



YEAR 8 KNOWLEDGE ORGANISERS



BLOCK: PROPORTIONAL REASONING

Multiplicative Change Multiplying and Dividing Fractions

"MATHS OPENS DOORS"

YEAR 8 - PROPORTIONAL REASONING...

Multiplicative Change

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

- Approximation:** Not an exact value, but close enough to be used
- Axis (Axes is plural):** a reference line, usually on a graph
- Conversion:** a change from one unit to another, especially currency
- Currency:** the system of money used in a particular country, e.g. pounds, dollars, euros
- Proportion:** a part, share or number considered by comparing it to a whole
- Scale:** the markings on an axis to show what numbers are represented on it
- Scale factor:** the ratio of the length in a drawing (or model) to the length on the real thing
- Variable:** a letter or symbol representing a quantity that can change in value. The most commonly used letters are x , y , and n

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

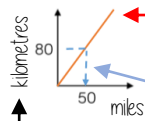
4 cans of pop = £2.40

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

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

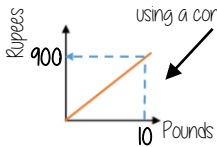
Conversion between currencies



£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

£1 = 90 Rupees
 $\times 7$
 £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

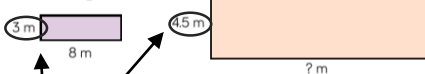
3m : 45m
 8m : 12m

8m : 12m
 1m : 1.5m

Note: Simplify to the same ratio

Understand Scale Factor

The two rectangles are similar.



$$3 \times 15 = 45$$

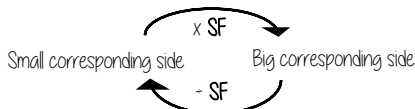
This is a multiplicative change.

Use corresponding sides to calculate a scale factor

Missing length
 $8 \times 15 = 12m$

Scale factor can also be calculated by:

Bigger corresponding side
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



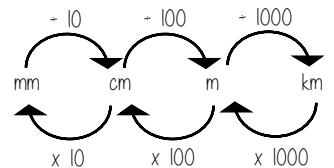
Image : Real life
 1cm : 30cm
 $\times 10$
 10cm : 300cm

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

$$250 \times 100 = 25000$$

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



YEAR 8 - PROPORTIONAL REASONING...

Multiplying and Dividing Fractions

What do I need to be able to do?

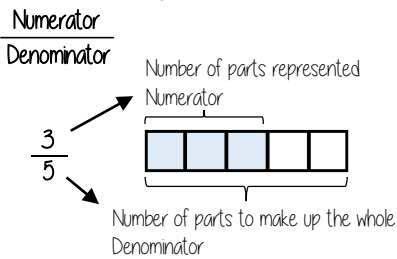
By the end of this unit you should be able to:

- Carry out any multiplication or division using fractions and integers.
- Solutions can be modelled, described and reasoned.

Keywords

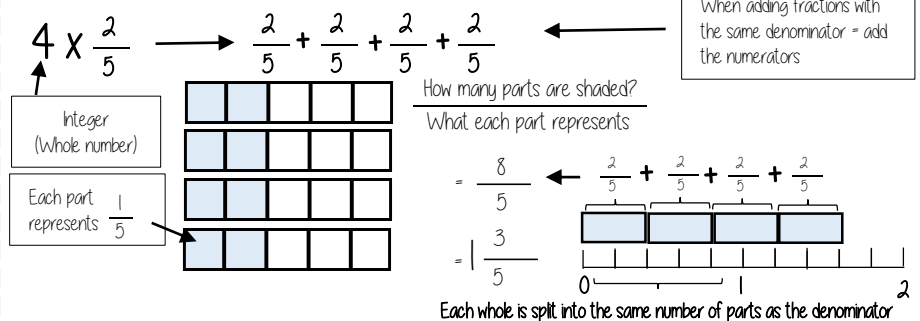
Commutative: a mathematical process is commutative if the numbers may be inputted in any order.
Denominator: the bottom number in a fraction, which shows how many equal parts the item is divided into.
Dividend: the amount you want to divide up: dividend ÷ divisor = quotient.
Divisor: the number we divide by: dividend ÷ divisor = quotient.
Non-unit fraction: a fraction whose numerator is greater than 1.
Numerator: the number above the line of a fraction, showing the number of parts of the whole.
Quotient: the result when one number is divided by another: dividend ÷ divisor = quotient.
Reciprocal: the reciprocal of a number is 1 divided by that number.
Unit fraction: a fraction whose numerator is 1.
Whole number: a number with no fractional or decimal parts. Also called an integer.

Representing a fraction

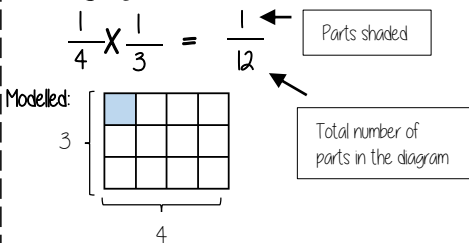


ALL PARTS of a fraction are of equal size

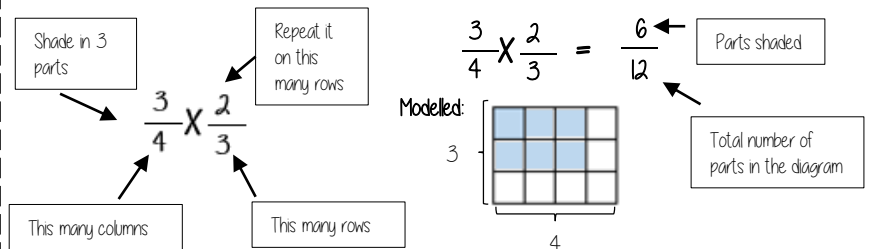
Repeated addition = multiplication by an integer



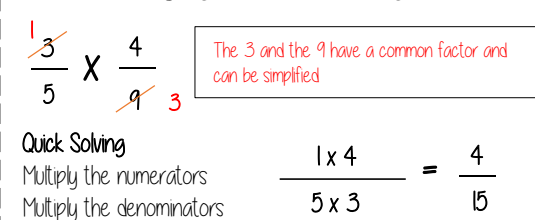
Multiplying unit fractions



Multiplying non-unit fractions

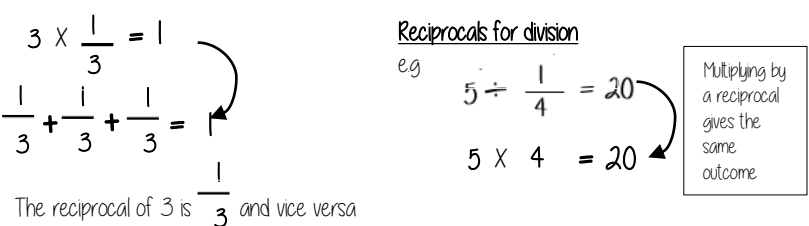


Quick Multiplying and Cancelling down

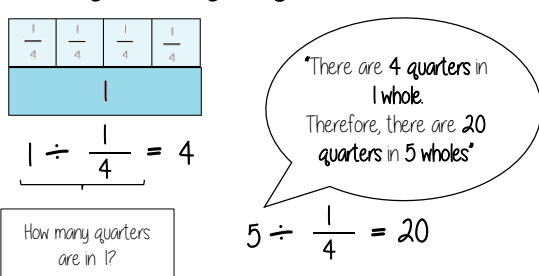


The reciprocal

When you multiply a number by its reciprocal the answer is always 1



Dividing an integer by an unit fraction



Dividing any fractions

Remember to use reciprocals

