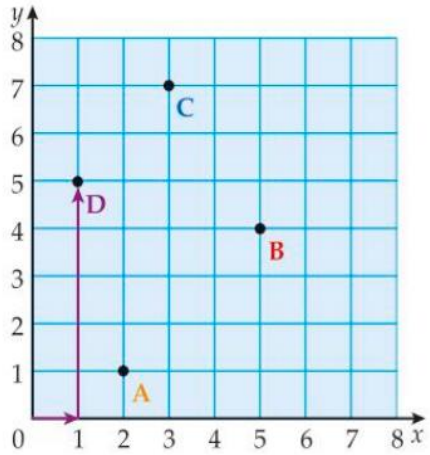
Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	6A	Ch 6 Graphs

1 Quadrant

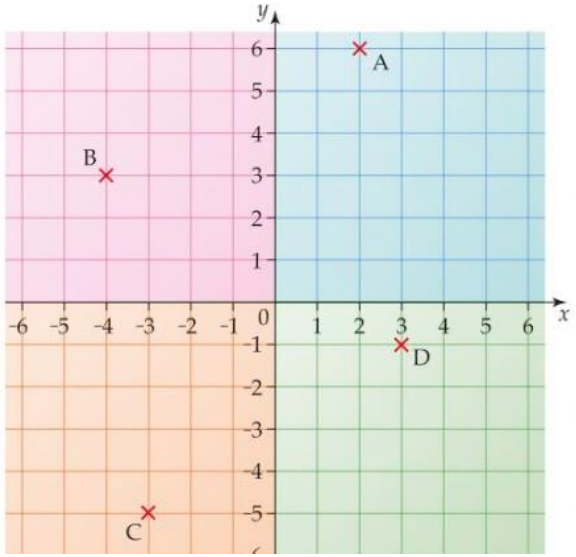
Give the coordinates for **A**, **B** and **C**.
Point **D** is at (1, 5). Plot point **D**.

A (2, 1)	2 across, 1 up
B (5, 4)	5 across, 4 up
C (3, 7)	3 across, 7 up

Plot point **D** by going 1 across and 5 up.



4 Quadrants



B is (-4, 3)
4 left, 3 up

A is (2, 6)
2 right, 6 up

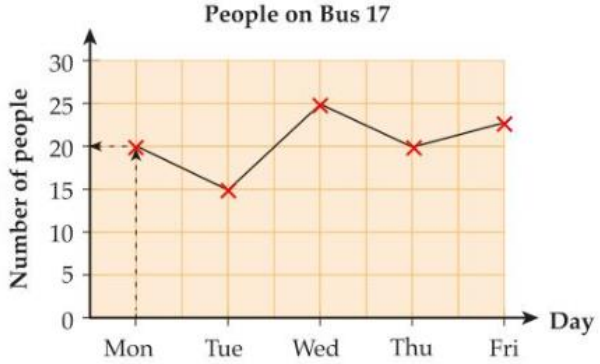
C is (-3, -5)
3 left, 5 down

D is (3, -1)
3 right, 1 down

Line Graphs

A **line graph** shows how things change over time.

When you read a line graph
- **Time** goes along the horizontal axis.
- The vertical axis shows what you are measuring.
- The points show the information that you are given.
- The points are joined with a line.



To find the number of people on the bus on Monday
- Read up from Monday to the graph.
- Read across from that point to the vertical axis.

20 people were on the bus on Monday.

Key words:

Coordinates: A pair of numbers that give the position of a point on a grid.

Axis: A coordinate grid has 2 axes

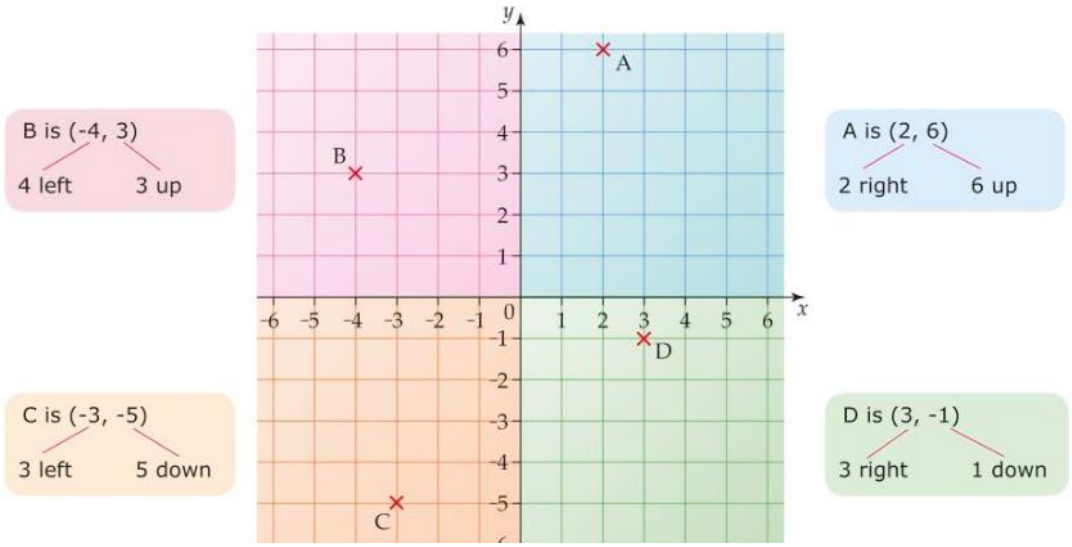
Quadrant: One of four quarters on a coordinate grid separated by the x and y axes.

Graph: A diagram that sows the relationship between 2 quantities.

Line Graph: A line graph shoes how quantities change over a period of time.

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	6B	Ch 6 Graphs

4 Quadrants

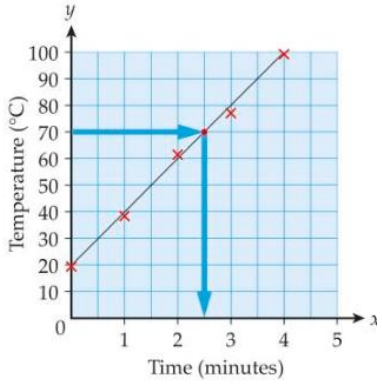


Real life graphs

Belinda did an experiment in her science lesson.
She recorded the time taken to heat a test tube of water to 100 °C.
She measured the temperature every minute and recorded it on the **table**.

Time (minutes)	0	1	2	3	4
Temperature (°C)	21	39	62	78	100

This is Belinda's graph.



In a real-life experiment like this, the data will not fit exactly to a straight line.

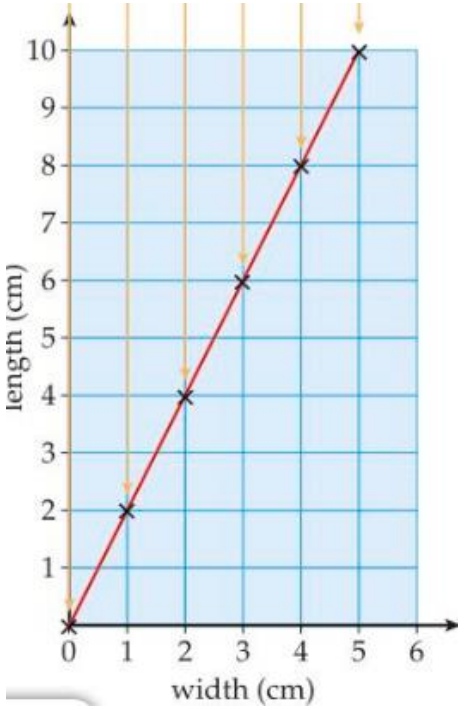
You can use a real life graph to estimate results

Plotting y = mx + c Graphs

- Find the coordinates.
- **Plot** the points on a set of axes.
- Join the points to make a straight line.

$L = 2W$

Width (cm)	0	1	2	3	4	5
Length (cm)	0	2	4	6	8	10



Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
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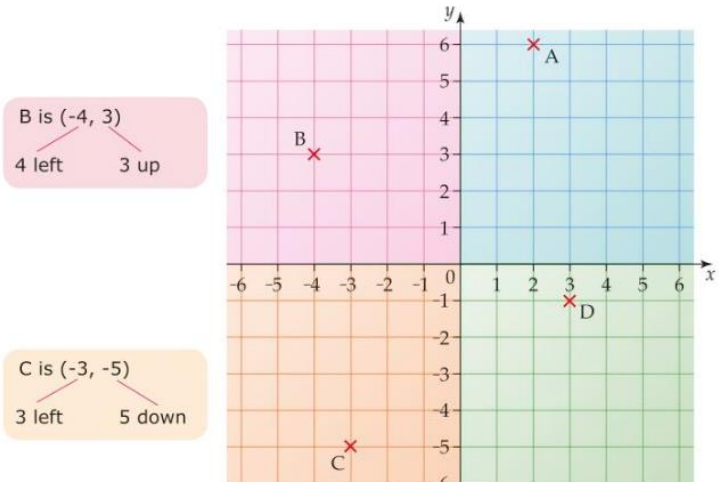

Lines Parallel to the axis

Lines parallel to x axis are in the form y = a

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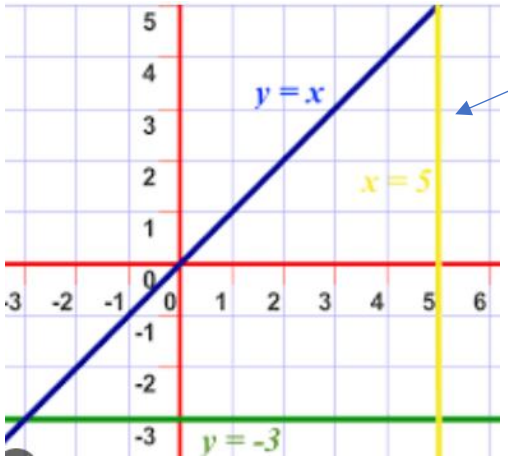

All values of x on this line is 5

All values of y on this graph is -3

Y = mx +c

The coefficient of the x (the number in front of x) tells us the gradient of the line.

$$y = mx + c$$

y and x are coordinates

m is the gradient

c is the y intercept

The equation of a line can be rearranged to y = c+mx

C = = y-mx

You must identify which coefficient is which and compare from the form

y = mx +c

Plotting y = mx + c Graphs

- Find the coordinates.
- **Plot** the points on a set of axes.
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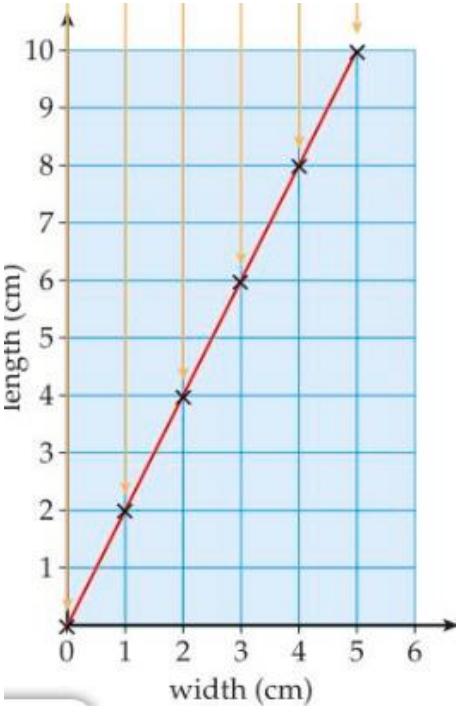
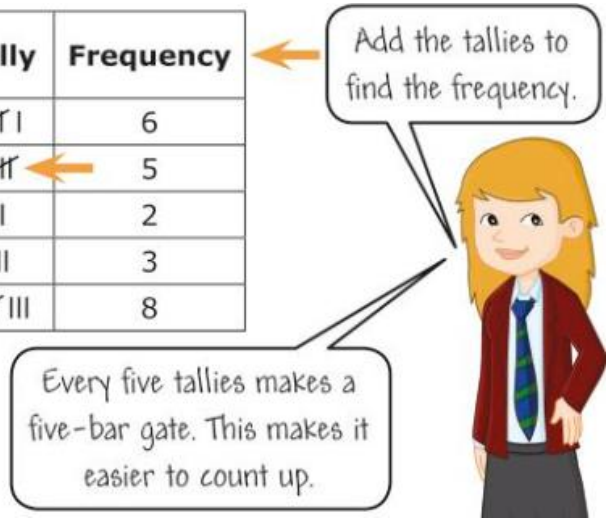


Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	8A	Ch 8 Statistics

Tally Charts

Favourite vegetable	Tally	Frequency
Carrot	𝍸 I	6
Beetroot	𝍸	5
Tomato	II	2
Sweetcorn	III	3
Peas	𝍸 III	8



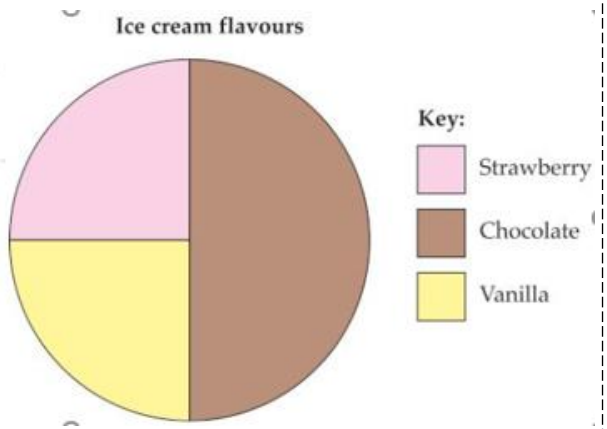
Pie Charts

This Pie chart shows the flavours of ice cream served one day in a shop. What fraction of the total is each flavour?

Chocolate is 1/2

Vanilla is 1/4

Strawberry is 1/4

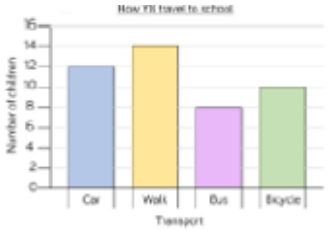


Pictograms, bar charts and line charts

Pictogram

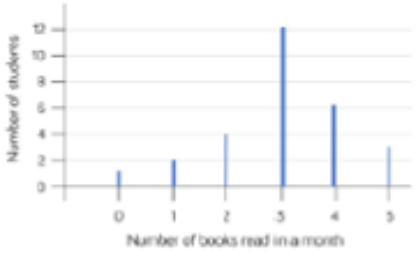
- Need to remember Key
- Visually able to identify mode

Bar chart



- Gaps between the bars
- Clearly labelled axes
- Scale for axes
- Title
- Discrete data

Line graphs



- Gaps between the lines
- Clearly labelled axes
- Scale for axes
- Discrete data

Median, Mode and Range:

The **Median** is the centre value once they are in numerical order:
24, 8, 4, 11, 8
Put them in order: 4, 8, 8, 11, 24
Find the middle: 4, 8, 8, 11, 24
So Median is 8

The **Mode** is the number or item that appears the most.
24, 8, 4, 11, 8
8 appears more than the others so the mode is 8

The **Range** is the largest value – the smallest value
24, 8, 4, 11, 8
Range = 24 – 4 = 20
The range is 20

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	8B	Ch 8 Statistics

Comparing Distributions

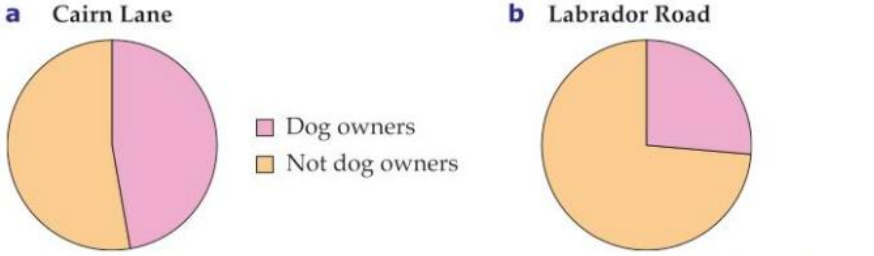
Comparisons should include a statement of average and central tendency, as well as a statement about spread and consistency.

Here are the number of runs scored last month by Lucy and James in cricket matches. Lucy: 45, 32, 37, 41, 48, 35 James: 60, 90, 41, 23, 14, 23

Lucy: **Mean**: 39.6 (1dp) **Median**: 38 **Mode**: no mode **Range**: 16
James: **Mean**: 41.8 (1dp) **Median**: 32 **Mode**: 23 **Range**: 76
James is less consistent than Lucy because his scores have a greater range. Lucy performed better on average because her scores have a similar mean and a higher median.

Pie Charts

These pie charts show the dog ownership in two different streets.

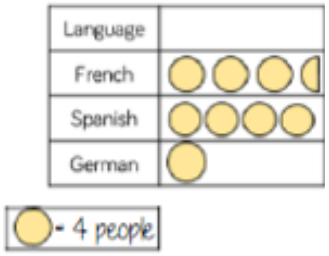


Can you say that there are more dog-owning households in Cairn Lane than there are in Labrador Road?

No. The charts show that nearly half the households in Cairn Lane have dogs, while only about a quarter of the households in Labrador Road have dogs. However, you do not know the total number of houses in each street.

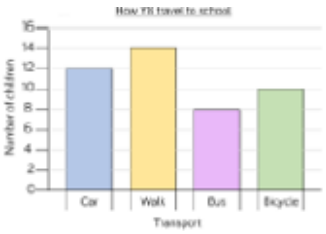
Pictograms, bar charts and line charts

Pictogram



- Need to remember Key
- Visually able to identify mode

Bar chart



- Gaps between the bars
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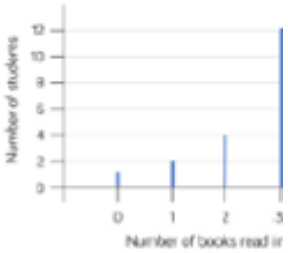
Line graphs



- Gaps between the lines
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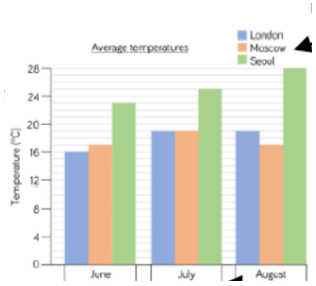
Multiple bar chart



- Clearly labelled axes
- Scales for axes
- Comparable data bars next to each other
- Key
- Gaps between different categories

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Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	8C	Ch 8 Statistics

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James is less consistent than Lucy because his scores have a greater range.
Lucy performed better on average because her scores have a similar mean and a higher median.

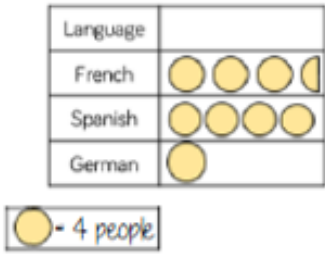
Draw and interpret Pie Charts

Type of pet	Dog	Cat	Hamster
Frequency	32	25	3

There were 60 people asked in this survey.
To calculate the angle we take the frequency and multiply it by (360 / total frequency)
Angle for Dog is 32 x (360/60) = 192 degrees
Angle for Cat is 25 x (360/60) = 150 degrees
Angle for Hamster is 3 x (360/60) = 18 degrees

Pictograms, bar charts and line charts

Pictogram



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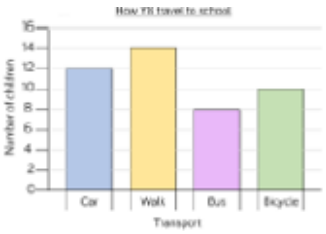

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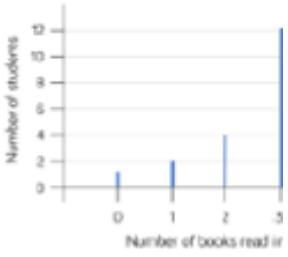
Line graphs



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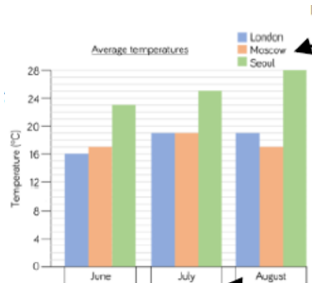


- Clearly labelled axes
- Scales for axes
- Comparable data bars next to each other
- Key
- Gaps between different categories

Grouped data:

Large sets of data could be presented in grouped data tables. It is easier to look for a trend from groups of equal size. Groups must not overlap. We do not know exact values in each group so we use the mid value as an estimate
Discrete data:

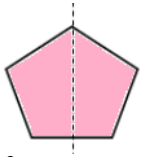
Cost of TV (£)	Tally	Frequency
101 – 150	𝍸 ||	7
151 – 200	𝍸 𝍸 |	11
201 – 250	𝍸	5
251 – 300	|||	3

Continuous data:

x Weight(g)	Frequency
$40 < x \leq 50$	1
$50 < x \leq 60$	3

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	9A	Ch 9 Transformations

Lines of symmetry



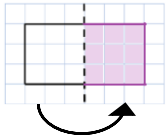
Mirror line (line of reflection) Shapes can have more than one line of **symmetry**….
This regular polygon (a regular pentagon has 5 lines of symmetry)

Rhombus two lines of symmetry

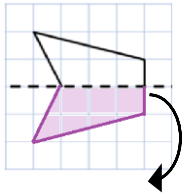
Parallelogram No lines of symmetry

A **circle** has an infinite number of lines of symmetry

Reflect horizontally and vertically

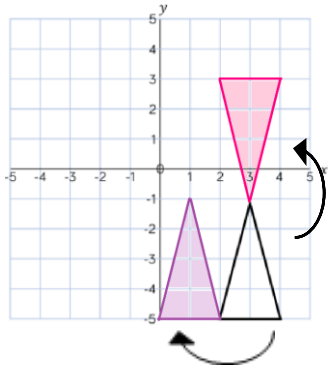


Reflection in a vertical line



Reflection in a Horizontal line

Reflection on an axis

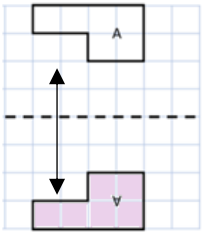


Reflection on the

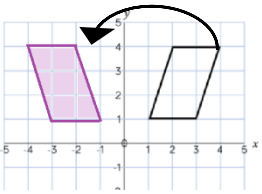
y = -2 line

Reflection in the x = 2 line

Reflect horizontally or vertically 2



All points need to be the same distance away from the line of reflection.

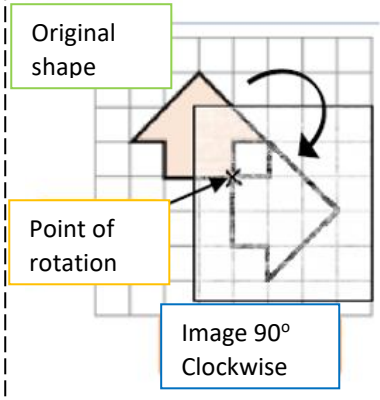


Reflection in the line y axis – this is also a reflection in the line x = 0

Lines parallel to the x and y axis

Remember Lines parallel to the x axis are of the form y = _____
Lines Parallel to the y axis are in the form x = ____

Rotation from a point (in the shape)

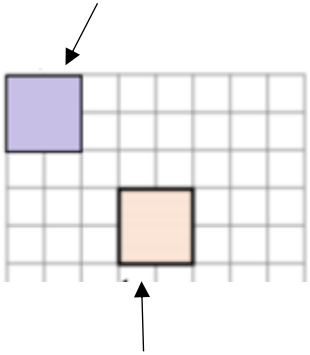


1. Trace the shape and mark the point of rotation
2. Keep the point in the same place and turn the tracing paper
3. Draw the new shape

Translation

Every **vertex** (corner) has been (moved) by the same amount in the same direction

Translation 3 units left and 3 units up

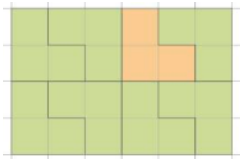


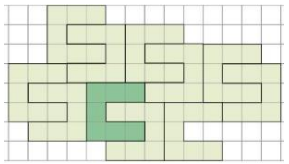
Original shape

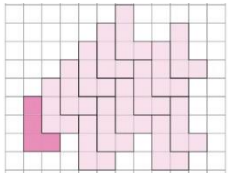
Tessellation

A tiling pattern with no gaps or overlaps

These shapes are all **congruent** in these diagrams







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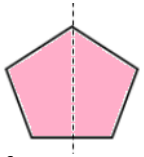
Lines of symmetry



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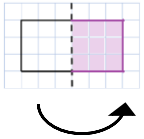
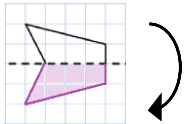
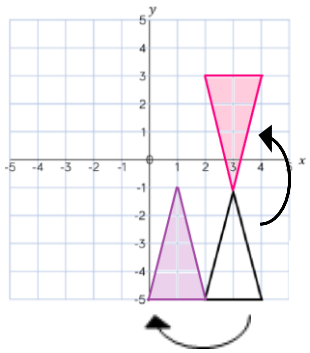


Reflection in a vertical line



Reflection in a Horizontal line

Reflection on an axis

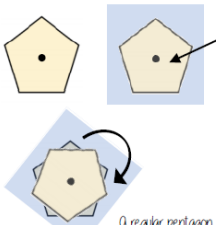


Reflection on the y = -2 line

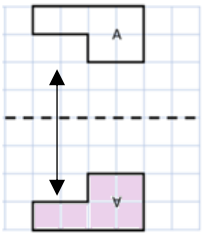
Reflection in the x = 2

Rotational Symmetry

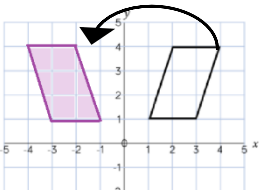
Trace your shape on tracing paper. Rotate the tracing paper through 360°. Count how many times it fits exactly onto itself.



Reflect horizontally or vertically 2



All points need to be the same distance away from the line of reflection.

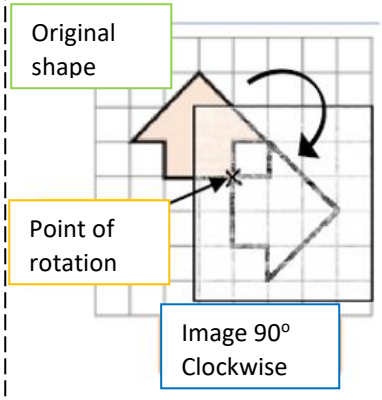


Reflection in the line y axis – this is also a reflection in the line x = 0

Lines parallel to the x and y axis

Remember Lines parallel to the x axis are of the form y = _____
Lines Parallel to the y axis are in the form x = ____

Rotation from a point (in the shape)

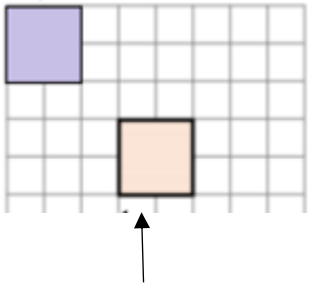


1. Trace the shape and mark the point of rotation
2. Keep the point in the same place and turn the tracing paper
3. Draw the new shape

Translation

Every **vertex** (corner) has been (moved) by the same amount in the same direction

Translation 3 units left and 3 units up

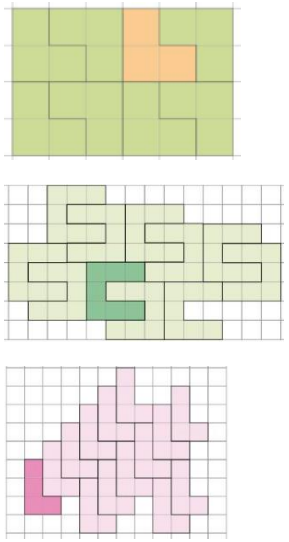


Original shape

Tessellation

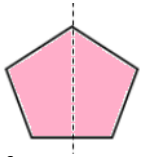
A tiling pattern with no gaps or overlaps

These shapes are all congruent in these diagrams



Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	9C	Ch 9 Transformations

Lines of symmetry



Mirror line (line of reflection) Shapes can have more than one line of symmetry….
This regular polygon (a regular pentagon has 5 lines of symmetry)

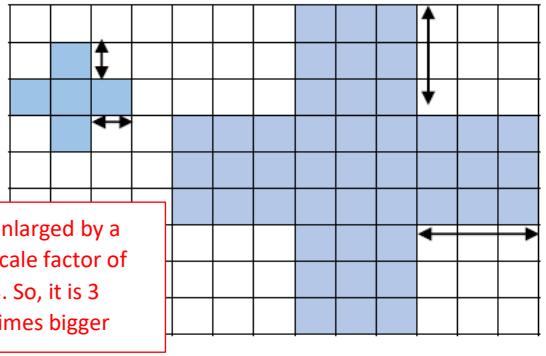
Rhombus two lines of symmetry

Parallelogram No lines of symmetry

Or A **circle** has an infinite amount of lines of symmetry

Enlarge by a positive scale factor

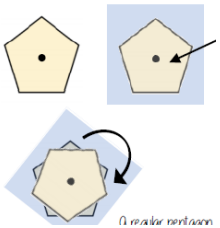
With a positive scale factor larger than 1 it makes the shape larger.



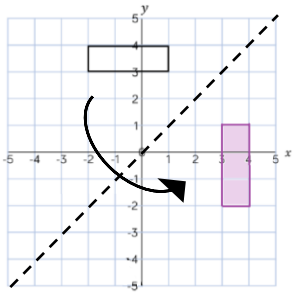
Enlarged by a scale factor of 3. So, it is 3 times bigger

Rotational Symmetry

Trace your shape on tracing paper. Rotate the tracing paper through 360°. Count how many times it fits exactly onto itself.

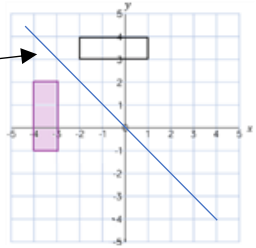


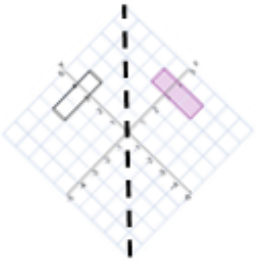
Reflect Diagonally



This is the line **y = x** (every y coordinate is the same as the x coordinate along this line)

This is the line **y = - x** The x and y coordinate have the same value but opposite sign



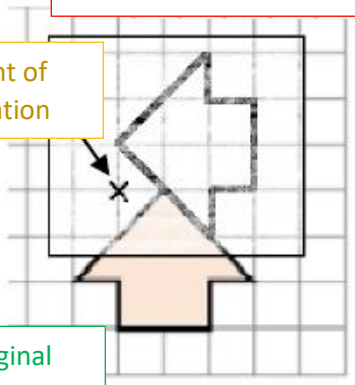


If you turn your image, it becomes a vertical/ horizontal reflection (also good to check your answer this way)

Rotation from a point (outside the shape)

Image 90° anti clockwise

Point of rotation



Original shape

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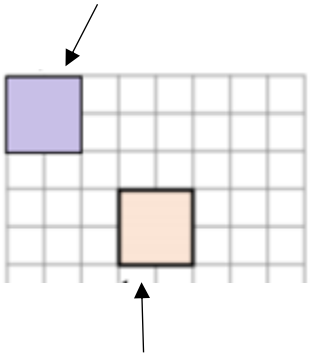

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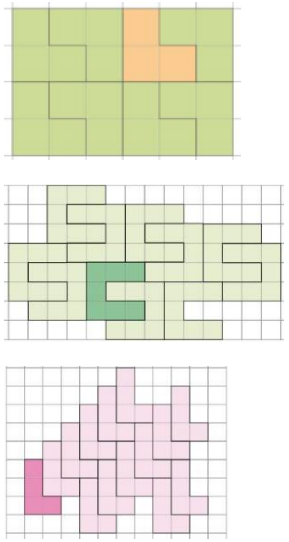


Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	10	Ch 10 Equations

Inputs and Outputs

Inputs are values that we put in to the **function**.

Outputs are the value we get after the **function** has been applied to the input.

Take a look at these functions. What is happening?

a input output

3 → 9

a $3 \boxed{+6} = 9$

or

$3 \boxed{\times 3} = 9$

b input output

5 → 12

b $5 \boxed{+7} = 12$

c input output

16 → 4

c $16 \boxed{-12} = 4$

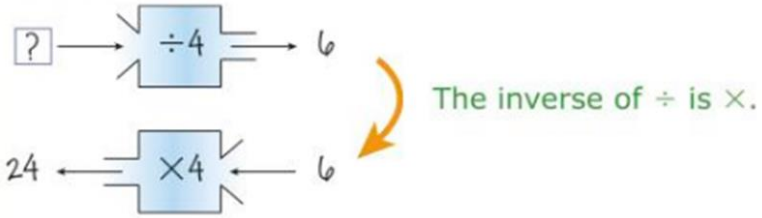
or

$16 \boxed{\div 4} = 4$

Inverse Functions

An inverse Function is where the reverse of the original function is taking place.

Olivia thought of a number and divided by 4. Her answer was 6. What was her number?



The starting number was 24.

Solving Equations

Solving equations is where we are finding the value of the unknown.

a $x + 15 = 25$ **b** $y - 7 = 20$ **c** $z \times 3 = 18$

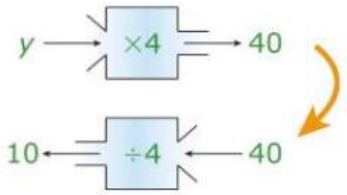
a $x + 15 = 25$
$x = 25 - 15$
$x = 10$

b $y - 7 = 20$
$y = 20 + 7$
$y = 27$

c $z \times 3 = 18$
$z = 18 \div 3$
$z = 6$

I think of a number. I multiply the number by 4 and get 40. What number did I start with?

Let the start number = y.
$4y = 40$
$40 \div 4 = 10$
so $y = 10$
You started with 10.



Vocabulary

Operation – a rule for processing numbers.

Inverse operation – An operation that reverses the effect of the original operation.

Equation – A statement that says two expressions are equal. An equation always contains an unknown number. We use a letter to stand for the unknown value.

Solve – The act of finding the unknown value in an equation.

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	Mathematics	7	2	10B	Ch 10 Equations

Simplifying Expressions

Simplify

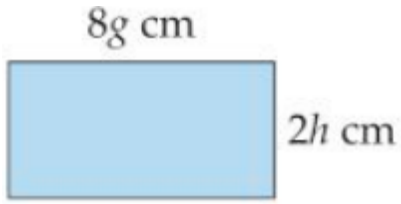
i) 3a x 5b = 3 x 5 x a x b = 15ab

ii) 5j x 8k = 5 x 8 j x k = 40jk

iii) 7***x*** x 5y = 7 x 5 x ***x*** x y = 35xy

iv) 8m ÷ 2 = 4m

Calculate the area of this rectangle.



Area = 8g x 2h

= 8 x 2 x g x h = 16gh cm^2

Solving 1 step equations

Solving equations is where you find the value of the unknown.

Solve these equations.

a $c + 7 = 19$ **b** $n - 10 = 25$

a
$c + 7 = 19$
$c + 7 - 7 = 19 - 7$
$c = 12$

b
$n - 10 = 25$
$n - 10 + 10 = 25 + 10$
$n = 35$

Solving 2 step Equations

Solving 2 step equations is where you find the value of the unknown using two stages to do so.

Solve these equations.

a $\frac{m}{2} + 7 = 10$ **b** $5y - 3 = 7$

a
$\frac{m}{2} + 7 = 10$
$\frac{m}{2} + 7 - 7 = 10 - 7$
$\frac{m}{2} = 3$
$\frac{m}{2} \times 2 = 3 \times 2$
$m = 6$

b
$5y - 3 = 7$
$5y - 3 + 3 = 7 + 3$
$5y = 10$
$5y \div 5 = 10 \div 5$
$y = 2$

Vocabulary

Expression – Letters and numbers with no equals sign

Term – Part of an expression between plus or minus signs

Equation – Expressions on both sides of an equals sign.

Solve – Finding an unknown value.

Inverse – The opposite of a maths operation.

Knowledge Organiser	Subject	Year	Term	KO n.o.	Title
	Mathematics	7	2	10C	Ch 10 Equations

Solving 1 step equations

Solving equations is where you find the value of the unknown.

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$$c + 7 = 19$$
$$c + 7 - 7 = 19 - 7$$
$$c = 12$$

b
$$n - 10 = 25$$
$$n - 10 + 10 = 25 + 10$$
$$n = 35$$

Solving 2 step Equations

Solving 2 step equations is where you find the value of the unknown using two stages to do so.

Solve these equations.

a $\frac{m}{2} + 7 = 10$ **b** $5y - 3 = 7$

a
$$\frac{m}{2} + 7 = 10$$
$$\frac{m}{2} + 7 - 7 = 10 - 7$$
$$\frac{m}{2} = 3$$
$$\frac{m}{2} \times 2 = 3 \times 2$$
$$m = 6$$

b
$$5y - 3 = 7$$
$$5y - 3 + 3 = 7 + 3$$
$$5y = 10$$
$$5y \div 5 = 10 \div 5$$
$$y = 2$$

Unknowns on both sides

To be able to solve with unknown on both sides you must first rearrange to collect the unknown on one side.

Solve these equations.

a $8x + 3 = 2x + 9$

a
$$8x + 3 = 2x + 9$$
$$6x + 3 = 9$$
$$6x = 6$$
$$x = 1$$

Subtract $2x$ from both sides.

Subtract 3 from both sides.

Divide both sides by 6.

Solve $\frac{x}{2} - 1 = \frac{x}{4} + 1$

$$\frac{x}{2} - 1 = \frac{x}{4} + 1$$
$$2x - 4 = x + 4$$
$$x - 4 = 4$$
$$x = 8$$

Multiply both sides by 4.

Subtract x from both sides.

Vocabulary

Equation – In an equation each letter stands for a missing number. Both sides of the equation represents the same value.

Solve – To find the value of the unknown. You can solve an equation by performing the same action to both sides.

Substitute – Replace the unknown with a value. You can check your solution to an equation by substituting your answer into the equation to check that both sides are still equal.