

Faculty Leader	Subject Leader
Mrs Moya Weighill	Mrs Moya Weighill
National Curriculum	
<p>The Ecclesbourne School follows the National Curriculum</p> <p>Aims</p> <p>The national curriculum for mathematics aims to ensure that all pupils:</p> <ul style="list-style-type: none"> • become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. • reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language • can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. <p>Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programme of study for key stage 4 is organised into apparently distinct domains, but pupils should develop and consolidate connections across mathematical ideas. They should build on learning from key stage 3 to further develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge wherever relevant in other subjects and in financial contexts.</p>	
Curriculum Intent	
<p>Purpose of study</p> <p>Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.</p> <p>Develop fluency</p> <ul style="list-style-type: none"> • consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of the number system to include powers, roots {and fractional indices} • select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π {and surds}, use of standard form and application and interpretation of limits of accuracy 	

- consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, {and expressions involving surds and algebraic fractions}
- extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities
- move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, {exponential and trigonometric} functions
- use mathematical language and properties precisely.

Reason mathematically

- extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically
- extend their ability to identify variables and express relations between variables algebraically and graphically
- make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments {and proofs}
- reason deductively in geometry, number and algebra, including using geometrical constructions
- interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning Mathematics
- explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally
- assess the validity of an argument and the accuracy of a given way of presenting information.

Solve problems

- develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems
- develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts
- make and use connections between different parts of mathematics to solve problems
- model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions
- select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.

Curriculum Implementation

AQA GCSE Mathematics 8300

Higher Tier and Foundation Tier students follow slightly different programmes of study. There is sufficient overlap and commonality to ensure successful transition between tiers up to January of Year 11, so this is when (post-mock exams) a final decision on tier of entry is made for each student.

Higher Tier

Term	Content
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Year 10 Higher Tier	Autumn Term	1	<p><u>Topic 1 – Indices and Laws of Indices</u> Prior Learning to reactivate (Year 9) Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, including indices. Use index notation and index laws for multiplication and division of positive integer powers</p> <ul style="list-style-type: none"> • Understand index notation • Use a calculator to find powers and roots of numbers • Know the square numbers up to 152 • Recognise the cube numbers up to 103 • Understand square root and cube root • Estimate powers and roots of any given positive number • Understand x^0 and x^1 • The Laws of Indices • Negative indices • Fractional indices <p><u>Topic 2 – Standard Form</u> Prior Learning to reactivate (Year 9) Interpret and compare numbers in standard form. Interpret the standard form display of a scientific calculator. Use a scientific calculator to perform calculations involving numbers written in standard form. Use numbers written in standard form to solve problems</p> <ul style="list-style-type: none"> • Evaluate powers of 10 • Multiply and divide by powers of 10 • Convert standard form to decimal form • Convert from decimal form to standard form • Use a calculator to evaluate calculations with standard form <p>Use non-calculator techniques to evaluate calculations with standard form</p> <p><u>Topic 3 – Basic Number, Factors and Multiples</u> Prior Learning to reactivate (Year 7) Understand the terms Factor, Multiple and Prime, (Year 8) Order positive and negative integer values, add and subtract large values and decimals using appropriate written methods, multiply 2 digit values using an appropriate written method, divide integer values and decimals by a single digit, complete long division where the answer is integer, complete long division where the answer needs rounding to a suitable level of accuracy</p> <ul style="list-style-type: none"> • Find factors and multiples • Recall the prime numbers • Use the symbols: $>$, $<$, \geq, \leq, \neq, $=$ • Order positive and negative integers • Add and subtract positive and negative integers and decimals • Multiply positive and negative integers (2 digit values and decimals) • Divide positive and negative integers (2 digit values and decimals) • Non-calculator techniques to simplify calculations (e.g. $2400 \div 120 = 240 \div 12$) • Estimate calculations by rounding to 1 significant figure • Express a number as a product of its prime factors

- Find the HCF and LCM of a pair of values

Topic 4 – Basic Algebra Review

Prior Learning to reactivate (Year 8) simplify and manipulate algebraic expressions by collecting like terms and multiply a single term over a bracket (including multiplying by a variable). (Year 9) Multiply across a single bracket by numerical and algebraic terms, factorise by taking out a numerical common factor, factorise by taking out simple algebraic common factors

- Understand standard algebraic notation e.g. $3a = 3 \times a$ and $a^2 = a \times a$
- Simplify expressions and collect like terms
- Multiply across a bracket (including algebraic terms)
- Take out a numerical common factor
- Substitute into algebraic expressions and evaluate correctly, using BIDMAS

Topic 5 – Sequences

Prior Learning to reactivate (Year 9) Generate and describe sequences using a term-to-term rule, recognise the triangle and square numbers, generate a sequence from the nth term rule, write an expression to describe the nth term of arithmetic sequences, find the next term of quadratic sequences, deduce the properties of the sequence of triangle and square numbers from spatial patterns

- Generate and describe a sequence using the term to term rule
- Generate a sequence using the position to term rule
- Continue a sequence from patterns and diagrams
- Recognise triangular, square and cube numbers
- Recognise a Fibonacci sequence
- Find an expression for the nth term of a linear sequence
- Continue a sequence expressed as a recursive relationship
- Generate a quadratic sequence given the nth term
- Generate a geometric sequence given the nth term or term to term rule
- Find an expression for the nth term of a quadratic sequence

Topic 6 – Basic Trigonometry

Prior Learning to reactivate (Year 9) Recall the definitions of sine, cosine and tangent, use sine, cosine and tangent in right-angled triangles to find lengths and angles.

- Pythagoras' Theorem in 2D problems
- Use trigonometry in right angled triangles
- Apply trigonometry and Pythagoras' theorem to solve problems including bearings
- Pythagoras' Theorem in 3D problems
- Use trigonometry in 3D problems
- Know the exact values for sin, cos and tan of 0° , 30° , 45° , 60° and 90°
- I can use the exact values to solve trigonometry problems without a calculator

	2	<p><u>Topic 7 – Collecting and Representing Data</u></p> <p>Prior Learning to reactivate (Year 8) gather relevant data from a large data set including tables and lists, plot a scatter graph, construct and interpret pie charts, use 2-way tables. (Year 9) Calculate mean, median, mode, quartiles, range and inter-quartile range from raw data</p> <ul style="list-style-type: none"> • Interpret and construct frequency tables • Interpret and construct pictograms • Interpret and construct bar charts and vertical line charts • Interpret and construct pie charts • Understand the terms; primary, secondary, discrete and continuous data • Interpret and construct line graphs from time series data • Compare distributions using a measure of average and spread • Interpret and construct cumulative frequency graphs • Interpret and construct box plots and use them to make comparisons • Construct histograms • Interpret histograms <p><u>Topic 8 – Rounding</u></p> <p>Prior Learning to reactivate (year 8) round decimals to the nearest whole number or to one or two decimal places, to write numbers to a stated degree of accuracy (including significant figures), estimate, to an appropriate level of accuracy, the answers to calculations</p> <ul style="list-style-type: none"> • Round to the nearest 10, 100, 1000 etc. • Round to 1 decimal place and 2 decimal places • Round to 1 significant figure • Round to a given number of significant figures or decimal places • Find upper and lower bounds • Use inequality notation to specify error intervals due to rounding • Find the upper and lower bounds of a calculation • Interpret upper and lower bounds as limits of accuracy in context <p><u>Topic 9 – Fractions and Decimals</u></p> <p>Prior Learning to reactivate (year 8) Use division to convert a fraction to a decimal, add and subtract large values and decimals using appropriate written methods, order fractions by writing them with a common denominator or by converting them to decimals, add and subtract fractions, calculate fractions of quantities, multiply a fraction by a fraction, divide a fraction by a fraction</p> <ul style="list-style-type: none"> • I can order decimals including negative values • I can simplify and find equivalent fractions • I can convert between mixed numbers and improper fractions • I order fractions using common denominators and equivalent decimals • I can +, -, \times and \div fractions • I can +, -, \times and \div decimals • I can find fractions of quantities with and without a calculator
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- I can convert between fractions and terminating decimals
- I can change a fraction into a recurring decimal by division
- I can change common recurring decimals into fractions by recognition
- I can prove a recurring decimal equals a given fraction

Topic 10 – Basic Percentages

Prior Learning to reactivate (year 8) Calculate percentages and find the outcome of a given percentage increase or decrease. (Year 9) Express one quantity as a percentage of another

- I can convert between fractions, decimals and percentages
- I can express one quantity as a percentage of another
- I can use a decimal multiplier to calculate percentages (calculator technique)
- I can find percentages of quantities without a calculator
- I can find percentage profit, loss, error, change etc.

Topic 11 – Calculating with Percentages

Prior Learning to reactivate (year 9) Solve simple problems involving percentage change (non-calculator method), use a multiplier to calculate percentages, use a multiplier to calculate the result of a percentage change, use percentages to calculate the original quantity given the result of a proportional change

- I can calculate simple interest and apply to financial situations
- I can calculate percentage increase and decrease
- I can use a multiplier for percentage change
- I understand the terms: cost price, selling price, debit, credit and balance
- I understand the terms: income tax, VAT, per annum and interest rate
- I can find the original amount after a percentage change
- I can use a multiplier for repeated percentage change

Topic 12 – Equations and Formulae

Prior Learning to reactivate (year 9) Solve simple linear equations (including ones with non-integer solutions), solve equations where simplification is needed eg $7 = 2 \times 3y - 2 + 4y$, solve linear equations including ones with brackets and unknowns on both sides

- I can solve linear equations with 2 operations e.g. $5x + 3 = 2$
- I can solve linear equations with brackets
- I can solve linear equations with unknowns on both sides
- I can solve linear equations with fractional coefficients

	Spring Term	<p>3</p> <p><u>Topic 13 – Angles, Scale Diagram and Bearings</u> Prior Learning to reactivate (year 8) To be able to use alternate and corresponding angles in parallel lines, use scales to make scale drawings, use compass bearings to specify direction, use three-figure bearings to specify direction.</p> <ul style="list-style-type: none"> • I know the standard vocabulary associated with geometry • I know the standard conventions for labelling sides and angles in triangles • I can use scale factors, scale diagrams and maps • I understand the eight compass point bearings to describe position • I know the angle rules: at a point, on a line, and vertically opposite • I know the angle sum of a triangle • I understand and can find 3 figure bearings to describe position • I understand and can use alternate and corresponding angles on parallel lines • I can find the bearing of the return journey (back bearing) <p><u>Topic 14 – Brackets and Factorising</u> Prior Learning to reactivate (year 9) Multiply across a single bracket by numerical and algebraic terms, factorise by taking out a numerical common factor, expand and simplify the product of two linear expressions, factorise by taking out simple algebraic common factors.</p> <ul style="list-style-type: none"> • I can multiply out 2 brackets • I can factorise a simple quadratic of the type $x^2 + bx + c$ • I can recognise the difference of 2 squares and use it to factorise $x^2 - n^2$ <p><u>Topic 15 – Perimeter and Area</u> Prior Learning to reactivate (year 9) Use correct units for perimeter, area and volume, calculate the perimeter and area of common 2D shapes and simple compound shapes, calculate the surface area of prisms, calculate the perimeter and area of compound shapes</p> <ul style="list-style-type: none"> • I can name common 3D solids • I understand the terms faces, edges and vertices • I can calculate the area of rectangles • I can calculate the area of triangles and composite shapes • I can calculate the perimeter of a 2D shape and composite shapes • I can use formulae to calculate area of a parallelogram and a trapezium • I can calculate the surface area of a cube and a cuboid • I can calculate the surface area of a prism and pyramid <p><u>Topic 16 – Circumference and Area of a Circle</u> Prior Learning to reactivate (year 9) Calculate the area and circumference of a circle, calculate the perimeter and area of compound shapes including parts of circles, calculate the surface area and volume of cylinders, find missing lengths given the area, volume or surface area, calculate the perimeter and area of compound shapes including parts of circles</p> <ul style="list-style-type: none"> • I know the names of the parts of a circle including sector, segment, tangent, arc
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- I can calculate circumference of a circle as either a decimal or a multiple of π
- I can calculate area of a circle as either a decimal or a multiple of π
- I can calculate the perimeter of composite shapes including parts of circles
- I can calculate the area of composite shapes including parts of circles
- I can calculate the surface area of cylinders, spheres, cones and composites
- I can find arc length and area of a sector as either a decimal or a multiple of π

Topic 17 – Ratio and Proportion

Prior Learning to reactivate (year 9) Simplify ratio, divide in a given ratio. Apply ratio and proportion to simple real life problems eg recipe or best buy. Understand the link between ratio and fractions.

- Express one quantity as a fraction of another
- I can simplify ratio
- I can divide in a given ratio
- I can apply ratio & proportion to simple real life problems e.g. recipe or best buy
- I understand the link between ratio and fractions
- I can solve proportion problems

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Topic 18- Coordinates and Linear Graphs

Prior Learning to reactivate (year 8) Read and plot co-ordinates in all four quadrants. Plot the graphs of linear functions where y is the subject. Plot the graphs of linear functions where y is given implicitly in terms of x . Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs.

- I can work with coordinates in all 4 quadrants
- I can plot a linear graph
- I can find the gradient and y intercept of a given graph
- I can use and interpret $y = mx + c$
- I can find the equation of a line parallel to a given line through a point
- I can find the equation of a line through 2 given points
- I can find the equation of a line perpendicular to a given line

Topic 19 – Real Life Graphs

Prior Learning to reactivate (year 8) Describe a story from a travel graph. Use conversion graphs. Plot and interpret a time series.

- I can interpret and draw travel graphs
- I can use gradient to calculate speed from a distance/time graph
- I can use gradient to calculate acceleration from a velocity/time graph
- I can interpret gradient as a rate of change
- I can use area under a velocity/time graph to calculate distance travelled
- I can plot non-linear graphs

Topic 20 – Basic Probability

Prior Learning to reactivate (year 9) Understand the concept of randomness, fairness, equally and unequally likely outcomes. Find probabilities giving the answer as a fraction. Recall that the probabilities of mutually exclusive outcomes sum to 1.

- I can record outcomes of experiments using tables and frequency trees
- I can understand basic probabilities expressed as fractions, decimals or %
- I can use appropriate language and the 0 to 1 probability scale
- I can find probability using $\frac{\text{Number of successful outcomes}}{\text{Number of possible outcomes}}$
- I know the probabilities of mutually exclusive events sum to 1
- I can construct and use sample space diagrams to find theoretical probabilities
- I can find the probability of an event NOT happening using $P(A') = 1 - P(A)$
- I can relate experimental and theoretical probabilities
- I know experimental & theoretical probabilities get closer with larger samples

Topic 21 – Probability

Prior Learning to reactivate (year 9) Construct and use sample space diagrams. Construct and use Venn diagrams. Construct and use Tree Diagrams for two events.

- I can construct and use 2 way tables
- I can construct and use Venn diagrams

- I can construct and use Tree diagrams for independent events
- I can work out the number of arrangements for simple situations by listing
- I know the addition and multiplication rules for probabilities
- I can construct and use Tree diagrams for dependent events
- I can work out the number of arrangements for simple situations without listing
- I know and can use formal notation for probabilities e.g. $P(A \cup B)$ and $P(A/B)$

Topic 22- 2D Representations of 3D Shapes

Prior Learning to reactivate (year 8) Know the names of common 3D solids

- I can construct plans and elevations of 3D shapes
- I can draw the 3D shape from its plan and elevations
- I can draw 3D shapes on isometric paper
- I can recognise the nets of standard 3D shapes

Topic 23 – Measures

Prior Learning to reactivate (year 9) Recall formulae for Speed, Density and Pressure. Solve problems using compound measure formulae.

- I know the standard units for measuring length, capacity, time and mass
- I know the units for compound measures e.g. speed, pressure and density
- I can convert between metric units
- I can convert between imperial units e.g. inches to feet
- I can convert between metric and imperial units given the relevant fact
- I can calculate and use compound measures e.g. speed, pressure and density
- I can find upper and lower bounds of values
- I can find upper and lower bounds for calculations and compound measures

Summer Term	5	<p><u>Topic 24 – Surds</u> Prior Learning to reactivate (year 9) Use index notation and index laws for multiplication and division of positive integer powers. Multiply across a single bracket by numerical and algebraic terms.</p> <ul style="list-style-type: none"> • I can perform calculations leaving my answer as a surd • I can simplify a surd • I can simplify expressions using the rules of surds and indices • I can expand brackets where the terms may be written in surd form • I can rationalise a simple denominator e.g. $\frac{3+2\sqrt{2}}{3\sqrt{2}}$ • I can solve equations which may be written in surd form <p><u>Topic 25 – Scatter Graphs</u> Prior Learning to reactivate (year 8) to be able to plot a scatter graph.</p> <ul style="list-style-type: none"> • I can recognise and name positive, negative and no correlation • I can recognise strong and weak correlation • I can draw a line of best fit • I understand that correlation does not necessarily imply causality • I can use a line of best fit to make a prediction • I understand the term outliers • I can decide when it is appropriate to exclude outliers <p><u>Topic 26 – Linear Simultaneous Equations</u> Prior Learning to reactivate (year 9) Find the solution of a pair of simultaneous linear equations using the point of intersection of their lines. Solve a pair of simultaneous linear equations by eliminating one variable.</p> <ul style="list-style-type: none"> • I can solve simultaneous equations using elimination • I can solve simultaneous equations using substitution • I can find the approximate solution using the point of intersection of 2 lines • I can set up a pair of linear simultaneous equations to solve problems • I can interpret solutions to equations in context <p><u>Topic 27 – Algebra: Quadratics, Rearranging Formulae and Identities</u> Prior Learning to reactivate (year 9) Multiply across a single bracket by numerical and algebraic terms. Factorise by taking out a numerical common factor. Expand and simplify the product of two linear expressions. Earlier in Year 10 Factorise a quadratic of the form $x^2 + bx + c$ and recognise the difference of 2 squares</p> <ul style="list-style-type: none"> • Expanding two or more brackets and simplifying e.g. $(x^2 + 3)(x - 2y)$ • I understand the difference between an equation, expression and identity • I know and can use the identity symbol • I write and use a formula to solve a real life situation
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| | | <ul style="list-style-type: none">• Factorise a quadratic of the form $ax^2 + bx + c$ where $a \neq 1$• I solve a quadratic equation by factorising• I can change the subject of a formula• I can equate coefficients in an identity e.g. completing the square• I can use algebraic expressions for proof |
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Topic 28 – Simultaneous Equations

Prior Learning to reactivate (earlier in year 10) Solve simultaneous equations using elimination and substitution. Solving quadratic equations by factorising.

- I can solve simultaneous equations where one is linear and the other quadratic
- I can draw straight lines on a graphs to find solutions of related equations
- I can set up a pair of simultaneous equations to solve problems in context

		6	<p><u>Topic 29 – Properties of Polygons</u> Prior Learning to reactivate (year 8) To be able to use alternate and corresponding angles in parallel lines. Use the interior and exterior angles properties of polygons. Earlier in Year 10 Know the angle rules: at a point, on a line, and vertically opposite. Know the angle sum of a triangle.</p> <ul style="list-style-type: none"> • I understand the terms equilateral, isosceles and scalene triangle • I can recognise special quadrilaterals and name them • I know the angle sum of a triangle is 180° • I know the side, angle and diagonal properties of quadrilaterals • I can name polygons with up to 10 sides • I can derive the angle sum of a triangle • I can find the sum of the interior angles of a polygon • I know the sum of the exterior angles of any polygon is 360° • I can solve geometric problems using angle and length properties <p><u>Year 10 Topic 30 – Statistical Measure and Review of Statistical Diagrams</u> Prior Learning to reactivate (year 8) Be able to gather relevant data from a large data set including tables and lists. To be able to plot a scatter graph. To be able to construct and interpret pie charts. To be able to use 2-way tables. Be able to communicate the results of a statistical enquiry and the methods used, justify the choice of what is presented. (year 9) Calculate mean, median, mode, quartiles, range and inter-quartile range from raw data.</p> <ul style="list-style-type: none"> • I can calculate mean, median, mode, range and quartiles from raw data • I can make comparisons using measures of average and spread • I know the difference between primary and secondary data • I know the difference between discrete and continuous data • I understand a sample may not be representative of a population • I know the size and construction of a sample affects how representative it is • I can calculate the mean and median group from a frequency table • I can identify outliers • I can construct and interpret pie charts • I can construct and interpret cumulative frequency graphs • I can construct and interpret cumulative box plots • I can construct and interpret time series graphs including predictions • I can construct and interpret histograms
Term		Content	
Year 11	Autumn Term	1	<p><u>Topic 31- Transformations</u> (Year 9) Reflect shapes in a given line eg $x=2$, $y=x$. Translate shapes by a given vector. Rotate shapes around a given centre of rotation. Enlarge shapes by a given scale factor.</p> <ul style="list-style-type: none"> • I can rotate a shape about the origin or any other point

- I can measure the angle of rotation
- I can translate a given shape by a vector
- I can find the scale factor for a given enlargement
- I can find the centre of rotation
- I can find the equation of a line of reflection
- I can enlarge a shape (centre specified), with a positive integer scale factor
- I can enlarge a shape (centre specified), with a positive fractional scale factor
- I can enlarge a shape (centre specified), with a positive fractional scale factor
- I can find the centre of enlargement for a given enlargement
- I can describe and transform 2D shapes using combined transformations
- I can enlarge a shape (centre specified), with a negative scale factor
- I can describe a combination of transformations as a single transformation
- I understand and can use the term 'invariance'

Topic 32- Construction and Loci

Year 7 Construction of triangles using SSS, ASA, and SAS

- I can measure and draw lines to the nearest mm
- I can measure and draw angles to the nearest degree
- I can construct a triangle
- I can construct a perpendicular
- I can construct an angle bisector
- I can construct an angle of 60°
- I can make an accurate scale drawing from a sketch, diagram or description
- I can construct the locus of a given distance from a point
- I can construct the locus of a given distance from a line
- I can construct the locus equidistant from two lines
- I can construct the locus equidistant from two points
- I can construct a region that is defined by several loci
- I know that the perpendicular distance from a point to a line is the shortest

Topic 33- Numerical Methods

		<p>Year 10 Substitute into algebraic expressions and evaluate correctly, using BIDMAS</p> <ul style="list-style-type: none"> • I can use systematic trial and improvement • I can use suffix notation in recursive formulae • I can find approximate solutions using recursive formulae <p><u>Topic 34- Inequalities</u></p> <p>Year 10 Recognise that $2x + 5 < 16$ is an inequality. Solve linear equations with 2 operations e.g. $5x + 3 = 2$. Plot a linear graph. Solve a quadratic equation by factorising.</p> <ul style="list-style-type: none"> • I know the difference between $<$, \leq, \geq, $>$ and \neq • I can solve simple linear inequalities in one variable • I can represent the solution set of an inequality on a number line. • I can use a solution set of discrete values written in the form $\{-2, -1, 0, 1, 2\}$ • I can use a solution set of continuous values written in the form $-3 < x < 3$ • I can set up inequalities based on the information given in the question • I can represent inequalities on a coordinate grid • I can shade out the side of the boundary line that does not satisfy the inequality • I can use inequalities on a coordinate grid to find the optimal solution. • I can solve quadratic inequalities
	2	<p><u>Topic 35 – Volume</u></p> <p>Year 9 Calculate the surface area and volume of prisms. Calculate the surface area and volume of cylinders. Find missing lengths given the area, volume or surface area.</p> <ul style="list-style-type: none"> • I can recall and use the formula for the volume of a cube or cuboid • I can find the surface area of simple 3D solids • I can recall and use the formula for the volume of a prism • I can recall and use the formula for the volume of a cylinder • I can work out the surface area of spheres, pyramids and cones • I can work out volume of spheres, pyramids and cones • I can work out the volume and surface area of compound solids constructed from cubes, cuboids, cones, pyramids, cylinders, spheres and hemispheres • I can give answers in terms of π

- I can work out volumes and surface areas of frustums

Topic 36 – Congruency and similarity

Year 11 Describe and transform 2D shapes using single rotations. Describe and transform 2D shapes using single reflections. Describe and transform 2D shapes using translations. Find the scale factor for a given enlargement.

- I can identify shapes that are congruent
- I can recognise congruent shapes when rotated or reflected
- I can identify shapes that are similar, including all squares, all circles or all regular polygons with equal number of sides
- I can recognise similar shapes when rotated, reflected or in different orientations
- I understand the effect of enlargement on perimeter
- I can work out the side of one shape that is similar to another shape given the ratio or scale factor of lengths.
- I understand and use conditions for congruent triangles: SSS, SAS, ASA, RHS
- I can compare areas and volumes of similar shapes
- I can use SSS, SAS, ASA and RHS to prove the congruence of triangles
- I understand the effect of enlargement on areas of shapes
- I understand the effect of enlargement on volumes of solids
- I can convert between length, area and volume ratios

Topic 37 – Sketching graphs

Year 10 Use and interpret $y = mx + c$

- I can draw, sketch, recognise and interpret linear functions
- I can recognise and interpret quadratic graphs
- I can recognise and interpret simple cubic graphs
- I can recognise and interpret the graph $y = 1/x$
- I can draw, sketch and interpret quadratic graphs
- I can draw, sketch and interpret graphs of the form $y = x^3 + k$
- I can draw, sketch and interpret the graph $y = \frac{1}{x}$
- I can draw, sketch, recognise and interpret graphs of $y = k^x$ for positive k values
- I know the shapes of the graphs of functions $y = \sin x$, $y = \cos x$ and $y = \tan x$

Topic 38 – Direct and Inverse Proportion

Year 10 Apply ratio & proportion to simple real life problems. Solve proportion problems. Recognise and interpret linear functions.

- I can use proportion to solve problems using informal strategies or the unitary method of solution
- I can calculate an unknown quantity from quantities in direct or inverse proportion
- I can set up and use equations to solve problems involving direct or inverse proportion
- I can use a constant of proportionality
- I can recognise the graphs that represent direct and inverse proportion.
- I can set up and use equations of the form $y = kx$ to represent direct proportion
- I can set up and use equations of the form $y = \frac{k}{x}$ to represent inverse proportion

Topic 39 – Growth and Decay

Year 10 Calculate percentage increase and decrease. Use a multiplier for percentage change. Use a multiplier for repeated percentage change.

- I can solve problems involving repeated proportional change
- I can use a multiplier and the power for exponential growth and decay
- I can solve compound interest problems.
- I can model growth and decay problems mathematically
- I understand that some iterations may have a limiting value.

Topic 40 – Circle Theorems

Year 10 Know the names of the parts of a circle including sector, segment, tangent, arc.

- I know that the tangent at any point on a circle is perpendicular to the radius at that point
- I know that tangents from an external point are equal in length
- I know that the angle subtended by an arc at the centre of a circle is twice the angle subtended at any point on the circumference
- I know that the angle subtended at the circumference by a semicircle is a right angle
- I know that angles in the same segment are equal
- I know that opposite angles of a cyclic quadrilateral sum to 180°
- I can use and prove the circle theorems
- I know the alternate segment theorem.

	3	<p><u>Topic 41 – Further Quadratic Equations</u></p> <p>Year 11 Solve a quadratic equation by factorising. Recognise and interpret quadratic graphs.</p> <ul style="list-style-type: none"> • I can read approximate solutions from a graph • I can complete the square • I can solve quadratic equations by factorising • I can solve quadratic equations by using the quadratic formula • I can solve quadratic equations by completing the square • I can deduce turning points by completing the square • I can interpret quadratic graphs by finding roots, intercepts and turning points • I can solve geometry problems that lead to a quadratic equation <p><u>Topic 42 – Transforming functions</u></p> <p>Year 11 Draw, sketch and interpret quadratic graphs. Draw, sketch and interpret graphs of the form $y = x^3 + k$</p> <ul style="list-style-type: none"> • I can transform the graph of any function $f(x)$ to $f(x) + a$ • I can transform the graph of any function $f(x)$ to $f(x + b)$, • I can transform the graph of any function $f(x)$ to $-f(x)$ • I can transform the graph of any function $f(x)$ to $f(-x)$ • I can write the equation of the transformed function given the original function. <p><u>Topic 43 – Sine and Cosine Rules</u></p> <p>Year 10 Use trigonometry in right angled triangles. Use trigonometry in 3D problems.</p> <ul style="list-style-type: none"> • I can use the sine rule to solve 2D problems. • I can use the cosine rule to solve 2D problems. • I can calculate the area of a triangle using $\frac{1}{2}ab \sin C$ • I can use the sine rule to solve 3D problems. • I can use the cosine rule to solve 3D problems
Spring Term		

		<p>4 <u>Topic 44 – Equation of a Circle</u> Year 11 Know that the tangent at any point on a circle is perpendicular to the radius at that point. Solve simultaneous equations where one is linear and the other quadratic.</p> <ul style="list-style-type: none"> • Recognise the equation of a circle, centre (0, 0), radius r • Write down the equation of a circle, centre (0, 0) and radius r • I can work out coordinates of points of intersection of a given circle and line • I can find the equation of a tangent to a circle at a given point <p><u>Topic 45 – Vectors</u> Year 11 Translate a given shape by a vector</p> <ul style="list-style-type: none"> • I understand and use vector notation • I can calculate the sum of two vectors, • I can calculate the difference of two vectors • I can calculate a scalar multiple of a vector • I can represent graphically the sum of two vectors, • I can represent graphically the difference of two vectors • I can calculate and represent graphically a scalar multiple of a vector • I can solve simple geometrical problems in 2D using vector methods • I can apply vector methods for simple geometric proofs • I can recognise when lines are parallel using vectors • I can recognise when three or more points are co-linear using vectors • I can use vectors to show three or more points are collinear <p><u>Topic 46 – Algebraic Fractions</u> Year 10 Simplify and find equivalent fractions. +, -, × and ÷ fractions. Year 11 Factorise a quadratic of the form $ax^2 + bx + c$. Change the subject of a formula.</p> <ul style="list-style-type: none"> • I can multiply two or more binomial expressions • I can simplify by factorising and cancelling algebraic fractions with quadratics
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		<ul style="list-style-type: none"> • I can add and subtract algebraic fractions with linear denominators • I can multiply algebraic fractions with linear denominators
Summer Term	5	<p><u>Topic 47 – Gradients and Rates of Change</u> Year 10 Use and interpret $y = mx + c$. Find the gradient and y intercept of a given linear graph. Find the equation of a line through 2 given points. Use gradient to calculate speed from a distance/time graph. Use gradient to calculate acceleration from a velocity/time graph. Interpret gradient as a rate of change. I can draw a tangent at a point on a curve and measure the gradient I know that the gradient is the rate of change of the y variable with the x variable I know that the gradient of a velocity/time graph represents acceleration I know that the gradient of a distance/time graph represents velocity I understand the difference between positive and negative gradients as rates of change I can interpret the meaning (giving the units) of the gradient at a point on a curve</p> <p><u>Topic 48 – Pre-calculus and area under a curve</u> Year 10 Use area under a velocity/time graph to calculate distance travelled. Calculate the area of triangles, trapezia and composite shapes. I can calculate the area under a graph consisting of straight lines I can use the areas of trapezia, triangles and rectangles to estimate the area under a curve I can find the units of the quantity calculated by finding the area under a graph</p> <p><u>Topic 49 – Functions</u> Year 10 Substitute into algebraic expressions and evaluate correctly, using BIDMAS. Solve linear and quadratic equations. I understand that a function is a relationship between two sets of values I understand and can use function notation, for example $f(x)$ I can substitute values into a function, knowing that, for example $f(2)$ I can solve equations that use function notation I can interpret and use composite function $fg(x)$ I can interpret and use inverse function $f^{-1}(x)$</p>

		6	Revision and exam preparation
Higher Tier			
	Term	Content	

Year 10 Foundation Tier	Autumn Term	1	<p><u>Topic 1 – Indices and Laws of Indices</u> Prior Learning to reactivate (Year 9) Use a calculator efficiently and appropriately to perform complex calculations with numbers of any size, including indices. Use index notation and index laws for multiplication and division of positive integer powers</p> <ul style="list-style-type: none"> • I can calculate and recognise powers 10 • Understand index notation • Use a calculator to find powers and roots of numbers • Know the square numbers up to 15^2 • Recognise the cube numbers of 1 to 5 and 10 • Understand square root and cube root • The \times and \div Laws of Indices <p><u>Topic 2 –Basic Number</u> Prior Learning to reactivate (Year 8) Order positive and negative integer values, add and subtract large values and decimals using appropriate written methods, multiply 2 digit values using an appropriate written method, divide integer values and decimals by a single digit, complete long division where the answer is integer, complete long division where the answer needs rounding to a suitable level of accuracy. Express remainders as fractions.</p> <ul style="list-style-type: none"> • I can recall all positive number complements to 100 • I know all multiplication facts to 12×12 and use the corresponding division facts • I can order positive and/or negative numbers given as integers • I know and can use the word integer and the equality and inequality symbols • I can $+$, $-$, \times and \div integers using both mental and written methods • I can $+$, $-$, \times and \div positive and negative numbers • I understand and can use inverse operations • I can interpret a remainder from a division problem • I can perform money calculations, writing answers using the correct notation • I can use approximation to estimate the value of a calculation • I can work out a calculation and check the answer using approximations <p><u>Topic 3 – Factors and Multiples</u> Prior Learning to reactivate (Year 7) Understand the terms Factor, Multiple and Prime.</p> <ul style="list-style-type: none"> • I can find factors and multiples • I know the prime numbers • I can identify multiples, factors and prime numbers from lists of numbers • I can find common factors or multiples by writing lists • I can write a number as the product of its prime factors • I can use a product of prime factors to find HCF and LCM (e.g.Venn diagrams) • I can use a product of prime factors to find square roots <p><u>Topic 4 – Basic Algebra Review</u></p>

Prior Learning to reactivate (Year 8) simplify and manipulate algebraic expressions by collecting like terms and multiply a single term over a bracket (including multiplying by a variable).

- Understand standard algebraic notation e.g. $3a = 3 \times a$ and $a^2 = a \times a$
- Simplify expressions and collect like terms
- I recognise that, for example, $V = IR$ is a formula
- I recognise that, for example, $5x + 1 = 16$ is an equation
- I recognise that $x + 3$ is an expression
- I recognise that $(x + 2)^2 \equiv x^2 + 4x + 4$ is an identity
- I recognise that $2x + 5 < 16$ is an inequality
- I can manipulate an expression by collecting like terms
- I can write expressions to solve problems
- I can write expressions using squares and cubes

Topic 5 – Sequences

Prior Learning to reactivate (Year 9) Generate and describe sequences using a term-to-term rule, recognise the triangle and square numbers, generate a sequence from the nth term rule, write an expression to describe the nth term of arithmetic sequences

- Generate and describe a sequence using the term to term rule
- Generate a sequence using the position to term rule
- Continue a sequence from patterns and diagrams
- Recognise triangular, square and cube numbers
- Recognise a Fibonacci sequence
- Find an expression for the nth term of a linear sequence
- I can continue a non-linear sequence

Topic 6 – Angles

Prior Learning to reactivate (Year 8) To be able to use alternate and corresponding angles in parallel lines.

- I can recognise and name acute, obtuse, reflex and right angles
- I know the standard vocabulary associated with geometry e.g. perpendicular
- I can estimate and draw angles in degrees
- I know the standard conventions for labelling sides and angles in triangles
- I know the angle rules: at a point, on a line, and vertically opposite
- I know the angle sum of a triangle
- I can identify and draw lines of symmetry on a shape, including coordinates
- I can identify the order of rotational symmetry on a shape, including coordinates
- I can use angle properties of equilateral, isosceles and right-angled triangles
- I can recognise and name regular pentagons, hexagons, octagons and decagons

			<ul style="list-style-type: none">• I understand and can use alternate and corresponding angles on parallel lines• I understand the proof that the angle sum of a triangle is 180°
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	2	<p><u>Topic 7 - Pythagoras' theorem</u> Prior Learning to reactivate (Year 9) Understand, recall and use Pythagoras' theorem</p> <ul style="list-style-type: none"> • I can find the hypotenuse of a right angled triangle using Pythagoras' Theorem • I can find any side of a right angled triangle using Pythagoras' Theorem <p><u>Topic 8 – Collecting and Representing Data</u> Prior Learning to reactivate (Year 8) gather relevant data from a large data set including tables and lists, plot a scatter graph, construct and interpret pie charts, use 2-way tables. (Year 9) Calculate mean, median, mode, quartiles, range and inter-quartile range from raw data</p> <ul style="list-style-type: none"> • Interpret and construct frequency tables • Interpret and construct pictograms • Interpret and construct bar charts including composite bar charts and dual bar charts and vertical line charts • Interpret and construct pie charts • Understand the terms; primary, secondary, discrete and continuous data • Design and use two-way tables • Complete a two-way table from given information • I can interpret and construct line graphs from time series data • I can compare distributions using a measure of average and spread <p><u>Topic 9 – Rounding</u> Prior Learning to reactivate (year 8) round decimals to the nearest whole number or to one or two decimal places, to write numbers to a stated degree of accuracy (including significant figures), estimate, to an appropriate level of accuracy, the answers to calculations</p> <ul style="list-style-type: none"> • Round to the nearest 10, 100, 1000 etc. • Round to 1 decimal place and 2 decimal places • Round to 1 significant figure • Round to a given number of significant figures or decimal places • Find upper and lower bounds • Use inequality notation to specify error intervals due to rounding <p><u>Topic 10 – Decimals</u> Prior Learning to reactivate (year 8) Use division to convert a fraction to a decimal, add and subtract large values and decimals using appropriate written methods, order fractions by writing them with a common denominator or by converting them to decimals.</p> <ul style="list-style-type: none"> • I can order decimals including negative values • I understand and can use place value • I can +, and - decimals • I can \times and \div decimals • I can convert between fractions and terminating decimals <p><u>Topic 11 – Fractions</u></p>
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Prior Learning to reactivate (year 8) Add and subtract fractions. Calculate fractions of quantities. Multiply a fraction by a fraction. Divide a fraction by a fraction.

- I can simplify and find equivalent fractions
- I can convert between mixed numbers and improper fractions
- I order fractions using common denominators and equivalent decimals
- I can +, -, \times and \div fractions, including negatives and mixed numbers
- I can find fractions of quantities with and without a calculator

Topic 12 – Basic Percentages

Prior Learning to reactivate (year 8) Calculate percentages and find the outcome of a given percentage increase or decrease. (Year 9) Express one quantity as a percentage of another

- I can work out the percentage of a shape that is shaded
- I know that percentage is 'number of parts per hundred'
- I can convert between fractions, decimals and percentages
- I can use percentages in real-life situations
- I can find percentages of quantities without a calculator
- I can work with percentages greater than 100%
- I can express one quantity as a percentage of another

Topic 13 – Calculating with Percentages

Prior Learning to reactivate (year 9) Solve simple problems involving percentage change (non-calculator method), use a multiplier to calculate percentages, use a multiplier to calculate the result of a percentage change, use percentages to calculate the original quantity given the result of a proportional change

- I can calculate simple interest and apply to financial situations
- I can calculate percentage increase and decrease
- I can use a multiplier for percentage change
- I understand the terms: cost price, selling price, debit, credit and balance
- I understand the terms: income tax, VAT, per annum and interest rate
- I can find the original amount after a percentage change

	Spring Term	<p>3</p> <p><u>Topic 14 – Properties of Polygons</u> Prior Learning to reactivate (year 8) Use the interior and exterior angles properties of polygons. Solve problems using the geometrical properties of polygons.</p> <ul style="list-style-type: none"> • I understand the terms equilateral, isosceles and scalene triangle • I can recognise special quadrilaterals and name them • I know the angle sum of a triangle is 180° • I know the side, angle and diagonal properties of quadrilaterals • I can name polygons with up to 10 sides • I can derive the angle sum of a triangle • I can find the sum of the interior angles of a polygon • I know the sum of the exterior angles of any polygon is 360° • I can solve geometric problems using angle and length properties • I can use the sum of the interior angles of an n-sided polygon is $180(n - 2)$ <p><u>Topic 15 – Equations</u> Prior Learning to reactivate (year 9) Solve simple linear equations (including ones with non-integer solutions), solve equations where simplification is needed eg $7 = 2 \times 3y - 2 + 4y$, solve linear equations including ones with brackets and unknowns on both sides</p> <ul style="list-style-type: none"> • I can solve linear equations with 2 operations e.g. $5x + 3 = 2$ • I can change formulae in words into symbols • I can solve linear equations with brackets • I can substitute numbers into a formula • I can solve linear equations with unknowns on both sides • I can solve linear equations with fractional coefficients <p><u>Topic 16 – Brackets and Factorising</u> Prior Learning to reactivate (year 9) Multiply across a single bracket by numerical and algebraic terms, factorise by taking out a numerical common factor, expand and simplify the product of two linear expressions, factorise by taking out simple algebraic common factors.</p> <ul style="list-style-type: none"> • I can multiply a single term over a bracket • I can factorise algebraic expressions by taking out common factors • I can multiply a single term over a bracket, involving higher powers of x • I can multiply out two linear expressions • I can factorise a simple quadratic of the type $x^2 + bx + c$ • I can recognise the difference of 2 squares and use it to factorise $x^2 - n^2$ <p><u>Topic 17 – Perimeter and Area</u> Prior Learning to reactivate (year 9) Use correct units for perimeter, area and volume, calculate the perimeter and area of common 2D shapes and simple compound shapes, calculate the surface area of prisms, calculate the perimeter and area of compound shapes</p>
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- I can find areas and perimeters by counting squares
- I can name common 3D solids
- I understand the terms faces, edges and vertices
- I can calculate the area of rectangles
- I can calculate the area of triangles and composite shapes
- I can calculate the perimeter of a 2D shape and composite shapes
- I can use formulae to calculate area of a parallelogram and a trapezium
- I can calculate the surface area of a cube and a cuboid
- I can calculate the surface area of a prism and pyramid

Topic 18 – Circumference and Area of a Circle

Prior Learning to reactivate (year 9) Calculate the area and circumference of a circle, calculate the perimeter and area of compound shapes including parts of circles.

- I know the names of the parts of a circle including sector, segment, tangent, arc
- I can calculate circumference of a circle as either a decimal or a multiple of π
- I can calculate area of a circle as either a decimal or a multiple of π
- I can calculate the perimeter of composite shapes including parts of circles
- I can calculate the area of composite shapes including parts of circles
- I can calculate the surface area of spheres, cones and composites
- I can find arc length and area of a sector as either a decimal or a multiple of π

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Topic 19 – Ratio and Proportion

Prior Learning to reactivate (year 9) Simplify ratio, divide in a given ratio. Apply ratio and proportion to simple real life problems eg recipe or best buy. Understand the link between ratio and fractions.

- Express one quantity as a fraction of another
- I can simplify ratio
- I can divide in a given ratio
- I can apply ratio & proportion to simple real life problems e.g. recipe or best buy
- I understand the link between ratio and fractions
- I can solve proportion problems#
- I can relate ratios to equations, e.g. $x : y = 1 : 2$ implies $y = 2x$

Topic 20- Coordinates and Linear Graphs

Prior Learning to reactivate (year 8) Read and plot co-ordinates in all four quadrants. Plot the graphs of linear functions where y is the subject. Plot the graphs of linear functions where y is given implicitly in terms of x . Recognise that equations of the form $y = mx + c$ correspond to straight-line graphs.

- I can work with coordinates in all 4 quadrants
- I can plot a linear graph
- I can solve geometrical problems on coordinate axes
- I can find the gradient and y intercept of a given graph
- I can use and interpret $y = mx + c$
- I can find the equation of a line parallel to a given line through a point
- I can find the equation of a line through 2 given points

Topic 21 – Real Life Graphs

Prior Learning to reactivate (year 8) Describe a story from a travel graph. Use conversion graphs. Plot and interpret a time series.

- I can interpret and draw travel graphs
- I can use gradient to calculate speed from a distance/time graph
- I can use gradient to calculate acceleration from a velocity/time graph
- I can interpret gradient as a rate of change
- I can draw and interpret conversion graphs
- I can plot non-linear graphs

Topic 22 – Basic Probability

Prior Learning to reactivate (year 9) Understand the concept of randomness, fairness, equally and unequally likely outcomes. Find probabilities giving the answer as a fraction. Recall that the probabilities of mutually exclusive outcomes sum to 1.

- I can record outcomes of experiments using tables and frequency trees
- I can understand basic probabilities expressed as fractions, decimals or %

- I can use appropriate language and the 0 to 1 probability scale
- I can find probability using $\frac{\text{Number of successful outcomes}}{\text{Number of possible outcomes}}$
- I know the probabilities of mutually exclusive events sum to 1
- I can construct and use sample space diagrams to find theoretical probabilities
- I can find the probability of an event NOT happening using $P(A') = 1 - P(A)$
- I can relate experimental and theoretical probabilities
- I know experimental & theoretical probabilities get closer with larger samples
- I can find all the possible combinations of two or more quantities

Topic 23 – Probability

Prior Learning to reactivate (year 9) Construct and use sample space diagrams. Construct and use Venn diagrams. Construct and use Tree Diagrams for two events.

- I can construct and use 2 way tables
- I can construct and use Venn diagrams
- I can construct and use Tree diagrams for independent events
- I can construct and use Tree diagrams for dependent events
- I know the addition and multiplication rules for probabilities

Summer Term	5	<p><u>Topic 24 – Measures</u> Prior Learning to reactivate (year 9) Recall formulae for Speed, Density and Pressure. Solve problems using compound measure formulae.</p> <ul style="list-style-type: none"> • I know the standard units for measuring length, capacity, time and mass • I know the units for compound measures e.g. speed, pressure and density • I can convert between metric units • I can convert between imperial units e.g. inches to feet • I can convert between metric and imperial units given the relevant fact • I can do calculations with time and money • I can calculate and use compound measures e.g. speed, pressure and density <p><u>Topic 25 – Scatter Graphs</u> Prior Learning to reactivate (year 8) to be able to plot a scatter graph.</p> <ul style="list-style-type: none"> • Plot a scatter graph • I can recognise and name positive, negative and no correlation • I can recognise strong and weak correlation • I can draw a line of best fit • I understand that correlation does not necessarily imply causality • I can use a line of best fit to make a prediction • I appreciate the limits of using a line of best fit to predict results <p><u>Topic 26 – Algebra: Quadratics, Rearranging Formulae and Identities</u> Prior Learning to reactivate (year 9) Multiply across a single bracket by numerical and algebraic terms. Factorise by taking out a numerical common factor. Expand and simplify the product of two linear expressions.</p> <ul style="list-style-type: none"> • I can use a given mathematical formula • I can interpret simple formulae as functions with inputs and outputs • I can multiply two linear expressions, • I understand the difference between an equation, expression and identity • I know and can use the identity symbol • I can write and use a formula to solve a real life situation • Factorise a quadratic of the form $x^2 + bx + c$ • I can change the subject of a formula • I can use simple algebraic expressions for proof <p><u>Topic 27 – Angles, Scale Diagram and Bearings</u> Prior Learning to reactivate (year 8) To be able to use scales to make scale drawings, use compass bearings to specify direction, use three-figure bearings to specify direction.</p> <ul style="list-style-type: none"> • I understand the eight compass point bearings to describe position • I can convert between scales and actual lengths
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| | | <ul style="list-style-type: none">• I can use scale to estimate a length, for example use the height of a man to estimate the height of a building where both are shown in a scale drawing.• I understand and can find 3 figure bearings to describe position• I can use and interpret maps and scale drawings• I can construct scale drawings• work out the bearing of a point from another given point• measure the bearing of a point from another given point• mark points on a diagram given the bearing from another point• I can find the bearing of the return journey (back bearing) |
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		6	<p><u>Topic 28 – Trigonometry</u> Prior Learning to reactivate (Year 9) Recall the definitions of sine, cosine and tangent, use sine, cosine and tangent in right-angled triangles to find lengths and angles.</p> <ul style="list-style-type: none"> • I can choose when to use sin, cos or tan • I can use trigonometry to find a missing side of a right angled triangle • I can use trigonometry to find an angle of a right angled triangle • I apply trigonometry and Pythagoras’ theorem to solve problems including bearings • I know the exact values for sin, cos and tan of 0, 30, 45, 60 and 90° <p><u>Year 10 Topic 29 – Statistical Measure and Review of Statistical Diagrams</u> Prior Learning to reactivate (year 8) Be able to gather relevant data from a large data set including tables and lists. To be able to plot a scatter graph. To be able to construct and interpret pie charts. To be able to use 2-way tables. Be able to communicate the results of a statistical enquiry and the methods used, justify the choice of what is presented. (year 9) Calculate mean, median, mode, quartiles, range and inter-quartile range from raw data.</p> <ul style="list-style-type: none"> • I can draw and interpret bar charts • I can draw and interpret pictograms • I can use two way tables • I can calculate mean, median, mode, range and quartiles from raw data • I can make comparisons using measures of average and spread • I know the difference between primary and secondary data • I know the difference between discrete and continuous data • I understand a sample may not be representative of a population • I know the size and construction of a sample affects how representative it is • I can design two way tables • I can calculate the mean and median group from a frequency table • I can identify outliers • I can construct and interpret pie charts • I can construct and interpret time series graphs including predictions
		Term	Content
Year 11	Autumn Term	1	<p><u>Topic 30- Transformations</u> (Year 9) Reflect shapes in a given line eg $x=2$, $y=x$. Translate shapes by a given vector. Rotate shapes around a given centre of rotation. Enlarge shapes by a given scale factor.</p> <ul style="list-style-type: none"> • I can describe and transform 2D shapes using single rotations • I can describe and transform 2D shapes using single reflections

- I can describe and transform 2D shapes using translations
- I can enlarge a shape on a grid (centre not specified)
- I recognise that enlargements preserve angle but not length
- I can rotate a shape about the origin or any other point
- I can measure the angle of rotation
- I can translate a given shape by a vector
- I can find the scale factor for a given enlargement
- I can find the centre of rotation
- I can find the equation of a line of reflection
- I can enlarge a shape (centre specified), with a positive integer scale factor
- I can enlarge a shape (centre specified), with a positive fractional scale factor
- I can find the centre of enlargement for a given enlargement
- I can describe and transform 2D shapes using combined transformations

Topic 31- Construction and Loci

Year 7 Construction of triangles using SSS, ASA, and SAS

- I can measure and draw lines to the nearest mm
- I can measure and draw angles to the nearest degree
- I can construct a triangle
- I can construct a perpendicular
- I can construct an angle bisector
- I can construct an angle of 60°
- I can make an accurate scale drawing from a sketch, diagram or description
- I can construct the locus of a given distance from a point
- I can construct the locus of a given distance from a line
- I can construct the locus equidistant from two lines
- I can construct the locus equidistant from two points
- I can construct a region that is defined by several loci

Topic 32 – Inequalities

	<p>Year 10 Recognise that $2x + 5 < 16$ is an inequality. Solve linear equations with 2 operations e.g. $5x + 3 = 2$. Plot a linear graph. Solve a quadratic equation by factorising.</p> <ul style="list-style-type: none"> • I know the difference between $<$, \leq, \geq, $>$ and \neq • I can solve simple linear inequalities in one variable • I can represent the solution set of an inequality on a number line. <p><u>Topic 33 – 2D representations of 3D shapes</u></p> <p>Year 8 Know the names of common 3D solids</p> <ul style="list-style-type: none"> • I can draw nets and show how they fold to make a 3D solid • I can draw plans and elevations • I can use and make isometric drawings.
2	<p><u>Topic 34 – Volume</u></p> <p>Year 9 Calculate the surface area and volume of prisms. Calculate the surface area and volume of cylinders.</p> <ul style="list-style-type: none"> • I can recall and use the formula for the volume of a cube or cuboid • I can find the surface area of simple 3D solids • I can recall and use the formula for the volume of a prism • I can recall and use the formula for the volume of a cylinder • I can work out the surface area of spheres, pyramids and cones • I can work out volume of spheres, pyramids and cones • I can work out the volume and surface area of compound solids constructed from cubes, cuboids, cones, pyramids, cylinders, spheres and hemispheres <p><u>Topic 35 – Congruency and similarity</u></p> <p>Year 11 Describe and transform 2D shapes using single rotations. Describe and transform 2D shapes using single reflections. Describe and transform 2D shapes using translations. Find the scale factor for a given enlargement.</p> <ul style="list-style-type: none"> • I can identify shapes that are congruent • I can recognise congruent shapes when rotated or reflected • I can identify shapes that are similar, including all squares, all circles or all regular polygons with equal number of sides

- I can recognise similar shapes when rotated, reflected or in different orientations
- I understand the effect of enlargement on perimeter
- I can work out the side of one shape that is similar to another shape given the ratio or scale factor of lengths.
- I understand and use conditions for congruent triangles: SSS, SAS, ASA, RHS
- I can compare areas and volumes of similar shapes
- I understand and can use conditions for congruent triangles: SSS, SAS, ASA and RHS

Topic 36 – Algebra and Graphs

Year 10 Solve linear equations with 2 operations e.g. $5x + 3 = 2$. Solve linear equations with brackets. Solve linear equations with unknowns on both sides. Plot a linear graph.

- I can solve simple linear equations
- I can solve simple linear equations with integer coefficients where the unknown appears on both sides
- I can solve simple linear equations with integer coefficients where the equation involves brackets
- I can set up simple linear equations
- I can interpret solutions of equations in context, including linear graphs

Topic 37 – Sketching graphs

Year 10 Work with coordinates in all 4 quadrants. Plot a linear graph. Find the gradient and y intercept of a given graph. Use and interpret $y = mx + c$

- I can draw, sketch, recognise and interpret linear functions
- I can recognise and interpret quadratic graphs
- I can recognise and interpret simple cubic graphs
- I can recognise and interpret the graph $y = \frac{1}{x}$

Topic 38 – Direct and Inverse Proportion

Year 10 Apply ratio & proportion to simple real life problems. Solve proportion problems. Recognise and interpret linear functions.

- I can use proportion to solve problems using informal strategies or the unitary method of solution
- I can calculate an unknown quantity from quantities in direct or inverse proportion

		<ul style="list-style-type: none"> • I can use a constant of proportionality • I can recognise the graphs that represent direct and inverse proportion. <p><u>Topic 39 – Growth and Decay</u> Year 10 Calculate percentage increase and decrease. Use a multiplier for percentage change.</p> <ul style="list-style-type: none"> • I can solve problems involving repeated proportional change • I can use a multiplier and the power for exponential growth and decay • I can solve compound interest problems.
Spring Term	3	<p><u>Topic 40 – Solving Quadratic Equations</u> Year 11 (earlier in year) Draw, sketch, recognise and interpret linear functions. Factorise a quadratic of the form $x^2 + bx + c$</p> <ul style="list-style-type: none"> • I can solve quadratic equations by factorising <p><u>Topic 41 – Quadratic Graphs</u> Year 11 (earlier in year) Recognise and interpret quadratic graphs</p> <ul style="list-style-type: none"> • I can find roots of quadratic from the graphs. • I can find intercepts of quadratic graphs turning points • I can find turning points of quadratic graphs • I can calculate values for a quadratic graphs and draw the graph • I can sketch quadratic graphs <p><u>Topic 42 – Linear Simultaneous Equations</u> Year 9 Find the solution of a pair of simultaneous linear equations using the point of intersection of their lines. Solve simultaneous equations using elimination. Year 10 Solve linear equations with 2 operations e.g. $5x + 3 = 2$</p> <ul style="list-style-type: none"> • I can solve simultaneous equations using elimination or substitution • I can find the approximate solution using the point of intersection of 2 lines • I can set up a pair of linear simultaneous equations to solve problems • I can interpret solutions to equations in context

		<p><u>Topic 43 – Standard Form</u></p> <p>Interpret and compare numbers in standard form. Interpret the standard form display of a scientific calculator. Use a scientific calculator to perform calculations involving numbers written in standard form.</p> <ul style="list-style-type: none"> • I can write an ordinary number in standard form • I can write a number written in standard form as an ordinary number • I can order and calculate with numbers written in standard form • I can use a calculator effectively for standard form calculations • I can solve standard form problems with and without a calculator. • I can solve simple equations where the numbers are written in standard form 	
	4	<p><u>Topic 44 – Vectors</u></p> <p>Year 11 Translate a given shape by a vector</p> <ul style="list-style-type: none"> • I understand and use vector notation • I can calculate the sum of two vectors, • I can calculate the difference of two vectors • I can calculate a scalar multiple of a vector • I can represent graphically the sum of two vectors, • I can represent graphically the difference of two vectors • I can calculate and represent graphically a scalar multiple of a vector • I can solve simple geometrical problems in 2D using vector methods 	
	Summer Term	5	Revision and exam preparation
		6	Revision and exam preparation

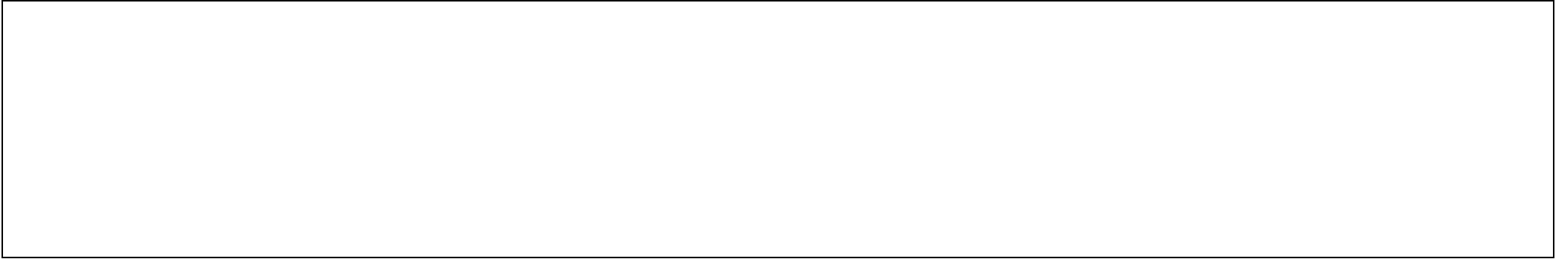
How you are assessed

Students will complete regular Graded Assessments throughout the course under formal conditions. These will inform expected outcomes but the GCSE result is based solely on performance in the final external assessment papers.

GCSE Mathematics has a Foundation tier (grades 1 – 5) and a Higher tier (grades 4 – 9). Students must take three question papers at the same tier. All question papers must be taken in the same series. It is not possible for students to be entered for more than one exam board nor for more than one tier of entry in the same series.

The information in the table below is the same for both Foundation and Higher tiers.

GCSE Examinations	Paper 1	Paper 2	Paper 3
Calculator Allowed	No	Yes	Yes
What's assessed	Content from any part of the specification may be assessed	Content from any part of the specification may be assessed	Content from any part of the specification may be assessed
How it's assessed	<ul style="list-style-type: none"> written exam: 1 hour 30 minutes 80 marks 33⅓% of the GCSE Mathematics assessment 	<ul style="list-style-type: none"> written exam: 1 hour 30 minutes 80 marks 33⅓% of the GCSE Mathematics assessment 	<ul style="list-style-type: none"> written exam: 1 hour 30 minutes 80 marks 33⅓% of the GCSE Mathematics assessment
Style of questions	A mix of question styles, from short, single-mark questions to multi-step problems. The mathematical demand increases as a student progresses through the paper	A mix of question styles, from short, single-mark questions to multi-step problems. The mathematical demand increases as a student progresses through the paper	A mix of question styles, from short, single-mark questions to multi-step problems. The mathematical demand increases as a student progresses through the paper

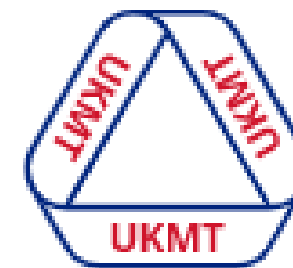


Extra-Curricular Opportunities**UKMT Individual Maths Challenge****Promoting a love of problem solving**

The Intermediate Mathematical Challenge is a 60-minute, multiple-choice competition aimed at students across UK.

It encourages mathematical reasoning, precision of thought, and fluency in using basic mathematical techniques solve interesting problems.

The problems on the Intermediate Mathematical Challenge are designed to make students think. Most are accessible, yet still challenge those with more experience.



**United Kingdom
Mathematics Trust**

the
to

Once a year approximately 30 Ecclesbourne students take part in the individual maths challenge. Students are awarded Bronze, Silver or Gold certificates and if they score highly enough they qualify for the Intermediate Kangaroo challenge for the top 8000 in the country or the Junior Mathematical Olympiad for the top 1200 in the country.

UKMT Intermediate Team Challenge**Promoting teamwork and problem solving**

The Team Maths Challenge is a competition giving students the opportunity to tackle a variety of engaging mathematical activities while developing teamwork and communication skills.

Teams of four students from schools around the UK take part in dozens of Regional Finals and high-scoring teams are invited to compete in the National Final.

Teams compete against each other in four rounds.

Group Round

Teams work to solve ten questions of varying type and difficulty in the time allowed. Each team must decide their own strategy: whether to work in pairs, individually or as a team.

Crossnumber

Similar to a crossword but with numerical answers. Teams work in pairs; one pair has the across clues and the other pair has the down clues. The pairs work independently to complete the grid using logic and deduction.

Shuttle

Teams compete against the clock to correctly answer a series of four questions. Each team is divided into Pair A (given Questions 1 and 3) and Pair B (given Questions 2 and 4). Question 1 can be solved independently of the others, but the answer to each subsequent question is dependent on the answer to the previous one.

Relay

Teams split off into pairs, with pairs taking it in turns to solve problems. This round involves lots of movement as well as mathematics: a race against the clock with lots of lively activity and excitement.

Each year 2 year 10 and 2 year 11 students are selected to represent the school at the UKMT Intermediate Team Challenge.

MangaHigh Challenges

The website www.mangahigh.com organise challenge weeks to encourage students to use this valuable resource. Students across the school endeavour to complete as many tasks as possible both in lessons and at home, with the school being ranked on a leader board. Previously the school made it into the top 10 of schools and was awarded a prize and individuals who gained more than 150 points were awarded a Manga medal.



In 2021 we are trialling using Simon Singh's Parallel project more formally, initially with Year 11. Problems are set on a Thursday night and then discussed in 'Problem solving club' on Friday.

More information can be found at:

<https://parallel.org.uk/>

Resources

Curriculum support We are blessed in Maths with the number of online resources that are available to support Maths outside the classroom. This list is by no means exhaustive but is a good place to start.

<https://www.mymaths.co.uk/> Revision help and practice questions – students have individual accounts for this website. MyMaths offers a wealth of resources that help develop confidence and fluency in maths.

<https://www.mangahigh.com/en-gb/> Challenges and Games to improve mastery and stretch – students have individual accounts for this website

<https://diagnosticquestions.com/> Weekly quizzes to improve basic skills and help to eliminate misconceptions – students have individual accounts for this website

<https://vle.ecclesbourne.derbyshire.sch.uk/ecclesbourne/Curriculum/maths/Living%20Worksheets/LivingWorksheets.aspx> “Living Worksheets” – Practice questions that are self-marking

Curriculum enrichment

<https://www.numberphile.com/> The best collection of interesting Maths videos, James Grime is particularly good but all of them well worth watching

<https://nrich.maths.org/> Engaging and accessible maths problems and puzzles

<https://twitter.com/edsouthall> Often tweets interesting Maths problems

<https://www.bbc.co.uk/programmes/p063yhf0> Puzzle for the day

https://www.transum.org/Software/SW/Starter_of_the_day/ a problem for every day of the year

<https://www.bbc.co.uk/programmes/b006qshd> bbc radio 4 more or less

<https://www.bbc.co.uk/programmes/b00snr0w> BBC RADIO 4 INFINITE MONKEY CAGE

There are also some very accessible Maths books that have been published, allowing students to access Mathematical ideas that are not on the curriculum. This is a list of our current favourites.

The Music of the Primes Marcus du Sautoy (Harper-Collins, 2003)

See also his horizon documentary with Alan Davies either on iplayer or youTube

The Simpsons and Their Mathematical Secrets

Fermat's Last Theorem

Both by Simon Singh , both excellent, well written, easy to read but interesting and clever

A Mathematician's Apology G.H. Hardy

Almost the go to book for anyone going to study Maths, don't put it on your personal statement if you want to stand out!

Mathematical Beauty Dan Pearcy

Mainly because Mr Walton used to tech him A level Maths

Impact

The study of Numeracy and Mathematics empowers students to become active members of society. It gives them the tools and the skills to navigate not only the world of work but also their worlds outside work. Looking after family life, their social life, understanding the numbers when it comes to the environment and the statistics that affect them from the political world.

At work, they will need Maths when giving or checking correct change, weighing and measuring, using spreadsheets and understanding data. In practical everyday activities at home and beyond like working out how many minutes until the next train or increasing a recipe to serve extra guests.

As consumers they will need to understand how to work out things like percentage discounts, checking they have received the right change or working out how much to tip in a restaurant.

Maths will help them in managing their finances by setting and keeping to a budget, understanding what interest is and understanding the financial implications of borrowing money.

Maths is in everything including health. Managing diets and calorie intake, knowing how to tell the time to aid making and keeping medical appointments or measuring medicine doses in different units.

Maths and Numeracy skills will help our students become active members of society. Understanding the world about us by making sense of statistics and graphs in the news, understanding information about government spending and thus allowing them to make truly informed choices in our democracy.

In our digital age of information Numeracy is equally as important as Literacy when preparing students for the world beyond school.