



Year 7 higher topic 8

Multiplicative reasoning

What careers would use these skills?

Carpenter, builder, lorry driver, sports analyst, hairdresser, vet, dentist, nurse, café worker, painter and decorator, architect

Conversion of metric and imperial units

The Imperial system of measurement is an old measurement system based on everyday activities that originated in England.

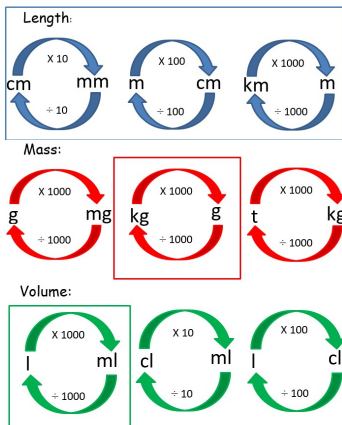
The metric system a decimal system of measurement based on 10.

Lengths	
Imperial	Metric
1 inch	= 2.5 cm
1 foot	= 30 cm
5 miles	= 8 km

Weights	
Imperial	Metric
1 pound	= 450 g
2.2 pounds	= 1 kg
1 stone	= 6.3 kg

Capacity	
Imperial	Metric
1 pint	= 570 ml
1 gallon	= 4.5 l
1.75 pints	= 1 l

Using metric units



Sharing in a given ratio

Worked example
Alex uses 250 g of cheese to make pizzas for 4 people.
How much cheese would he need to make pizzas for 6 people?

4 people + 2 people = 6 people

250 g

125 g

250 g + 125 g = 375 g

Worked example

There are 4 male and 6 female kittens.
a Write the ratio of male to female kittens in its simplest form.
b What proportion of the kittens are male?
Write your answer as a fraction and a percentage.

a Male : Female

4 : 6

$\div 2$ $\div 2$

2 : 3

b

M M M M F F F F F F

$\frac{4}{10}$ $\frac{6}{10}$

$\frac{4}{10} = \frac{2}{5}$ Simplify the fraction.

$\frac{4}{10} = \frac{40}{100} = 40\%$ Write as a percentage.

Ratio and proportion

- Ratio compares part to part.
- Proportion compares part to whole.
- Proportions can be written as fractions or percentages.

Writing ratios

A ratio is a way of comparing two or more quantities. These show the ratio of red beads to green beads.



Simplify a ratio

You can make the numbers in a ratio as small as possible by **simplifying**. You simplify a ratio by dividing the numbers in the ratio by the **highest common factor (HCF)**

Simplifying Ratios – Example 1

Simplify the Ratio 6 : 15

Divide both our number values by the GCF of 3.

$$\begin{array}{ccc} 6 & : & 15 \\ \div 3 & & \div 3 \\ 2 & : & 5 \end{array}$$

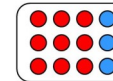
The simplified Ratio Answer is 2 : 5 ✓

Ratios

Simplifying a ratio ?

For example,

What is the ratio of red counters to blue counters?



$$\begin{array}{ccc} \text{red} & : & \text{blue} \\ 9 & : & 3 \\ \div 3 & & \div 3 \\ 3 & : & 1 \end{array}$$

For every three red counters there is one blue counter.

For ratios with fractions or decimals, first multiply both sides of the ratio to get whole numbers

Simplifying ratios containing decimals

When a ratio is expressed using fractions or decimals we can simplify it by writing it in whole-number form.

Simplify the ratio 0.8 : 2.

We can write this ratio in whole-number form by multiplying both parts by 10.

$$\begin{array}{ccc} 0.8 & : & 2 \\ \times 10 & & \times 10 \\ 8 & : & 20 \\ \div 4 & & \div 4 \\ 2 & : & 5 \end{array}$$

Simplifying ratios containing fractions

Simplify the ratio $\frac{2}{3} : 4$

We can write this ratio in whole-number form by multiplying both parts by 3.

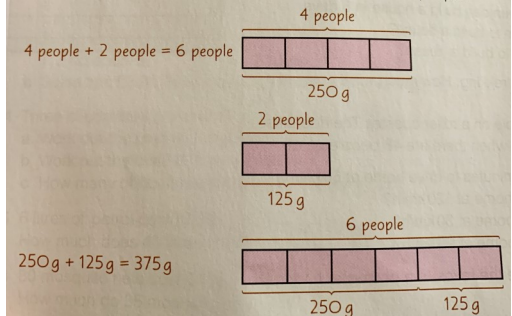
$$\begin{array}{ccc} \frac{2}{3} & : & 4 \\ \times 3 & & \times 3 \\ 2 & : & 12 \\ \div 2 & & \div 2 \\ 1 & : & 6 \end{array}$$

Direct and Proportion

When two quantities are in direct proportion, as one increases or decreases, the other increases or decreases in the same ratio.

Worked example

Alex uses 250 g of cheese to make pizzas for 4 people.
How much cheese would he need to make pizzas for 6 people?



Inverse proportion

When two quantities are in inverse proportion, as one increases, the other decreases in the same ratio.

Worked example

It takes 2 people 20 minutes to wash a car.
How long does it take:

a 4 people

Number of people	Time (mins)
2	20
4	10

Number of people	Time (mins)
2	20
1	40

b 1 person?

The more people there are, the less time it takes.

Doubling the number of people halves the time.

Halving the people doubles the time.