

Unit 11 - Foundation Mathematics Knowledge Organiser

Ratio and Proportion

Writing Ratios

Key point 1

A **ratio** is a way to compare two or more quantities.

Key point 2

You **simplify** a ratio by making the numbers as small as possible.

Divide the numbers in the ratio by their **highest common factor (HCF)**.

Blue Beads : Red Beads



3 : 6

1 : 2

$$\begin{array}{l} \div 4 \quad 4 : 12 \\ \quad \quad 1 : \square \end{array} \quad \begin{array}{l} \div 5 \quad 15 : 20 \\ \quad \quad \square : \square \end{array}$$

Mathswatch Clip - 38

Write each ratio in its simplest form.

a 20 : 25 : 15

b 36 : 24 : 30

c 56 : 42 : 35

d 16 : 40 : 56

Sharing Using Ratios

Key point 3

Ratios in their **simplest form** only have whole numbers.

Example 1

To make orange paint Maria mixes yellow paint with red paint in the ratio 3 : 1. She uses 4 tins of red paint. How many tins of yellow paint does she use? Write down the ratio. Use Y for yellow and R for red.

Y : R

$$\times 4 \quad \begin{array}{l} 3 : 1 \\ 12 : 4 \end{array} \times 4$$

Maria uses 12 tins of yellow paint.

Multiply each part by the same number to get an equivalent ratio.

Convert 8 m to cm.

1 m is 100 cm.

m : cm

$$\times 8 \quad \begin{array}{l} 1 : 100 \\ 8 : 800 \end{array} \times 8$$

So 8 m is 800 cm.

The ratio of m : cm is 1 : 100.

Exam-style question

5 schools sent some students to a conference.

One of the schools sent both boys and girls.

This school sent 16 boys. The ratio of the number of boys it sent to the number of girls it sent was 1 : 2

The other 4 schools sent only girls.

Each of the 5 schools sent the same number of students.

Work out the total number of students sent to the conference by schools. (4 marks)

March 2013, Q12, IMAO/1H

Mathswatch Clip - 106

More Sharing Using Ratios

Example 4

Share £25 in the ratio 3 : 2.

3 + 2 = 5 parts



Work out how many parts there are in total.

Work out 1 part.

Work out 3 parts and 2 parts.

$$£25 \div 5 = £5$$

$$£5 \times 3 = £15$$

$$£5 \times 2 = £10$$

Answer: £15 : £10

Check: £15 + £10 = £25

Check they add up to the correct total.

Example 5

Molly makes a blackcurrant drink by mixing 30 ml of blackcurrant with 450 ml of water.

Hope makes a blackcurrant drink by mixing 40 ml of blackcurrant with 540 ml of water.

Whose drink is the stronger? Explain your answer.

Molly

blackcurrant : water

$$\div 30 \quad \begin{array}{l} 30 : 450 \\ 1 : 15 \end{array} \div 30$$

Hope

blackcurrant : water

$$\div 40 \quad \begin{array}{l} 40 : 540 \\ 1 : 13.5 \end{array} \div 40$$

Simplify to a unit ratio.

Hope's drink is the stronger because it uses less water for every millilitre of blackcurrant.

Compare the quantity of water per ml of blackcurrant.

Key point 6

You can compare ratios by writing them as **unit ratios**. In a unit ratio, one of the numbers is 1.

Key point 5

A **proportion** compares a part with the whole.

Proportion

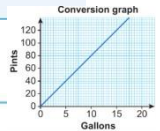
Key point 9

When two values are in **direct proportion**, if one value is zero so is the other. When one value doubles, so does the other.

When two quantities are in direct proportion, plotting them as a graph gives a straight line through the origin. The origin is the point (0, 0) on a graph.

Key point 11

When two values are in **inverse proportion**, one increases at the same rate as the other decreases. For example, as one doubles ($\times 2$) the other halves ($\div 2$).



Example 6

A recipe for 6 people uses 900 g of mince. How much mince is needed for

a 12 people

P : M

$$\times 2 \quad \begin{array}{l} 6 : 900\text{g} \\ 12 : 1800\text{g} \end{array} \times 2$$

b 3 people

P : M

$$\div 2 \quad \begin{array}{l} 6 : 900\text{g} \\ 3 : 450\text{g} \end{array} \div 2$$

c 9 people?

6 people + 3 people = 9 people

$$900 + 450 = 1350\text{g}$$

Mathswatch Clip - 42

Discussion How would you work out the amounts for 18 people and 15 people?