

Ratio

Starter

- (Review of last lesson)** During a Grand Prix car race, the tyres on a car are reduced in weight by 3%. If they weigh 388 kg at the end of the race, how much did they weight at the start?
- (Review of last lesson)** When an iron bar is heated it expands by 0.2%. If the increase in length is 1 cm, what was the original length of the bar?
- (Review of previous material)**
Simplify these ratios: (a) 16 : 24 : 80 (b) 20 mm : 4 cm
- (Review of previous material)** Write the ratio 3 : 5 in the form 1 : n .

Notes

Simplifying ratios is like cancelling fractions but the units must be the same.

Basic ratio questions

E.g. 1 If $\frac{5}{8}$ of the students in a school are girls, what is the ratio of girls to boys? Give your answer in terms of integers.

Working: Fraction of boys = $1 - \frac{5}{8} = \frac{3}{8}$
 Ratio of girls to boys is $\frac{5}{8} : \frac{3}{8}$
Multiply by 8: $5 : 3$
 The ratio of girls to boys is 5 : 3

E.g. 2 A farmer has sheep and cows. The proportion that are sheep is $\frac{4}{7}$. What is the ratio of sheep to cows?

Using one part of the ratio

When one part of the ratio is equivalent to a number, set the fraction equivalent to the number. Then divide and multiply in order to get the required fraction.

E.g. 3 A wood has oak and beech trees in the ratio 2 : 9. If there are 42 oak trees, how many of the trees are beech?

Working: $\frac{2}{11}$ of the trees are oak and $\frac{9}{11}$ are beech.
 Since there are 42 oak trees: $\frac{2}{11} \equiv 42$
Divide by 2: $\frac{1}{11} \equiv \frac{42}{2}$
 $\frac{9}{11}$ are beech so multiply by 9: $\frac{11}{9} \equiv \frac{42}{2} \times 9$
 $\frac{11}{9} \equiv 189$
 There are 189 beech trees.

E.g. 4 Max and Sid split their savings in the ratio 7 : 6. Sid gets £51. How much do they have in total?

Algebra

Some questions can be solved using algebra.

E.g. 5 I share some sultanas between Alice and Barbara in the ratio 3 : 5. Alice gets 28 g fewer sultanas than Barbara. How many grams of sultanas does Barbara get?

Working: The ratio is 3 : 5 so Alice could get $3x$ and Barbara could get $5x$.
Since Barbara has 28 g more than Alice: $5x - 3x = 28$
 $2x = 28$
 $x = 14$

Barbara gets $5x = 5 \times 14 = 70$ g of sultanas

Alternatively:

Alice gets 3 parts and Barbara gets 5 parts

So Barbara gets 2 parts more than Alice i.e. 2 parts \equiv 28 g
1 part \equiv 14 g

Barbara gets 5 parts = $5 \times 14 = 70$ g of sultanas

E.g. 6 If $x : 3$ and $12 : x$ are equivalent ratios, calculate the positive value of x .

Video: [GCSE Ratio](#)

[Solutions to Starter and E.g.s](#)

Exercise

9-1 class textbook: p37 M2.5 Qu 1ace..., 3, 4, 6, 9, 10, 12, 15-17

A*-G class textbook: p37 M2.5 Qu 1-5, 9-13

9-1 homework book: p11 M2.5 Qu 1, 3, 5-8

A*-G homework book: p8 M2.5 Qu 1-3ab, 6, 8

Summary

Simplifying ratios is like cancelling fractions but the units must be the same.

When one part of the ratio is equivalent to a number, set the fraction equivalent to the number.

Then divide and multiply in order to get the required fraction.