Direct Proportion

Starter

1. **(Review of last lesson)** The ratio of wool to other materials in two pairs of trousers are A 5 : 2 and B 9 : 4. Which pair of trousers has the greater proportion of wool? Show your working.

Working: Convert the ratios to $n \ : \ 1$

Trousers A: divide both ratios by 5

$$\frac{5}{2} \ : \ \frac{2}{2}$$
$$2.5 \ : \ 1$$

Trousers B: divide both ratios by 4

$$\frac{9}{4} \ : \ \frac{4}{4}$$
$$2.25 \ : \ 1$$

Trousers A has a higher proportion of meat because $2.5 \ : \ 1$ is greater than $2.25 \ : \ 1$.

2. If 5 pens cost £45, how much will 17 pens cost?

Working: 5 pens cost 45

1 pen costs $\frac{45}{5} = 9$

17 pens cost $17 \times 9 = £153$

E.g. 1 On Helen's bike, the back cog makes 10 turns for every 3 turns the front cog makes. If the front cog makes 200 turns, how many does the back cog make?

Working: Copy both methods down and then decide which one you like the best.

Unitary method

Front cog		Back cog
3	$\equiv$	10
$\div 3$ ↓		$\div 3$ ↓
1	$\equiv$	$\frac{10}{3}$
$\times 12$ ↓		$\times 12$ ↓
200	$\equiv$	$200 \times \frac{10}{3} = 666\frac{2}{3}$

Equation method

Front cog : Back cog

$$200 \ : \ x$$
$$3 \ : \ 10$$
$$\frac{200}{3} = \frac{x}{10}$$

Solve the equation by multiplying by 10:

$$x = 10 \times \frac{200}{3} = 666\frac{2}{3}$$

The back cog makes $666\frac{2}{3}$ turns.

E.g. 2 5 miles is about 8 km.

(a) Manzoor cycled 17 miles to a friend's house. How many kilometres is this?

(b) On the way home, he got a puncture after 14.5 km. How many miles from home was he?

Working: (a) Unitary method

Miles		Kilometres	
5	$\equiv$	8	$\div 5$
1	$\equiv$	$\frac{8}{5}$	
17	$\equiv$	$\frac{8}{5} \times 17 = 27.2$	$\times 17$

Answer = 27.2 km

(b) Distance left to travel $= 27.2 - 14.5 = 12.7$ km

Convert 12.7 km to miles

Equation method Miles : Km

$$x : 12.7$$
$$5 : 8$$
$$\frac{x}{5} = \frac{12.7}{8}$$

Solve the equation by multiplying by 5: $x = 5 \times \frac{12.7}{8} = 7.9375$

He was 7.9375 miles from home.

E.g. 3 The lengths of the junior, intermediate and senior cross-country courses are in the ratio 3 : 4 : 9. The intermediate course is 2 km long. How long were the other two courses?

Working:

Junior	:	Intermediate	:	Senior	
3	:	4	:	9	
1.5	:	2	:	4.5	***divide by 2 to get 2 km for intermediate***

The junior and senior races are 1.5 km and 4.5 km long respectively.

Video: Direct proportion - unitary method

Video: Direct proportion - recipes

Solutions to Starter and E.g.s

Exercise

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Textbook answers (only available during a lockdown)