# Ratios

**Ratios can be a grisly subject, no doubt about it — but work your way through the examples on the next two pages, and the whole murky business should become crystal clear...**

## Reducing Ratios to their Simplest Form

**To reduce a ratio to a simpler form, divide all the numbers in the ratio by the same thing (a bit like simplifying a fraction). It's in its simplest form when there's nothing left you can divide by.**

**EXAMPLE:** **Write the ratio 15:18 in its simplest form.**

For the ratio 15:18, both numbers have a factor of 3, so divide them by 3.

We can't reduce this any further. So the simplest form of 15:18 is 5:6.

$$15:18 \xrightarrow{\div 3} 5:6$$

### A handy trick for the calculator paper — use the fraction button

If you enter a fraction with the $\square\!\!\square$ or $a\frac{b}{c}$ button, the calculator automatically cancels it down when you press $=$.

So for the ratio 8:12, just enter $\frac{8}{12}$ as a fraction, and you'll get the reduced fraction $\frac{2}{3}$.

Now you just change it back to ratio form, i.e. 2 : 3. Ace.

## The More Awkward Cases:

### 1) If the ratio contains decimals or fractions — multiply

**EXAMPLES:** **1. Simplify the ratio 2.4:3.6 as far as possible.**

1) Multiply both sides by 10 to get rid of the decimal parts.
2) Now divide to reduce the ratio to its simplest form.

$$2.4:3.6 \xrightarrow{\times 10} 24:36 \xrightarrow{\div 12} 2:3$$

**2. Give the ratio $\frac{5}{4}:\frac{7}{2}$ in its simplest form.**

1) Put the fractions over a common denominator (see p8).
2) Multiply both sides by 4 to get rid of the fractions.
3) This ratio won't cancel further, so we're done.

$$\frac{5}{4}:\frac{7}{2} = \frac{5}{4}:\frac{14}{4} \xrightarrow{\times 4} 5:14$$


### 2) If the ratio has mixed units — convert to the smaller unit

**EXAMPLE:** **Reduce the ratio 24 mm : 7.2 cm to its simplest form.**

1) Convert 7.2 cm to millimetres.
2) Simplify the resulting ratio. Once the units on both sides are the same, get rid of them for the final answer.

$$24\text{ mm}:7.2\text{ cm} = 24\text{ mm}:72\text{ mm} \xrightarrow{\div 24} 1:3$$

### 3) To get the form 1 : n or n : 1 — just divide

**EXAMPLE:** **Reduce 3:56 to the form 1:n.**

Divide both sides by 3:

$$3:56 \xrightarrow{\div 3} 1:\frac{56}{3} = 1:18\frac{2}{3}\ (\text{or } 1:18.\dot{6})$$

This form is often the most useful, since it shows the ratio very clearly.