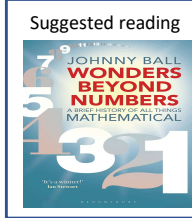


# Year 8 – Proportional Reasoning

## Multiplicative Change



Want to know more? Scan the QR code to visit the curriculum overview for Year 8 Maths, including topic summaries, key words, and books that you may want to read in your own time



### 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

$\times 0.5$   
2 cans of pop = £1.20

$\times 3$   
12 cans of pop = £7.20

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

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

This is a multiplicative change

### Conversion Graphs

Compare two variables

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

Labelling of both axes is vital

### Conversion between currencies



For every £1 I have 90 Rupees

£1 = 90 Rupees

Currency is directly proportional

$\times 10$   
£10 = 900 Rupees

Currency can be converted using a conversion graph

Convert 630 Rupees into Pounds

$\div 90$   
£7 = 630 Rupees

$630 \div 90 = 7$

### 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

$\times 15$   
1m : 15m

$\times 8$   
8m : 12m

Note: Simplify to the same ratio

### Understand Scale Factor

The two rectangles are similar.

3m : 8m = 4.5m : ?m

$3 \times 15 = 45$

This is a multiplicative change

Use corresponding sides to calculate a scale factor

Scale factor can also be calculated by:

Bigger corresponding side  
Smaller corresponding side

$\times SF$   
Small corresponding side → Big corresponding side

$\div SF$   
Big corresponding side → Small 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  
 $\div 7$   
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

$250 \times 100 = 25000$

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