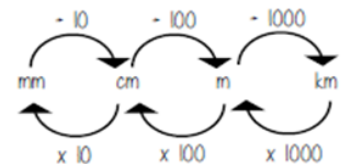


The car in real life is 210cm

Image : Real life  
1cm : 30cm  
 $\times 7$   
 $\rightarrow$  7cm : 210cm



## Interpret maps with scale factors



1cm : 250m

Ratios need to be in the same units

1cm : 250m

1cm : 25000cm

$250 \times 100 = 25000$

For every 1cm on my map is 25000cm in real life.

