

Ratio and Proportion Cheat Sheet

Most ratio problems need one move: find the value of one part, then multiply.

↗ Write and simplify

$$\text{red} : \text{blue} = 12 : 8$$

Order matters

12 red and 8 blue beads: red to blue is 12 : 8, but blue to red is 8 : 12.

$$\begin{aligned} 12 : 8 &= 3 : 2 \cdot 40 \text{ cm} \\ : 2 \text{ m} &= 1 : 5 \end{aligned}$$

Simplify by the HCF

Divide every part by the highest common factor. Use the same units first.

$$\begin{aligned} 3 : 2 &\rightarrow \text{red is } 3/5, \\ \text{blue is } 2/5 \end{aligned}$$

Ratio vs fraction

A ratio compares part to part. A fraction compares part to whole: add the parts for the total.

🔄 Share in a ratio

$$\text{EUR } 100 \text{ and EUR } 250$$

Total parts, one part, multiply

Share EUR 350 in the ratio 2 : 5. There are 7 parts, and one part is EUR 50.

$$8 \text{ kg}, 24 \text{ kg and } 40 \text{ kg}$$

Three-part ratios

Share 72 kg in the ratio 1 : 3 : 5. There are 9 parts of 8 kg each.

$$\text{girls} = 5 \times 5 = 25$$

When you know one share

Boys to girls is 4 : 5 and there are 20 boys. One part is $20 \div 4 = 5$.

🛒 Rates and best buys

$$150 \div 2.5 = 60 \text{ km/h}$$

Unit rate: how much for one

Divide by the quantity you want one of. 150 km in 2.5 hours is an average of 60 km/h.

$$\begin{aligned} \text{GBP } 0.48 \text{ vs GBP } 0.46: \\ 750 \text{ g wins} \end{aligned}$$

Compare the same amount

500 g of rice for GBP 2.40 or 750 g for GBP 3.45? Compare the price of 100 g.

↗ Direct proportion

$$25 \times 18 = 450 \text{ g}$$

The unitary method

250 g of flour makes 10 biscuits. Find one biscuit (25 g), then multiply for 18.

$$\begin{aligned} \text{USD } 4.50 \div 3 &= \text{USD } 7.50 \\ \div 5 &= 1.50 \end{aligned}$$

Test for proportion

The ratio stays the same: $y = kx$, and the graph is a straight line through (0, 0). A fixed charge breaks it.

📖 Scale drawings and maps

$$350 \div 50 = 7 \text{ cm}$$

Plan scale 1 : 50

1 cm on the plan is 50 cm in real life. A 3.5 m wall is 350 cm, so it is drawn 7 cm long.

$$\begin{aligned} 4 \text{ cm} \times 25,000 &= 100,000 \\ \text{cm} &= 1 \text{ km} \end{aligned}$$

Map scale 1 : 25,000

Multiply the map length by 25,000, then convert units: 100 cm = 1 m and 1,000 m = 1 km.



Multiply, never add

Equivalent ratios come from multiplying both parts by the same number: 2 : 3 becomes 4 : 6, not 4 : 5. Adding the same amount to both parts changes the ratio.

