

# Ratios

A **ratio** is a relationship or comparison between two integer numbers.

**Example:** In a school there are 783 students and 29 teaching staff on a particular day. What teacher to pupil ratio will the school be quoted for that school?

**Answer:** The ratio of teachers to pupils is 29 : 783. As both numbers are divisible by 29, this can be simplified to 1 : 27, that is, one teacher is responsible for 27 students.

A ratio can also be expressed as a fraction. In the above example this would be  $\frac{1}{27}$ , which is the fraction of teachers to students.

**If a ratio contains a decimal fraction**, then both sides of the ratio must be multiplied by ten to convert the decimal fraction to an integer.

**Example:**

$$\begin{aligned} 0.6:5 &= 0.6 \times 10 : 5 \times 10 \\ &= 6 : 50 \text{ which can be simplified to } 3 : 25 \end{aligned}$$

**If a ratio has fractions** they too must be converted to integers by multiplying both sides by the lowest common denominator.

**Example:**

$$\frac{1}{3} : 4$$

The lowest common denominator is 3, therefore  $\frac{1}{3} \times 3 : 4 \times 3 = 1 : 12$

A ratio that compares values with **units of measurement** should compare values in the same form.

**Example:**

$$400\text{mg} : 2\text{g}$$

There are 1000mg in each gram, therefore the ratio should be written as 400 : 2000 or 1 : 5 after simplifying

## Converting a ratio to a percentage

If the ratio is expressed as a fraction:  $1 : 4 = \frac{1}{4} \times 100 = 25\%$

If the ratio is expressed as a decimal:  $\frac{1}{4} = 1 \div 4 = 0.25 \times 100 = 25\%$

## Converting a percentage to a ratio

Express the percentage as a fraction and simplify. The numerator becomes the first part of the ratio and the denominator becomes the second part of the ratio.

So,

$$55\% = \frac{55}{100} = \frac{11}{20} = 11:20$$

### **Remember**

- To convert a percentage into a decimal or fraction divide by 100
- To convert a decimal or fraction into a percentage multiply by 100