

Division in a Given Ratio

Starter

1. (Review of last lesson)

A photocopier is set to reduce in the ratio 2 : 5, where the ratio means reduced : original.

- (a) What is the length of a reduced diagram if the length of the original is 4 cm?
 (b) What length on an original will be reduced to 30 mm?

Working:

- (a) Unitary method

$$\begin{array}{ccc}
 \text{Reduced} & \equiv & \text{Original} \\
 2 & \equiv & 5 \\
 \div 5 & & \div 5 \\
 \frac{2}{5} & \equiv & 1 \\
 \times 4 & & \times 4 \\
 \frac{2}{5} \times 4 = 1.6 & \equiv & 4
 \end{array}$$

The length of a reduced diagram is 1.6 cm

- (b) Equation method Reduced : Original

$$\begin{array}{l}
 30 : x \\
 2 : 5 \\
 \frac{30}{2} = \frac{x}{5}
 \end{array}$$

Solve the equation by multiplying by 5: $x = 5 \times \frac{30}{2} = 75$

The length on the original diagram is 75 mm

2. To make green paint, Bob mixed 4 litres of blue paint with 5 litres of yellow paint. Calculate

- (a) how much yellow paint he would need if he had 15 litres of blue paint and
 (b) how much yellow paint he would need if he wanted to make 54 litres of green paint.

Discuss the difference between the two calculations with your partner.

Working:

- (a) Equation method Blue : Yellow

$$\begin{array}{l}
 15 : x \\
 4 : 5 \\
 \frac{15}{4} = \frac{x}{5}
 \end{array}$$

Solve the equation by multiplying by 5: $x = 5 \times \frac{15}{4} = 18.75$

Bob would need 18.75 litres of yellow paint.

- (b) 4 litres of blue + 5 litres of yellow = 9 litres of green paint
 8 litres of blue + 10 litres of yellow = 18 litres of green paint

We need to make 54 litres of green paint: $\frac{54}{9} = 6$

4 × 6 litres of blue + 6 × 5 litres of yellow = 6 × 9 litres of green

24 litres of blue + 30 litres of yellow = 54 litres of green

Bob would need 30 litres of yellow paint.

or

$$4 + 5 = 9 \text{ parts}$$

$$1 \text{ part is worth } \frac{54}{9} = 6 \text{ m}$$

$$\text{Yellow paint needed} = 6 \times 5 = 30 \text{ litres}$$

E.g. 1 Divide the following amounts in the given ratios:

(a) 48 m 5 : 7

(b) £42 2 : 5

(c) 65 km

2 : 3 : 8

Working:

(a) $5 + 7 = 12$ parts

$$1 \text{ part is worth } \frac{48}{12} = 4 \text{ m}$$

$$4 \times 5 = 20$$

$$4 \times 7 = 28$$

20 m and 28 m

(b) $2 + 5 = 7$ parts

$$1 \text{ part is worth } \frac{42}{7} = 6 \text{ m}$$

$$6 \times 2 = 12$$

$$6 \times 5 = 30$$

£12 and £30

(c) $2 + 3 + 8 = 13$ parts

$$1 \text{ part is worth } \frac{65}{13} = 5 \text{ m}$$

$$5 \times 2 = 10$$

$$5 \times 3 = 15$$

$$5 \times 8 = 40$$

10 km, 15 km and 40 km

E.g. 2 Concentrated orange juice has to be diluted with water in the ratio 2 : 9 by volume. How many millilitres of concentrated juice are needed to make 2 litres of juice to drink? Give your answer to the nearest ml.

Working:

$$2 \text{ litres} \equiv 2000 \text{ ml}$$

$$2 + 9 = 11 \text{ parts}$$

$$1 \text{ part is worth } \frac{2000}{11} \text{ ml} \quad \textit{leave as a fraction to avoid rounding error}$$

$$\text{Juice needed} = \frac{2000}{11} \times 2 = 363.6 \approx 364 \text{ ml (nearest ml)}$$

E.g. 3 A bonus of £3000 is to be shared between three employees, Anna, Barbara and Cara in the ratio of their salaries. Given that their salaries are £12000, £17000 and £14000 respectively, how much more does Barbara get compared to Anna.

Working:

$$12000 + 17000 + 14000 = 43000 \text{ parts}$$
$$1 \text{ part} = \frac{3000}{43000} = \frac{3}{43} \text{ ml } \textit{leave as a fraction to avoid rounding error}$$
$$\text{Barbara gets} = \frac{3}{43} \times 15000$$
$$\text{Anna gets} = \frac{3}{43} \times 12000 \textit{ leave as calculations to avoid rounding error}$$
$$\text{Difference} = \frac{3}{43} \times 15000 - \frac{3}{43} \times 12000 = \text{£}209.30$$

E.g. 4* A square and rectangle have the same area. The sides of the rectangle are in the ratio 4 : 1. Its perimeter is 200 cm. What is the length of the side of the square?

Working:

$$4 + 1 = 5 \text{ parts so } 1 \text{ part} = 200 \div 5 = 40 \text{ cm}$$
$$\text{Area of rectangle} = 80 \times 20 = 1600$$
$$\text{Area of square} = 1600$$
$$\text{Side of square} = \sqrt{1600} = 40$$

Video: [Division in a given ratio](#)

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

Exercise

p119 Ex 7.3 Qu 1-10

[Textbook answers \(only available during a lockdown\)](#)