Y10 FOUNDATION HT1 SPEED, RATIO, AND PROPORTION

Simplifying a ratio

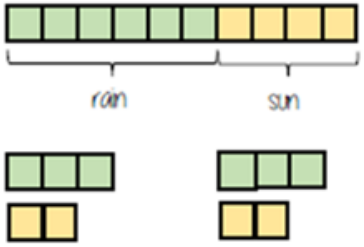
Cancel down the ratio to its lowest form

"For every 6 days of rain there are 4 days of sun"

6:4

÷ by 2

3:2



Find the biggest common factor that goes into all parts of the ratio

For 6 and 4 the biggest factor (number that multiples into them is 2)

"For every 3 days of rain there are 2 days of sun" – when this happens twice the ratio becomes 6:4

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 → (x 0.5) → 2 cans of pop = £1.20

4 cans of pop = £2.40 → (x 3) → 12 cans of pop = £7.20

This is a multiplicative change

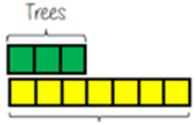
This multiplier is the same in the same way that this would be for ratio

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

Ratio as a fraction

Trees: Flowers

3 : 7



Ratio

There are 3 parts for trees

Fraction of trees

Number of parts of in group / Total number of parts

3/10

Fraction

Tree parts 3 + Flower parts 7 = 10

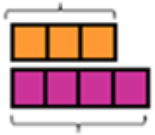
Sharing a whole into a given ratio

James and Lucy share £350 in the ratio 3:4. Work out how much each person earns

Model the Question

James: Lucy

3 : 4



Find the value of one part

Whole: £350

7 parts to share between (3 James, 4 Lucy)

£350 ÷ 7 = £50

□ = one part = £50

Put back into the question

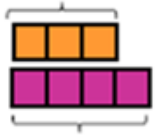
James: Lucy

(x 50) 3 : 4 (x 50)

£150:£200

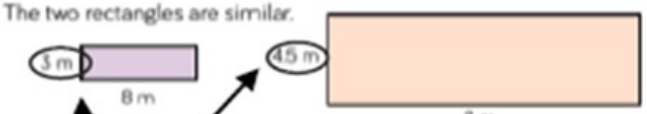
James = 3 x £50 = £150

Lucy = 4 x £50 = £200



Understand Scale Factor

The two rectangles are similar.



3 x 1.5 = 4.5

This is a multiplicative change

Missing length

8 x 1.5 = 12m

Use corresponding sides to calculate a scale factor

Scale factor can also be calculated by

Bigger corresponding side / Smaller corresponding side

Ratio 1:n (or n:1)

This is asking you to cancel down until the part indicated represents 1

Show the ratio 4:20 in the ratio of 1:n

The question states that this part has to be 1 unit. Therefore Divide by 4

4 : 20 → 1 : 5

This side has to be divided by 4 too – to keep in proportion

If the n part does not have to be an integer for this type of question

Order is Important

"For every dog there are 2 cats"

1:2

The ratio has to be written in the same order as the information is given

e.g. 2:1 would represent 2 dogs for every 1 cat ✗

Keywords

Ratio: a statement of how two numbers compare

Equal Parts:: all parts in the same proportion, or a whole shared equally

Proportion: a statement that links two ratios

Order: to place a number in a determined sequence

Part: a section of a whole

Equivalent: of equal value

Factors: integers that multiply together to get the original value

Scale: the comparison of something drawn to its actual size.

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Unit Pricing

4 Oranges	5 cupcakes
£1	£1.20

4 = £1.00 ÷ 2 → 2 = £0.50 ÷ 2 → 1 = £0.25

5 = £1.20 ÷ 5 → 1 = £0.20

Cost per Unit

To calculate unit per cost you divide by the cost

Cupcakes are the best value as one item has the cheapest value

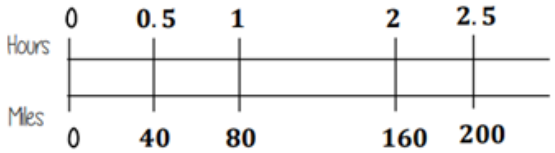
There is a directly proportional relationship between the cost and number of units

Speed, Distance, Time

"per" for every
e.g. 80 miles per hour (mph)
Travel 80 miles every hour

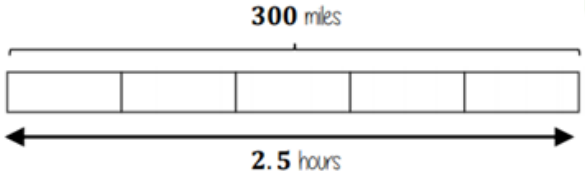
$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

You can use a double number line to help you calculate distance



e.g. A boat travels at a constant speed for 2.5 hours
It travels 300 miles.

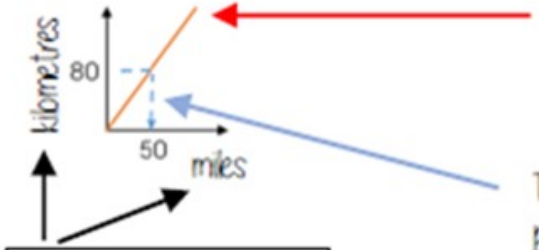
Bar models can help to calculate mph



Each part is half an hour
Each part is 60 miles

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

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
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.