Exmouth Community College
Academy Trust

Mean, Median, Mode and Range

[video]

MEAN

$$\frac{Sum\ of\ all\ values}{Number\ of\ values}$$

[video]

MEDIAN

Middle value when numbers are placed in order

[video]

MODE

Most Common

[video]

RANGE

Largest value – smallest value

Practice:
Find the mean, median, mode and range of the following set of numbers

1, 3, 2, 8, 7, 9, 5, 4, 10, 2, 4,

Challenge Question

| 12 | 6 | 15 | ? |

The mean of these 4 cards is 10, what is the missing number?

[Mean from frequency table video]

Averages and Range from a Frequency table

20 students scored goals for the school hockey team last month. The table gives information about the number of goals they scored.

This means 9 students each scored 1 goal

Goals scored	Number of students	Goals scored x no. of students
1	9	1 x 9 = 9
2	3	2 x 3 = 6
3	5	3 x 5 = 15
4	3	4 x 3 = 12
	20 students	42 goals scored

Add a totals row to work out the total number of students and total goals scored

Add an extra column to work out the number of goals scored

[Mean from frequency table video]

Mean = Total number of goals scored divided by the number of students
= 42 ÷ 20 = 2.1 goals per student

Mode = Most common number of goals scored
= 1 (as 9 students scored 1 goal which is more than any other number of goals)

Median = The number in the middle = 2
If I wrote the goals scored by each student as a list it would look like:

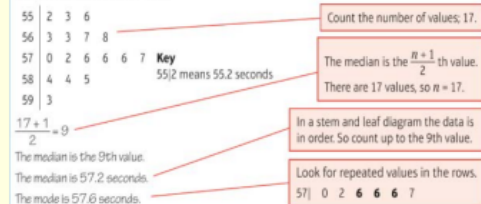1, 1, 1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 3, 3, 3, 3, 3, 4, 4, 4

9 students scored 1 goal each

3 students scored 4 goals each

The **median** is the middle number now that they are in order.

Range of the number of goals scored = 4 – 1 = 3

[video] **Stem and leaf Diagrams**

This stem and leaf diagram shows the times, in seconds, for a group of swimmers to swim 100 m. Find the median and the mode.

55	2 3 6
56	3 3 7 8
57	0 2 6 6 6 7
58	4 4 5
59	3

Key
55|2 means 55.2 seconds

Count the number of values; 17.

The median is the $\frac{n+1}{2}$ th value. There are 17 values, so $n = 17$.

$\frac{17+1}{2} = 9$

The median is the 9th value.
The median is 57.2 seconds.
The mode is 57.6 seconds.

In a stem and leaf diagram the data is in order. So count up to the 9th value.

Look for repeated values in the rows.
57| 0 2 6 6 6 7

Estimating the mean from a grouped frequency table

[Estimated mean video]

The table represents the scores of 30 students in a Maths test:

Score	Frequency
1–5	5
6–10	6
11–15	9
16–20	10

Add a column to calculate the midpoint of each class. Use this as an estimate of the scores, because you don't know the exact values in each class

Work out an estimate for the mean.

Score	Frequency, f	Midpoint of class, m	$m \times f$
1–5	5	3	15
6–10	6	8	48
11–15	9	13	117
16–20	10	18	180
Total	30	Total	360

Estimate of mean = $\frac{360}{30} = 12$

Add a column, $m \times f$, to calculate an estimate of the total score for each class.

Divide the total of the $m \times f$ column by the total frequency.

Our data has been grouped into classes

This is only an **ESTIMATE** for the mean as we are estimating the scores of the students by using the mid-point.

Practice Question:

Real In a survey, 30 small companies were asked how many employees they had. This table shows the results.

Number of employees	Frequency, f	Midpoint of class, m	$m \times f$
1–5	12		
6–10	7		
11–15	6		
16–20	5		
Total		Total	

Calculate an estimate for the mean number of employees per company.

Perimeter, Area and Volume

(Unit 8 Foundation)

VIDEOS: V44 V45 V49 V40 V355

Perimeter

Is the distance round the edges of the shape
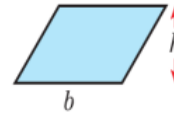
4cm

5cm

P = 5+4+5+4=18cm

Area

Is the inside of a shape.

Area of **Rectangle** = length × width
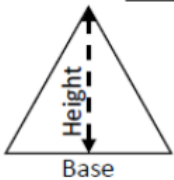
Area of **Triangle** = $\frac{1}{2}$ × base × height

Height

Base

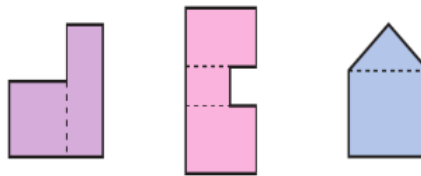Area of a parallelogram = base × vertical height
= b × h

h

b

Area of trapezium = $\frac{1}{2}$ × $(a + b)$ × h

a

h

b

Volume

volume = length x width x height

height

width

length

Surface

The area of each face added together.

Face

Net of a cube
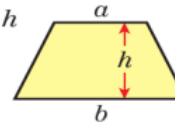
To find the area of a **compound shape**, draw lines to split the shape into simple shapes. Find the area of each shape separately. Add to find the total area.

The **volume** of a 3D solid is the amount of space it takes up. Volume is measured in mm^3, cm^3 or m^3.
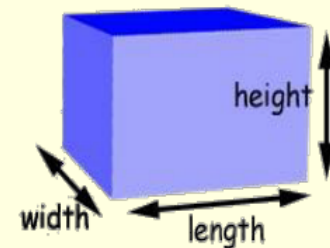
Volume of a prism = area of cross-section × length

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Co-ordinates

These are given in the form (X,Y). We go along the x axis and up or down the y axis.

Y intercept

This is the point where the line crosses the y axis. On the example the y intercept = +2
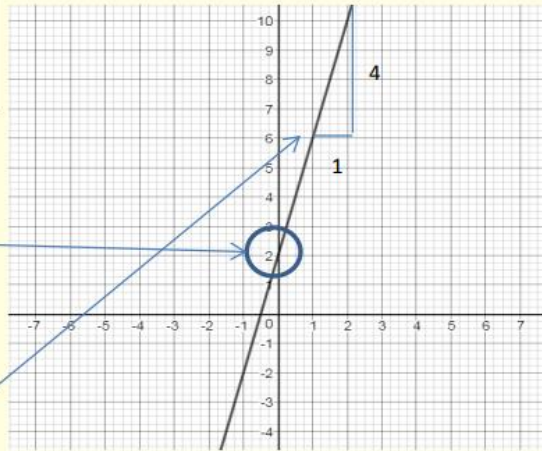
Gradient

The steepness of a graph is called the **GRADIENT.** You can find the gradient by :

$$\frac{\text{Squares up or down}}{\text{Squares across}}$$

$\frac{4}{1}$

Gradient + 4

Gradient can be positive (/) or negative (\\)

Parallel Lines have the same gradient but a different y intercept. For example a parallel line for the above graph would be y = 4x – 3

Mid points is the point exactly in the middle. To find the coordinates add the x coordinates together and divide by 2 and do the same for the y coordinates.

Table of Values/ Plotting graphs

To find the coordinates of a straight line you can use a table of values.
Firstly create a function machine

X → X4 → +2 → Y
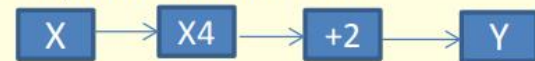
Then input numbers from the x axis to find the y axis.
These create coordinates which you can then plot onto the graph and join up with a ruler.

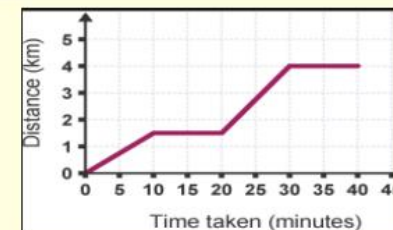| X	0	1	2	3
Y	2	6	10	14

Distance time graphs

Represents a journey. The vertical axis represents the distance from starting point. The horizontal line represents time taken.
A horizontal line on a distance time graph represents an object at rest.
The gradient of the line represents the speed of the journey

$Y = mx + c$

Gradient   Y intercept

You can use the gradient and y intercept to write an equation for a line.
Equation for above line is y = 4x+ 2

Reflection

Every point in the image is the same distance from the mirror line as the original shape.

The line joining a point on the original shape to the same point on the image is perpendicular to the mirror line.
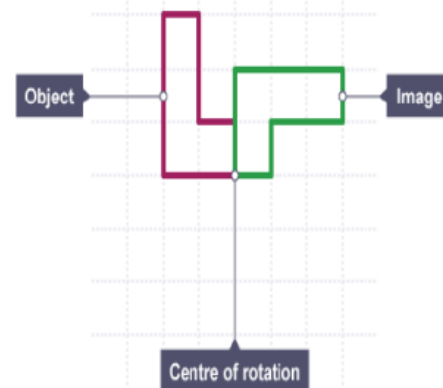
A reflection creates a congruent image

Mirror line

Mirror image
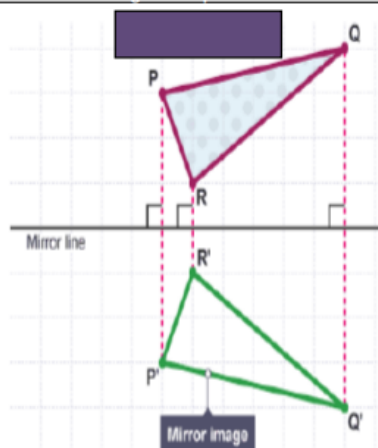
Rotation

Rotation turns a shape around a fixed point called the **centre of rotation**.

3 parts of a rotation
* the centre of rotation
* the angle of rotation
* the direction of rotation

A Rotation creates a congruent image

Object Image

Centre of rotation

Translation

A **translation** moves a shape up, down or from side to side and creates a congruent image.

Column vectors are used to describe translations

$\begin{pmatrix} 4 \\ -3 \end{pmatrix}$ means translate the shape 4 squares to the right and 3 squares down.

$\begin{pmatrix} -2 \\ 1 \end{pmatrix}$ means translate the shape 2 squares to the left and 1 square up.
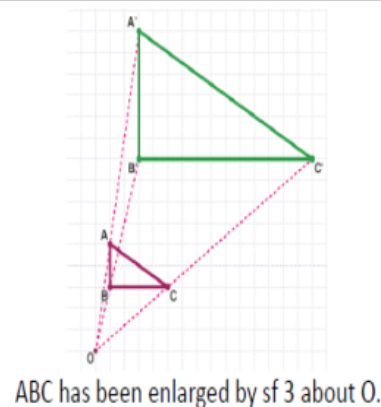

$\begin{pmatrix} -3 \\ -6 \end{pmatrix}$
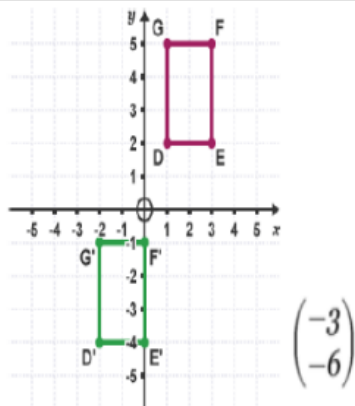
Enlargement

Enlarging a shape changes its size

2 parts of an enlargement
* the scale factor
* the centre of enlargement

Fractional SF reduces the shape
Negative SF inverts the shape

An enlargement creates a similar shape

ABC has been enlarged by sf 3 about O.

Linked Prior Topics

Shapes
Scales
Angles
Straight line graphs

Vocabulary

Object – Starting shape
Image – Created by a transformation
Congruent – 2 shapes are exactly the same
Similar – 2 shapes with the same angles but different length sides
Perpendicular – Forms a 90° angle

Linked Future Topics

Transformation of functions
Similar shapes