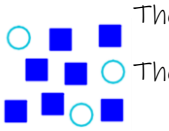
Y10 Maths Knowledge Organiser Foundation Tier: Ratio and Proportion

What must I be able to do?	Key vocabulary	
New content: ☐ Complete calculations from a given ratio and partial information ➢ Mathswatch 38, 39, 106, 165 (GCSE) ☐ Calculate speed, distance or time when given the other 2 bits of information ➢ Mathswatch 142 (GCSE) ☐ Recognise and solve problems which involve direct proportion ➢ Mathswatch 42 (GCSE) ☐ Use comparative values to solve best value problems ➢ Mathswatch 41 (GCSE)	**Unitary**	The unitary method is a technique which is used for solving a problem by finding the value of a single unit.
	Best value	Compare the price of the same amount of an item. The item that is cheaper for the same quantity is better value for money.
	Speed	How fast an object is travelling. The units combine distance and time.
	Direct Proportion	As one value increases, the other increases at the same rate.

Expressing as a ratio

the order matters!



The ratio of circles to squares is 3:7

The ratio of squares to circles is 7:3

The fraction which are squares is $\frac{7}{10}$ 7 + 3

Equivalent ratios

Ratios can be simplified by dividing by a common factor

e.g. 25 : 10 : 15 → ÷ 5 → 5 : 2 : 3 (÷ 5 → ÷ 5)

They can also be simplified to 1:n or n:1 by dividing by an appropriate value

e.g. 5 : 18 → ÷ 5 → 1 : 3.6 (÷ 5)

The only time we allow a decimal in a ratio is when it is the "n"

Best value using a unitary method

For these questions, scale the quantity down to 1 (also known as the unitary method) then compare.

Brand A	Brand B
400g	750g
£2.56	£5.10

Brand A: £2.56 ÷ 400 = £0.0064

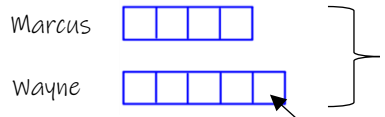
Brand B: £5.10 ÷ 750 = £0.0068

This is cost per 1g

£0.0064 is smaller than £0.0068 so Brand A is better value

Sharing in a ratio

e.g. Marcus and Wayne share £4500 in the ratio 4 : 5



£4500 split into 9 parts is

£4500 ÷ 9 = £500 — Each part is worth £500

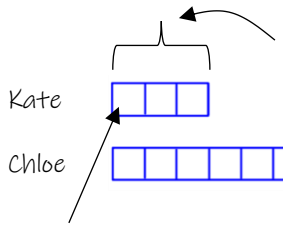
So Marcus gets £500 x 4 = £2000

And Wayne gets £500 x 5 = £2500

e.g. Kate and Chloe both have young children and have bought a large quantity of nappies in the ratio 3 : 7

Kate has bought 210 nappies.

How many has Chloe bought?



So one part is worth 210 ÷ 3 = 70 nappies

Chloe has 7 parts so has a total of 70 x 7 = 490 nappies

Speed

Speed = distance ÷ time

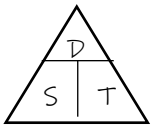
Speed is usually measured in:

Kilometres per hour	km/h
Miles per hour	mph
Metres per second	m/s

The formula can also be rearranged to give:

Time = distance ÷ speed

Distance = speed x time



Questions involving speed will often talk about 'average speed'. Objects rarely travel at a constant speed and instead speed up and slow down during the journey. To get around this we often use the average speed of the journey instead.

Average speed = total distance ÷ total time

Converting units of speed

This is usually best done in stages.

e.g. Convert 60 km/h into m/s

1000m in a km	60 km/h = 60,000 m/h	(x 1000)
60 minutes in an hour	60,000 m/h = 1000 m/min	(÷ 60)
60 seconds in an hour	1000 m/min = 16.67 m/s (2d.p.)	(÷ 60)

Problem solving with speed

On the first part of the journey a car travels 160 km in 3 hours. On the second part of the journey the car travels at 70km/h for 2 hours. What is the average speed of the journey?

During the second part of the journey the car travels:

Distance = speed x time = 70 x 2 = 140km.

So total distance = 140 + 160 = 300km.

And total time = 3 + 2 = 5 hours.

Average speed = total distance ÷ total time = 300 ÷ 5 = 60 km/h.

GLUE

HERE