

Ratio

Expressing ratios

A ratio is a way of comparing 2 or more quantities. When writing a ratio you should always make sure they are:

in the same **units**
in the correct **order**
cancelled down/simplified (always do the same to each side).

When writing a ratio, **separate the numbers by colons and do not include any units.**

Examples:

- **Write £3 to 50p as a ratio:**

Same units (pence):	300p to 50p	
As a ratio (in order):	300:50	(both sides will ÷ by 10)
Cancel down/simplify:	30:5	(both sides will ÷ by 5)
Cancel further:	<u>6:1</u>	(final ratio)

- **Write 20cm to 5m as a ratio:**

Same units:	20cm to 500cm	
As a ratio:	20:500	(both sides will ÷ by 20)
Cancel down:	<u>1:25</u>	

- **In a box there are 8 blue pens, 12 red and 28 black. What is the ratio of red to black to blue?**

	R:B:B	
Correct order:	12:28:8	(all numbers will ÷ by 4)
Cancel down:	<u>3:7:2</u>	

- **Write $\frac{1}{3}$ to 5 as a ratio:** (Multiply by this)



At the moment these are different units as one is a fraction and the other is a whole number. To make the fraction into a whole number multiply each side of the ratio by 3.

As a ratio: 1:15

- **Write $\frac{3}{7}$ to 2 as a ratio:** (Multiply by this)



Again the units are different as one is a fraction and the other is a whole number. To make the fraction into a whole number multiply each side of the ratio by 7.

As a ratio: 3:14

Sharing Quantities in a Given Ratio

Sometimes you are asked to share a quantity (e.g. an amount of money) in a given ratio.

To do this: find the **total** number of parts needed
Divide by the total number of parts to find the size of 1 part
Multiply each number in the ratio by the value of 1 part.

Examples:

This side needs 3 parts. This side needs 4 parts.

- Split £140 in the ratio **3:4**

Total number of parts needed: $3+4 = 7$
Divide the money into 7 equal parts: $140 \div 7 = \text{£}20$

Now we know each part is worth **£20**

The original ratio is **3:4**

$3 \times 20 = \text{£}60$ $4 \times 20 = \text{£}80$

The 2 amounts of money are: £60 and £80 (check these add to the original £140)

This one needs 5 parts. This one needs 3 parts. This one needs 2 parts.

- Split £4500 in the ratio **5:3:2**

Total number of parts needed: $5+3+2 = 10$
Divide the money into 10 equal parts: $4500 \div 10 = \text{£}450$

Now we know each part is worth **£450**

The original ratio is **5:3:2**

$5 \times 450 = \text{£}2250.$ $3 \times 450 = \text{£}1350.$ $2 \times 450 = \text{£}900.$

The 3 amounts of money are: £2250, £1350 and £900 (check they add to £4500)

Sometimes you could be given one part of the money instead of the full amount. The method is the same, as in you need to find the value of one part – just be careful to think about how many parts you know about.

Examples:

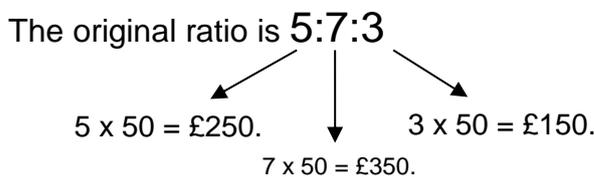
- **Arthur, Betty & Carl share prize money in the ratio 5:7:3 (A:B:C). If Betty receives £350 how much do the others receive and how much was the total prize money?**

Instead of knowing the full amount of money we know Betty's share. In this case to find the value of 1 part we need to divide the £350 by 7 (the number of parts Betty received).

Betty received £350 and her share was 7 parts, so:

$$7 \text{ parts} = \text{£}350$$

$$1 \text{ part} = \text{£}350 \div 7 = \text{£}50$$



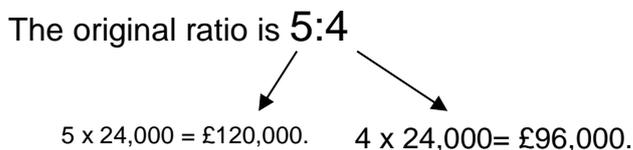
We know that:	Betty receives	£350
We have found that:	Arthur receives	<u>£250</u>
	Carl receives	<u>£150</u>
	Total prize money	<u>£750</u>

- **Diane and Edward paid for a house in the ratio 5:4 (D:E). If Diane paid £120,000 towards the house, how much did Edward pay and how much did the house cost?**

Diane paid £120,000 and her share was 5 parts, so:

$$5 \text{ parts} = \text{£}120,000$$

$$1 \text{ part} = \text{£}120,000 \div 5 = \text{£}24,000$$



We know that:	Diane paid	£120,000
We have found that:	Edward paid	<u>£96,000</u>
	Total house cost	<u>£216,000</u>