

# Foundation **RATIO & PROPORTION**

## Ratio

A ratio is a way of comparing amounts of something.

They are always written with a colon.

E.g. 4:1 is 4 to 1.

We can write a ratio in its **simplest form** by dividing all numbers by their highest common factor.

E.g. Simplify 15:10

The highest common factor is 5 so it simplifies to 3:2

## Scale Factors and Map-Reading

We use ratios to describe scales, particularly on a map or a model building or aeroplane.

1:50 would mean that 1cm on the map is 50cm in real life.

E.g. A scale drawing uses a scale of 1:100. If the length in real life is 8m, what is the length on the drawing?

$8 \div 100 = 0.08\text{m}$  or 8cm.

## Percentages

To find 10% of a number, divide by 10. Everything else can be found from there!

If using a calculator, you can write your percentage as a decimal multiplier.

e.g. 8% of 15 =  $0.08 \times 15$

To find the original amount (after a percentage change), **divide** by the multiplier.

E.g. A coat has been reduced by 10% and now costs £72. Its original price is found by calculating  $72 \div 0.9 = £80$

## Problem-Solving

Ben and Sajid share some money in the ratio 4:7. If Sajid gets £60 more than Ben, how much does Ben get?

The difference between Ben and Sajid's shares is  $7 - 4 = 3$ .

This means that £60 represents these 3 parts. To find the value of 1 part, calculate  $60 \div 3 = £20$

If 1 part is £20, then the 4 parts that Ben gets are worth  $20 \times 4 = £80$

## Proportion

Two quantities are in direct proportion if they increase or decrease at the same rate.

E.g. A recipe for 4 people calls for 120g flour. How much flour would be needed for 7 people?

$120 \div 4 = 30\text{g}$  – this is the amount needed for 1 person.

$30 \times 7 = 210\text{g}$  – this is the amount needed for 7 people.

**Remember:** divide for one, multiply for all!

## Sharing in a Ratio

Share £40 in the ratio 3:2

**Step one:** Add the numbers in the ratio.

$$3 + 2 = 5$$

**Step two:** Divide the amount by this number.

$$40 \div 5 = 8$$

**Step three:** Multiply this by each number in the ratio.

$$8 \times 3 = £24$$

$$8 \times 2 = £16$$

You can check your answer is correct by adding the final answers and making sure the total is the same as in the question!

$$£24 + £16 = £40$$

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## Direct and Inverse Proportion

If two amounts are directly proportional we write

$$y \propto x$$

a)  $y$  is directly proportional to  $x$       $y = kx$

b)  $y$  is directly proportional to  $x^2$       $y = kx^2$

c)  $y$  is directly proportional to  $\sqrt{x}$       $y = k\sqrt{x}$

d)  $y$  is inversely proportional to  $x$       $y = \frac{k}{x}$

e)  $y$  is inversely proportional to  $x^2$       $y = \frac{k}{x^2}$

f)  $y$  is inversely proportional to  $\sqrt{x}$       $y = \frac{k}{\sqrt{x}}$