NUMBER

Topics

- Growth and decay
- Compound interest and depreciation

Autumn term

Number 2

What do I need to be able to do?

- Calculate compound interest
- Understand growth and decay

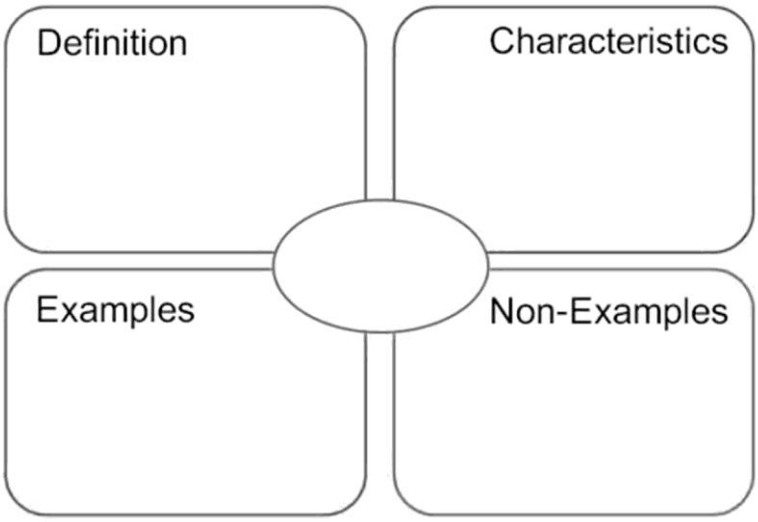
Career Links

Being able to confidently work with numbers is a great skill to have and has lots of links with a number of careers such as:

- Accountancy/banking
- Insurance
- Engineering
- Construction
- Carpenter

Key Vocabulary

Multiplier	Used to calculate percentages with a calculator
Increase	When an amount goes up
Decrease	When an amount goes down
Simple interest	The amount of interest is fixed over a period of time
Compound interest	The interest earned over time will continue to increase



$$y = ab^t$$

a = initial amount
$0 < b < 1$ = exponential decay
$b > 1$ exponential growth
t = time period

$$y = a(1+r)^t$$

a = initial amount
r = growth rate per time period
t = time period

Simple interest

To calculate simple interest we start by calculating the percentage and multiplying it by the period of time.

Example: £250 is in a bank account which is paying 5% simple interest per year. How much will be in the bank account at the end of 3 years?

5% = 0.05
0.05 x 250 = £12.50

Multiply by 3 because the question asks for 3 years.

3 x £12.50 = £37.50.

Add your answer to the original amount in the question.

£250 + £37.50 = £287.50

Compound interest

To calculate compound interest we use powers as the amount changes at the end of each year.

Example: £250 is in a bank account which is paying 4% compound interest per year. How much will be in the bank account at the end of 5 years?

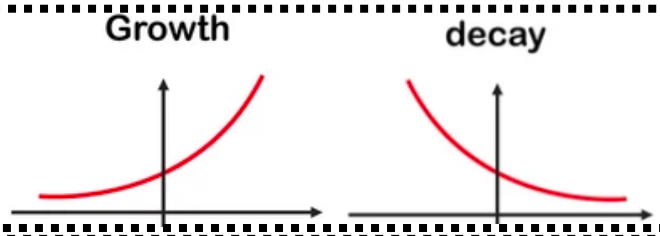
Interest means an increase so 100% + 4% = 104% which as a multiplier is 1.04

4% increase = 1.04

1.04^5 x 250 = £304.16

Power of 5 because the questions asks for 5 years.

This is the final answer



$$12\% = \frac{12}{100} = 0.12$$

Year 9 F – Knowledge Organiser

SHAPE

Topics

- Column vectors
- Transformations

Autumn term

Transformations

What do I need to be able to do?

- Represent, add, and subtract vectors
- Translate shapes using vectors
- Reflect, rotate, and enlarge shapes
- Describe a transformation

Career Links

- Being able to confidently work with shape and geometric rules is a skill with links to these careers
- Air travel
- Animation
- Architecture
- Physics

Key Vocabulary

Vector	A vector has magnitude and direction
Reflect	An image or shape as it would be seen in a mirror
Rotate	A circular movement around a central point
Enlarge	To make bigger
Scale factor	The ratio between the scale of a given object and a new object
Translation	Moving a shape without rotating or flipping it

Vectors

Vectors are often written as column vectors

Left or right $\begin{pmatrix}3\\-4\end{pmatrix}$ Up or down

Positive values are right and up. Negative values are left and down.
This is 3 right and 4 down.

This is the vector $\begin{pmatrix}4\\1\end{pmatrix}$

It goes 4 units right and 1 unit up.

Add/subtract vectors:

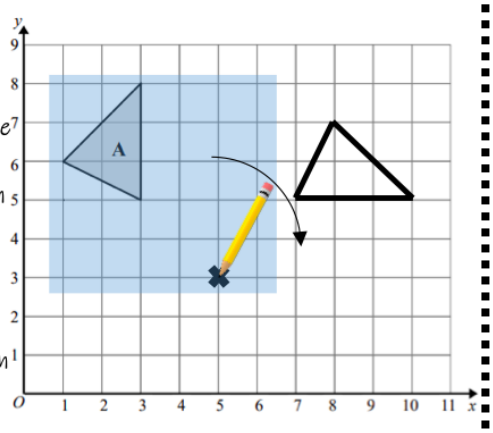
$$\begin{pmatrix}8\\4\end{pmatrix} - \begin{pmatrix}3\\6\end{pmatrix} = \begin{pmatrix}5\\-2\end{pmatrix}$$

Multiply vectors by a constant

$$3\begin{pmatrix}4\\7\end{pmatrix} = \begin{pmatrix}12\\21\end{pmatrix}$$

Rotation: e.g. rotate shape A 90° clockwise about (5,3)

Draw the object onto tracing and paper and put the pencil on the centre of rotation (5,3)
Then rotate the tracing paper as instructed and draw the image in its new position.

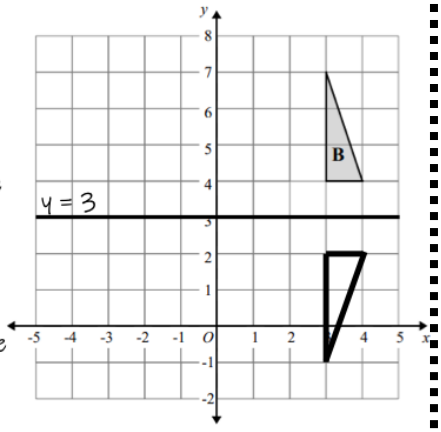


Reflection: e.g. reflect shape B in the line y = 3

Draw on the line of reflection.

Reflect each point to the other side of the line of reflection.

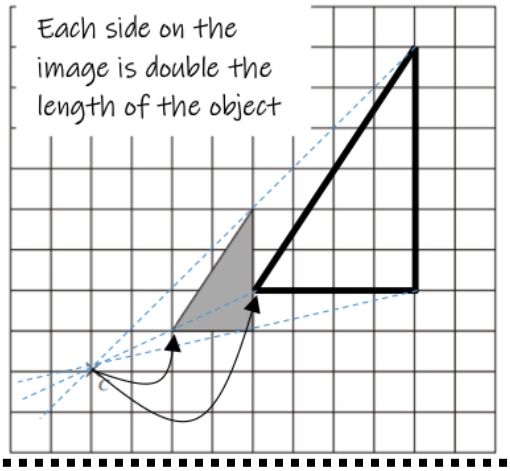
Each point on the image is the same distance from the line of reflection as they are on the object.



Enlargement: e.g. Enlarge the shaded shape by scale factor of 2, centre C.

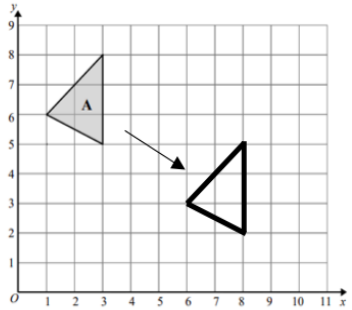
Each side on the image is double the length of the object

Counting from C to the first vertex, it was 2 squares right and 1 square up, so the image will be double that (s.f. of 2) so 4 right and 2 up from the centre, C.



Translation: e.g. translate triangle A by the vector $\begin{pmatrix}5\\-3\end{pmatrix}$

A translation is a movement, so in this instance it moves 5 squares right and 3 squares down.



Rotation, reflection and translation all leave a congruent (identical) shape to the object.

RATIO

Topics

- Ratio
- Direct Proportion

Autumn term

RATIO

What do I need to be able to do?

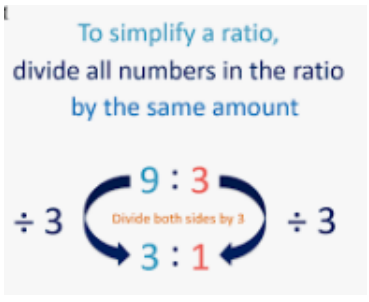
- Simplify Ratio and relate to fractions
- Share into a ratio or find a ratio given one part or the difference
- Combine ratios
- To be able to determine the best value
- To be able to adjust a recipe amount.

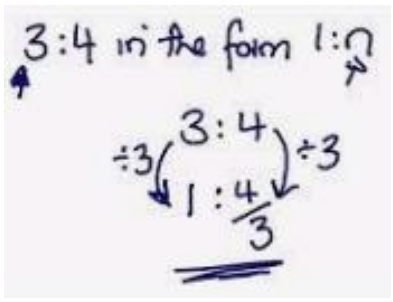
Career Links

- Being able to confidently work with ratio and proportion is a skill with links to these careers
- Cosmetic industry
- Stock Analysists/finance/ Banking
- Architecture / Cartography/ Construction
- Food industry

Key Vocabulary

Scale	The relationship between the length in a model to the length on the real item
Simplify	Reducing the ratio into a simpler form by finding common factors
Proportion	The size of one thing compared to the size of another
Share	To split into equal parts or groups
Equivalent	Equal in amount or value
Fractions	The portion/ part of the whole thing.





Describe the **first amount** in this ratio as a fraction of the whole.

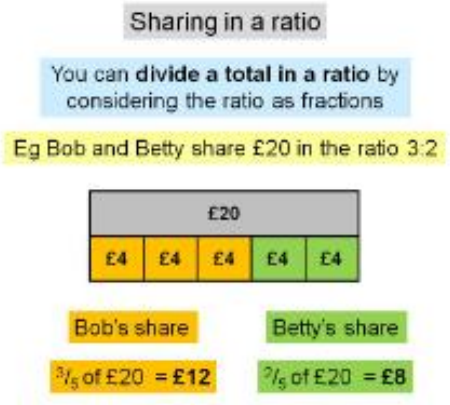
10 : 25

Simplify first!

2 : 5

2 + 5 = 7 parts

$\frac{2}{7}$



The ingredients for making 10 pancakes are shown.

Ingredients to make 10 pancakes

2 eggs
150g flour
250ml milk

a) Work out the amount of each ingredient needed to make 15 pancakes.

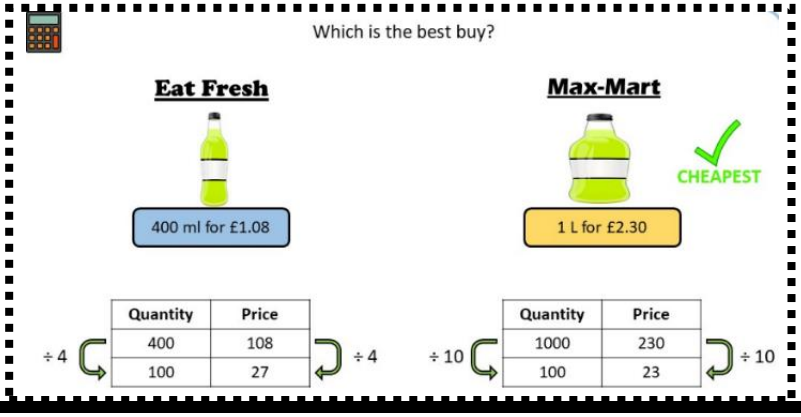
	Eggs	Flour	Milk
10 pancakes	2	150g	250ml
5 pancakes	1	75g	125ml
15 pancakes	3	225g	375ml

(÷2, ×3 between 10 and 5 pancakes; ÷2, ×3 between 5 and 15 pancakes)

b) Jude has 6 eggs, 1.5kg of flour and 500ml of milk.
He makes as many pancakes as possible.
Which ingredient does Jude run out of first? How many pancakes has he made?

×3: 2 eggs for 10 pancakes → 6 eggs for 30 pancakes (×3)

×10: 150g flour for 10 pancakes → 1500g flour for 100 pancakes



Year 9 F – Knowledge Organiser