

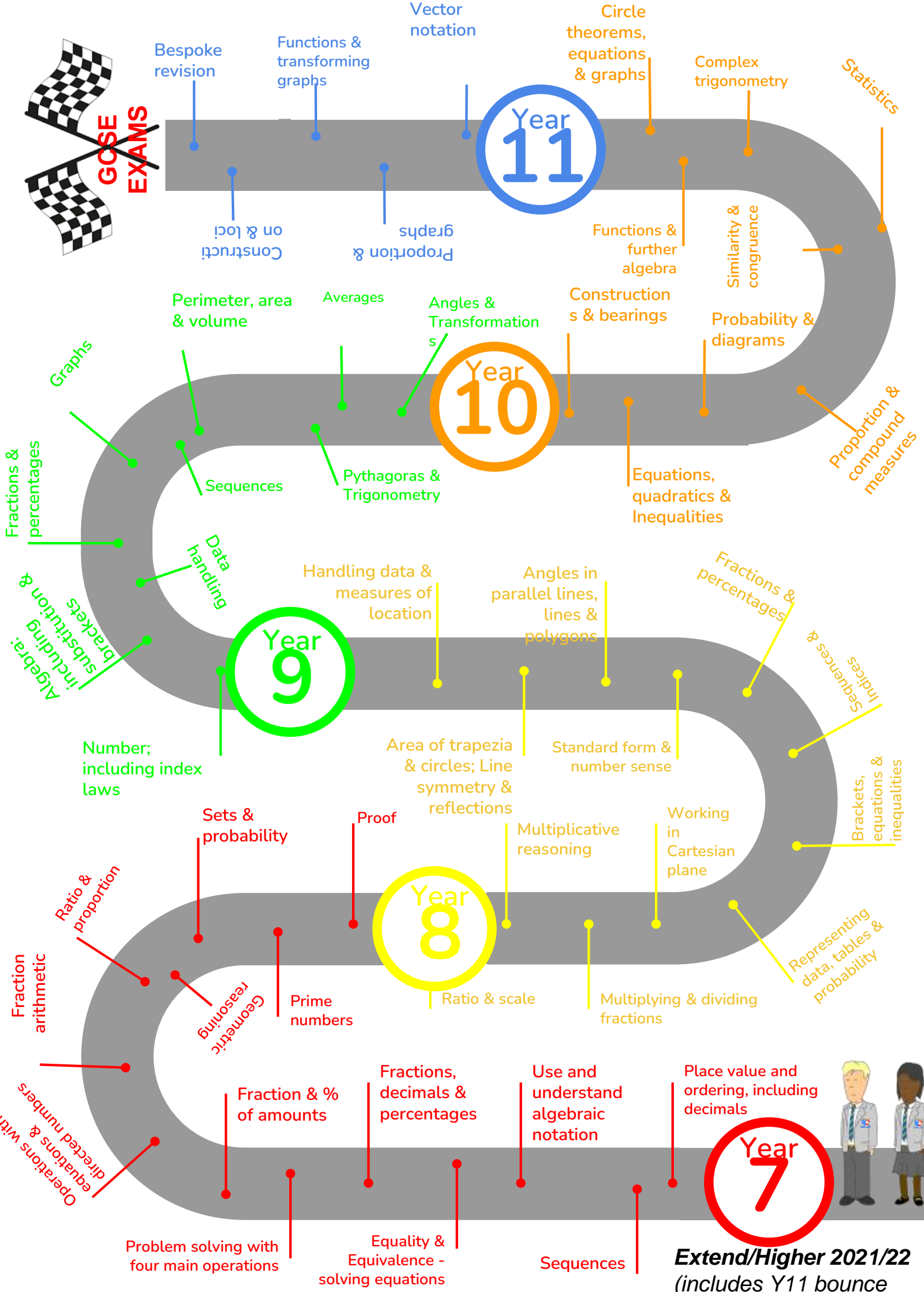


Year 11 Higher Scheme of Learning

MODULE 2



Bishop Chadwick
Catholic Education Trust



Operations with directed numbers

Problem solving with four main operations

Fraction & % of amounts

Equality & Equivalence - solving equations

Fractions, decimals & percentages

Use and understand algebraic notation

Sequences

Place value and ordering, including decimals

Extend/Higher 2021/22
(includes Y11 bounce back)



Year 7

Fraction arithmetic

Geometric reasoning

Prime numbers

Year 8

Ratio & scale

Multiplying & dividing fractions

Representing data, tables & probability

Ratio & proportion

Sets & probability

Proof

Multiplicative reasoning

Working in Cartesian plane

Brackets, equations & inequalities

Number; including index laws

Area of trapezia & circles; Line symmetry & reflections

Standard form & number sense

Fractions & percentages

Indices, Sequences & series

Year 9

Handling data & measures of location

Angles in parallel lines, lines & polygons

Algebra: including substitution & brackets

Data handling

Pythagoras & Trigonometry

Equations, quadratics & Inequalities

Proportion & compound measures

Year 10

Perimeter, area & volume

Averages

Angles & Transformations

Constructions & bearings

Probability & diagrams

Fractions & percentages

Sequences

Graphs

Functions & further algebra

Similarity & congruence

Statistics

Year 11

Bespoke revision

Functions & transforming graphs

Vector notation

Circle theorems, equations & graphs

Complex trigonometry

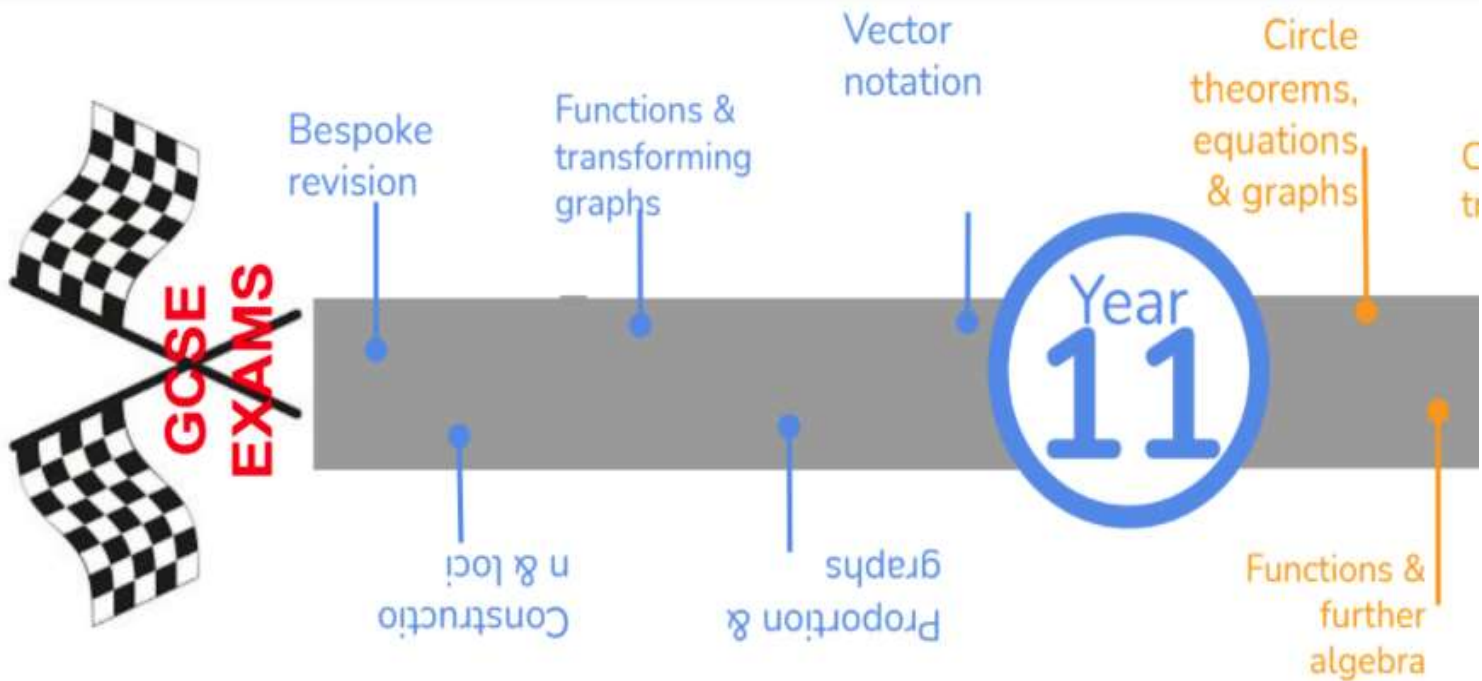
Construction & loci

Proportion & Graphs

Functions & further algebra

Similarity & congruence

This is what your child will be taught as part of the GCSE higher course in Year 11 in their MATHS lessons.



Cross Curricular Lessons

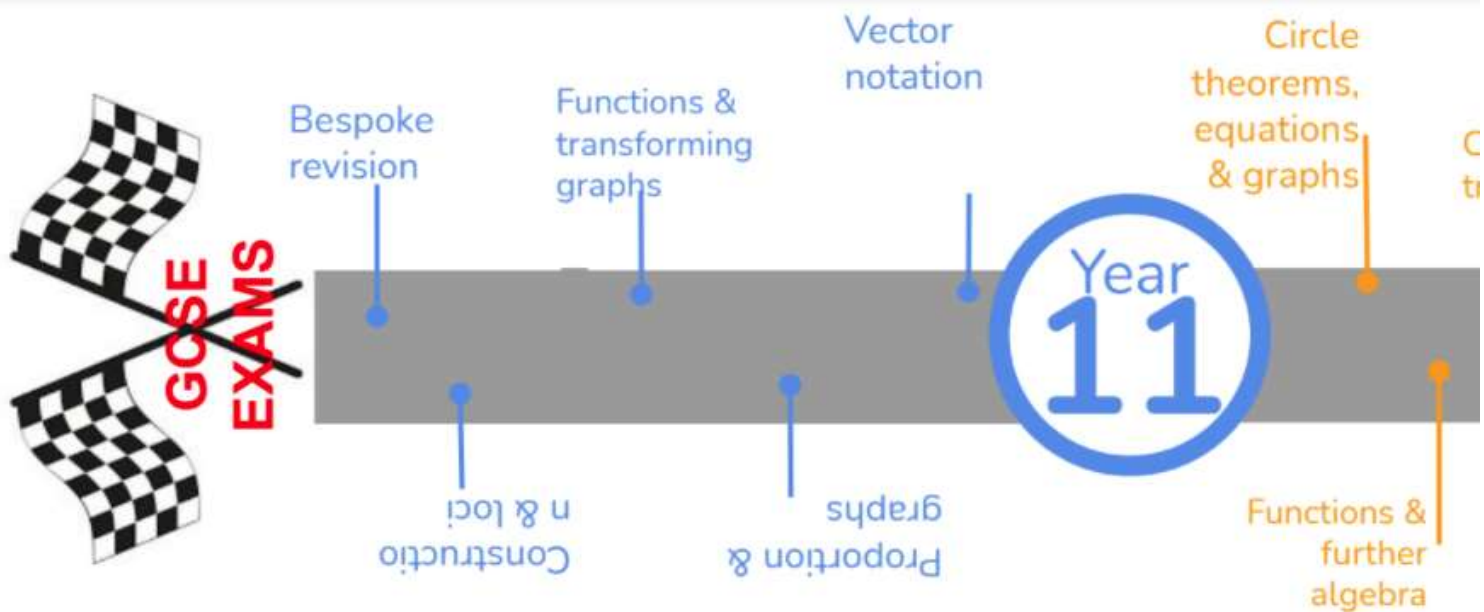


They will also have specific lessons linked to other subjects and a diet of retrieval built into their lessons.



In Year 11 Module 2 your child will study:

- Vectors
- Proportion and graphs
- Constructions and loci



The Year 11 scheme of learning includes elements of our 'bounce back' scheme, which takes into account the periods of lockdown.



Vectors

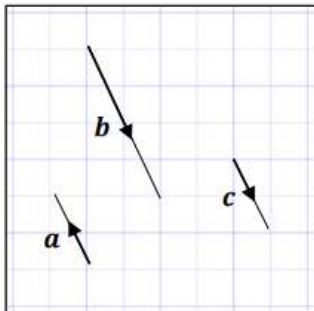


In this Unit students will study:

- Vector notation
- Vector arithmetic
- Vector proof

Vectors multiplied by a scalar

Parallel vectors are scalar multiples of each other



$b = 2 \times c = 2c$
Multiply c by 2 this becomes b .
The two lines are parallel

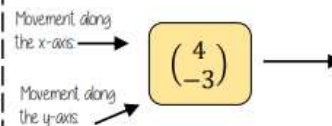
$a = -1 \times c = -c$
The vectors a and c are also parallel. A negative scalar causes the vector to reverse direction

$$b = -2 \times a = -2a$$

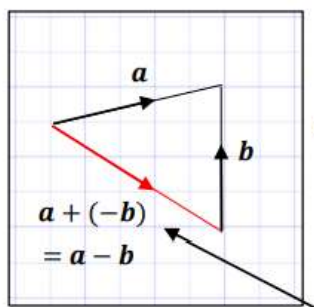
$$a = \begin{pmatrix} -1 \\ 2 \end{pmatrix} \quad b = \begin{pmatrix} 2 \\ -4 \end{pmatrix} \quad c = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$$

Understand and represent vectors

Column vectors have been seen in translations to describe the movement of one image onto another



Addition and subtraction of vectors



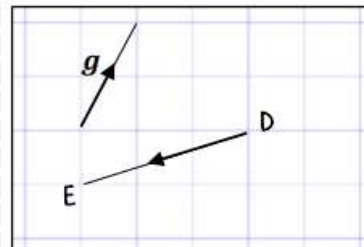
$$a = \begin{pmatrix} 5 \\ 1 \end{pmatrix} \quad b = \begin{pmatrix} 0 \\ 4 \end{pmatrix}$$

$$a + (-b) = \begin{pmatrix} 5 + -0 \\ 1 + -4 \end{pmatrix} = \begin{pmatrix} 5 \\ -4 \end{pmatrix}$$

$$a + (-b) = a - b$$

The resultant is $a - b$ because the vector is in the opposite direction to b which needs a scalar of -1

Understand and represent vectors



Vector notation \overrightarrow{DE} is another way to represent the vector joining the point D to the point E

$$\overrightarrow{DE} = \begin{pmatrix} -3 \\ -1 \end{pmatrix}$$

The arrow also indicates the direction from point D to point E

Vectors can also be written in bold lower case so g represents the vector $g = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$

Keywords

Direction: the line our course something is going

Magnitude: the magnitude of a vector is its length

Scalar: a single number used to represent the multiplier when working with vectors

Column vector: a matrix of one column describing the movement from a point

Resultant: the vector that is the sum of two or more other vectors

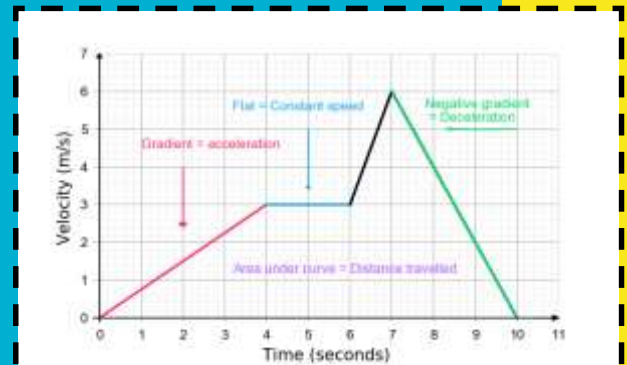
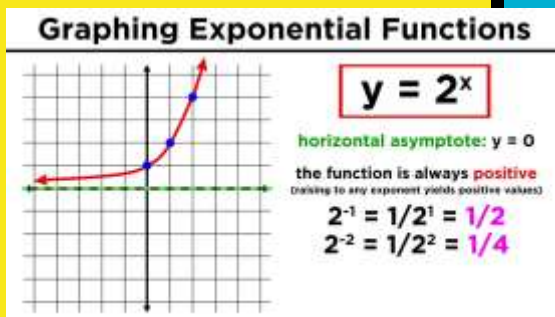
Parallel: straight lines that never meet

In the algebra unit your child will study:

- Solving problems with direct and inverse proportion using algebra
- Proportionality graphs
- Exponential graphs
- Velocity-Time graphs
- Transforming graphs



Proportion and Graphs



Rate of Change

A rate that describes how one quantity changes in relation to another quantity

It is represented by the Gradient of a line

Gradient = $\frac{y_2 - y_1}{x_2 - x_1}$

Gradient = $\frac{\text{Rise}}{\text{Run}}$

Interpreting Rates of Change

Gradient → Amount of (y) per Amount of (x)

Rate of change = \$50 per month

Average rate of change

The rate of change over a given interval

Create chord between two intervals

Calculate gradient of chord

Interpret gradient as a rate of change

Instantaneous rate of change

The rate of change at a particular moment

Create tangent at specific point

Calculate gradient of tangent

Interpret gradient as a rate of change

DIRECT AND INVERSE PROPORTION

Direct proportion

Inverse proportion

Direct Proportion Statements

$y \propto x$

$y = kx$

Statement	Formula for y in terms of x
y is proportional to x	$y = kx$
y is proportional to the square of x	$y = kx^2$
y is directly proportional to x cubed	$y = kx^3$
y varies directly with the square root of x	$y = k\sqrt{x}$

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Constructions and Loci



In this Unit students will study:

- Constructing triangles and bisectors
- Loci
- Bearings and scale drawing

Locus of a distance from a point

All points are equidistant (the same distance) from the fixed point in the middle.

Equipment needed
The radius is the distance from the fixed point.

If the point is in the corner it can only make a quarter circle.

Keywords

Protractor: piece of equipment used to measure and draw angles
Locus: set of points with a common property
Equidistant: the same distance
Discorectangle: (a stadium) – a rectangle with semi circles at either end
Perpendicular: lines that meet at 90°
Arc: part of a curve
Bisector: a line that divides something into two equal parts
Congruent: the same shape and size

Locus of a distance from a straight line

All points are equidistant (the same distance) from line.

Equipment needed
The line is straight so a ruler is used for the straight lines parallel to your original line.

The ends of the line are fixed points.

Locus equidistant from two points

Also a perpendicular bisector
Because if the points are joined this new line intersects it at a 90°

Join the intersections with a ruler
All points on this line are equidistant from both points

Keep the compass the same size and draw two arcs from each point.

Locus of a distance from two lines

Also an angle bisector
This cuts the angle in half

From the angle vertex draw two arcs that cut the lines forming the angle

Keep the compass the same size and use the new arcs as centres to draw intersecting arcs in the middle

Join the vertex to the intersection

Congruent figures

Congruent figures are identical in size and shape – they can be reflections or rotations of each other

Congruent shapes are identical – all corresponding sides and angles are the same size

$\triangle ABC \cong \triangle KLM$

Because all the angles are the same and $AC = KM$ $BC = LM$ triangles ABC and KLM are **congruent**.

Constructing Triangles

Link to steps → **R**

Side, Angle, Angle

Side, Angle, Side

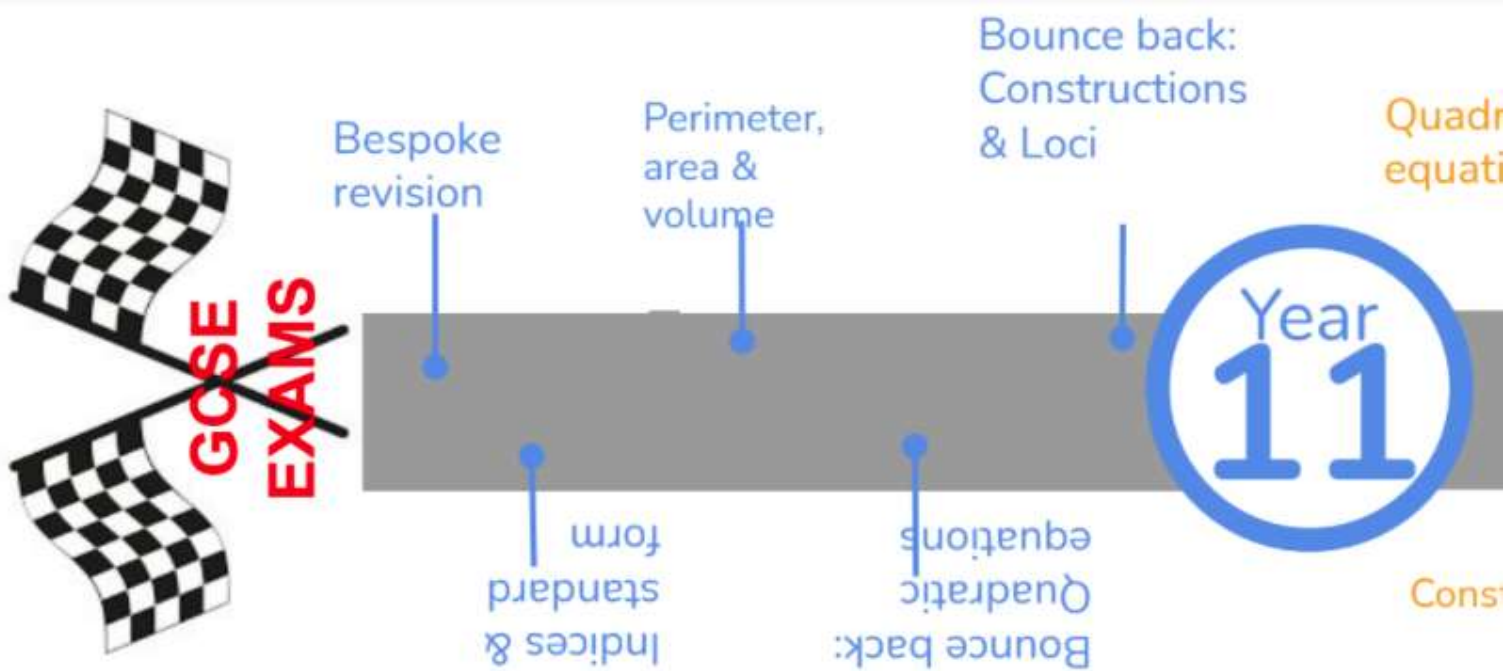
Side, Side, Side

We recommend pupils have a Casio scientific calculator.

The Casio calculator featured is the one we use when demonstrating in lessons.



Moving into Module 3



The Year 11 scheme of learning includes bespoke revision in order to prepare our students for their external examinations.

Module 2 ends our delivery of new content.

Module 3 concentrates on revision centred around the needs of your child.

