

YEAR 8 - PROPORTIONAL REASONING...

Multiplicative Change

@whisto_maths

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

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

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

This is a multiplicative change

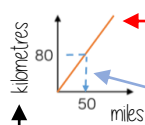
4 cans of pop = £2.40

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

Conversion Graphs

Compare two variables



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

Labelling of both axes is vital

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

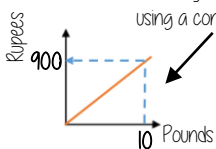
Conversion between currencies



£1 = 90 Rupees

Currency is directly proportional

For every £1 I have 90 Rupees



Currency can be converted using a conversion graph

Convert 630 Rupees into Pounds

£1 = 90 Rupees
 $\times 10$
 £10 = 900 Rupees
 $\times 7$
 £7 = 630 Rupees

630 ÷ 90 = 7

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.

3m 8m

45m ?m

Corresponding sides

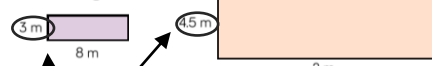
3m : 45m
 8m : 120m

8m : 12m
 1m : 15m

Note: Simplify to the same ratio

Understand Scale Factor

The two rectangles are similar.



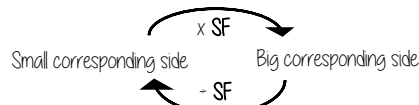
$$3 \times 15 = 45$$

This is a multiplicative change.

Use corresponding sides to calculate a scale factor

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
 $\times 10$
 10cm : 300cm

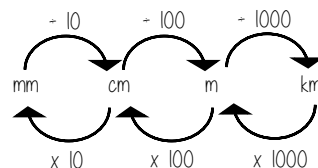


The car in real life is 210cm

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



Interpret maps with scale factors



1 cm : 250 m

Ratios need to be in the same units

1 cm : 250m

1 cm : 25000cm

250 x 100 = 25000

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

