

Year 8 - Unit 5: Ratios

Learning Journey:

Prior Learning

- Simplify fractions and use multiplication and division to scale numbers.
- Convert between fractions, decimals and percentages and calculate with them confidently.

Next Steps

- Solve direct and inverse proportion problems using ratios and scale factors.
- Apply ratio skills to similarity, trigonometry and real-life GCSE problem-solving.



By the end of this unit, you should be able to:

- Simplify, compare and use ratios to solve problems, including sharing in a given ratio.
- Use equivalent ratios and scale factors to interpret and draw scale diagrams.

Keywords:

- Ratio** – A comparison of two or more quantities.
- Equivalent ratio** – A ratio with the same value but different numbers.
- Simplify** – Write a ratio using the smallest whole numbers.
- Scale factor** – The number used to enlarge or reduce a shape.
- Scale drawing** – A drawing where lengths are proportional to the real object.
- Proportion** – When two quantities have the same ratio.

Writing and simplifying ratios including in form 1:n

To **simplify** a ratio we **divide** all parts of the ratio by a common factor.

Example: Write the following ratio in its simplest form, **15:30:24**

All we do is divide each number by the highest common factor of all three numbers, which is 3.

$$\begin{array}{l} 15:30:24 \\ 5:10:8 \end{array} \div 3$$

To reduce a ratio to the form 1:n or n:1, all you have to do is divide the whole ratio by the smallest number.

$$\begin{array}{l} 4:35 \\ 1:\frac{35}{4} \end{array} \div 4 = 1:8\frac{3}{4} = 1:8.75$$

Can convert between ratios, fractions and percentages

Percentages, fractions, ratio and decimals all show proportions and as such we can interchange between them.

What is the ratio of shaded : unshaded?

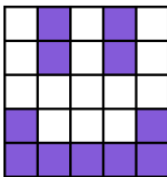
$$11:14$$

What fraction is shaded?

$$\frac{11}{25}$$

What percentage is shaded?

$$\frac{11}{25} = \frac{44}{100} = 44\%$$



Using equivalent ratios to find unknown amounts

- Step 1: Identify which part of the ratio has been given.
- Step 2: Calculate the individual share value.
- Step 3: Multiply the other quantities in the ratio by the share value.

E.g. A bag of sweets is shared between boys and girls in the ratio of 5: 6. Each person receives the same number of sweets. If there are 15 boys, how many girls are there?

$$\begin{array}{ccc} & 5:6 & \\ \times 3 & \curvearrowright & \times 3 \\ & 15:18 & \end{array}$$

Sharing amounts in a given ratio

1. Add the parts of the ratio together.
2. Divide the quantity by the sum of the parts.
3. Multiply the share value by each part in the ratio.

Share the amount £120 in the ratio 1: 4.

Add the parts of the ratio together $1 + 4 = 5$
Divide the quantity by the sum of the parts. $120 \div 5 = 24$
3 Multiply the share value by each part in the ratio.

$$24 \times 1 = \text{£}24$$

$$24 \times 4 = \text{£}96$$

Answer £24: £96.

Can draw and interpret scale drawings

A map has a scale of **1cm: 2km**. Find the actual distance represented by **5cm** on the map.

State the scale of the enlargement as a ratio in the form 1: n.

$$1\text{cm}: 2\text{km}$$

Multiply n by the length given from the scale drawing.

$$2 \times 5 = 10$$

Write the units.

$$10\text{km}.$$