Year 9- Reasoning with geometry- Solving ratio and proportion problems

Essential knowledge

- Solve problems with direct proportion
- Use conversion graphs
- Solve problems with inverse proportion
- Solve ratio problems
- Solve 'best buy' problems

Key Vocabulary

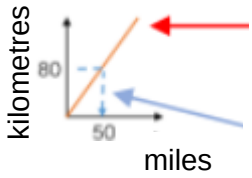
Proportion: a comparison between two numbers
Ratio: a ratio shows the relative size of two variables
Direct proportion: as one variable is multiplied by a scale factor the other variable is multiplied by the same scale factor.
Inverse proportion: as one variable is multiplied by a scale factor the other is divided by the same scale factor.

Prior learning links

- Year 8- Ratio and multiplicative change
- Year 7- Solving problems with multiplication and division

Conversion graphs

Compares two variables



This is always a straight line because as one variable increases so does the other at the same rate

To make conversions between units you need to find the point to compare – then find the associated point by using your graph.

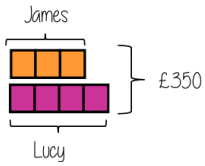
Labelling of both axes is vital

Sharing a whole into a ratio

James and Lucy share £350 in the ratio 3:4. Work out how much each person earns

Model the question

James : Lucy
3 : 4



Work out one part

7 parts in total

£350 ÷ 7 = £50

Put back into the question

James: 3 × £50 = £150
Lucy: 4 × £50 = £200

Direct proportion

As one variable changes, the other changes at the same rate.

÷2 (4 cans = £2.40 / 2 cans = £1.20) ÷2

4 cans of pop cost £2.40

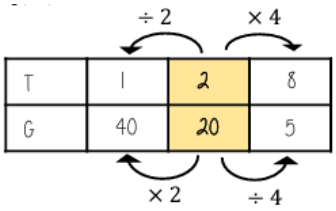
Sometimes it is easier to work out how much one unit is first- this is called *unitary method*

×3 (4 cans = £2.40 / 12 cans = £7.20) ×3

This multiplier is the same, in the same way that it would be for ratio

Inverse proportion

As one variable is multiplied by a scale factor the other is divided by the same scale factor.



Best buys

They have a directly proportional relationship.

To calculate best buys you need to be able to compare the cost of one unit or units of equal amounts

Best value is the most product for the lowest price per unit

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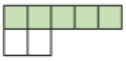
Prior learning links

The ratios show shaded parts to non-shaded parts.

Match the ratios, statements and bar models.

2:3	five to two	
5:2	three to two	
2:5	two to three	
3:2	two to five	

Show that all of these scenarios have similar ratio representations.

2 in every 5 people wear glasses.	For every £1 Whitney has, Mo has £1.50	For every 225 g of flour there are 150 g of sugar.

Direct proportion

One packet of stickers costs £1.20.
Complete the table.

Packets	0	1	2	6	15
Cost (£)		£1.20			

At a petrol station, 6 litres of petrol costs £9.

a) How much does 60 litres of petrol cost?

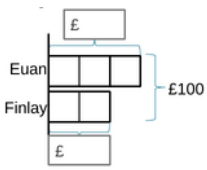
b) How much does 24 litres of petrol cost?

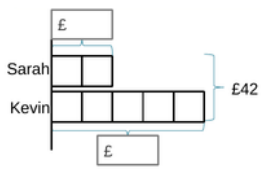
c) How much does 2 litres of petrol cost?

Inverse proportion

One machine can print 10,000 pages in one hour. How long would it take the following amount of machines to print 10,000 pages?

a) 2 machines
b) 10 machines
c) 4 machines
d) 15 machines





Key Vocabulary

Use cover, look, write, check to write the definitions

Ratio:

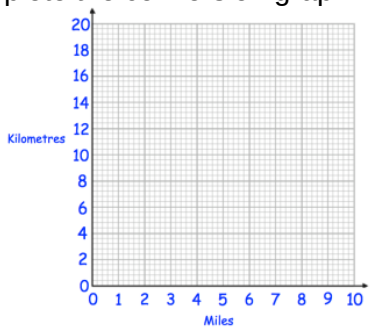
Proportion:

Direct proportion:

Inverse proportion:

Conversion graphs

Use the knowledge that 5 miles = 8 kilometres to complete the conversion graph.



A car is travelling 60km/h. Use the conversion graph to find out the speed of this car in miles per hour.

Best buys

Which pack of lemonade is the best value?

Pack of 4
Cost £1.20

Pack of 6
Cost £1.60

Sharing into a ratio

a) Euan and Finlay share £100 in the ratio 3:2. How much does each person get?

b) Sarah and Kevin share £42 in the ratio 2:5. How much does each person get?

c) John and Fiona share £60 in the ratio 7:3. How much more does John get?

d) Eva and Pat share £360 in the ratio 5:4. How much does Eva get?