Intent, sequencing, and narrative thread

Department: Mathematics

EXCELLENCE IN LEARNING; COLLABORATION; CURRICULUMS; COMMUNITY.

What is the **intent statement** for you subject? What does the **discipline offer** young people? What is the subject's **purpose**? This should be a short, snappy statement.

Mathematics, together with many other subjects, is a key part of understanding how to make sense of the world. The purpose of the mathematics curriculum is to advance students' numerical fluency, mathematical reasoning and problem-solving skills so they are able to become successful members of the local and wider community. We offer a well sequenced and ambitious 5-year curriculum, with KS5 mathematics as an ultimate goal, which ensures students are challenged and aspire to achieve.

We develop students so that they:

- Become independent learners
- See methods in a variety of contexts so that knowledge is deepened
- Can understand and reason through complex problems
- Can use prior understanding to reach new goals
- Gain in confidence and are able succeed at a wide variety of numerical, algebraic, statistical and spatial mathematics problems.
- Can analyse a situation and approach it effectively
- Develop an understanding of the language of mathematics and the way we use notation to communicate mathematical truths
- Are prepared for everyday life, higher education and the world of work

What are the **core aims** of the curriculum? What **key knowledge** do you want students to have at the end of their learning journey?

Year 7

Core Aims:

To be able to manipulate number with the four basic operations of addition, subtraction, multiplication, and division.

To be able to apply these four basic operations to decimals

To gain an understanding into algebraic notation and the ways in which it can be manipulated.

To have an understanding of skills involved in the manipulation of fractions, decimals and percentages

To have knowledge of 2D shapes and the concepts of perimeter and area.

Key knowledge:	**Key skills:**
• **To begin the year with key number content. These first six topics are essential prerequisite knowledge to enable students to access future topics.** • **Students will be introduced to manipulating algebraic expressions and solving**	**Number sense and calculations** • **Number sense** o Using number lines o Integer place value o Decimal place value o Ordering negative numbers o Rounding integers o Rounding decimals

	equations. This content is then interleaved into future topics to ensure these concepts are continually revisited.
	• **Ordering and calculating with negative numbers are covered in depth. These concepts are then regularly revisited in future topics, providing opportunities for students to continually revise and practise working with negative numbers.**
	• **Students are introduced to the basic knowledge revolving around shape and space. This knowledge is limited to properties of 2-Dimensional shapes and their corresponding areas and perimeters.**
	• **Students will begin to apply their learned numeracy skills in mathematical reasoning**
	• **To develop independent learners and build mathematical resilience**
		• **Adding and subtracting**
		  o Adding integers
		  o Adding decimals
		  o Subtracting integers
		  o Subtracting decimals
		• **Multiplying**
		  o Multiplying and dividing by 10, 100 and 1000
		  o Multiplying using place value
		  o Using a written method to multiply integers
		  o Using a written method to multiply decimals
		• **Dividing**
		  o Dividing numbers into equal groups
		  o Using a written method to divide integers
		  o Dividing with remainder
		  o Using a written method to divide by integers to get a decimal answer
		  o Using a written method to divide by decimals
		• **Calculating with negative numbers**
		  o Adding and subtracting with negative numbers
		  o Multiplying and dividing with negative numbers
		• **Order of operations**
		  o Calculating with roots and powers
		  o Using the correct order of operations
		  o Using the commutative laws
		  o Using the associative laws
		Expressions and equations
		• **Expressions**
		  o Algebraic notation
		  o Algebraic terminology
		  o Simplifying expressions containing a single variable
		  o Simplifying expressions containing multiple variables
		  o Simplifying expressions containing non-linear terms
		• **Substitution**

		○ Substituting into expressions with one operation ○ Substituting into expressions with multiple operations ○ Substituting into algebraic formulae ○ Substituting into real-life formulae • **Solving equations** ○ Solving equations with one step ○ Solving equations of the form ax+b=c ○ Solving equations of the form x/a+b=c **Measures** • **Time** ○ Converting units of time ○ Using clocks ○ Calculating with time ○ Using timetables ○ Using calendars • **Measures** ○ Estimating and measuring length, mass and capacity ○ Converting units of length, mass and capacity ○ Using appropriate units **2D Shapes** • **Line and shape properties** ○ Line properties ○ Shape properties ○ Symmetry **Perimeter and area** • **Perimeter** ○ Finding perimeters using grids ○ Finding the perimeter of rectangles and simple shapes ○ Finding the perimeter of compound shapes • **Area** ○ Finding areas using grids ○ Finding the area of rectangles ○ Finding the area of compound shapes ○ Finding the area of triangles ○ Finding the area of compound shapes containing triangles

		Coordinates
		• **Coordinates and shapes**
		  o Reading and plotting coordinates
		  o Solving shape problems involving coordinates
		Factors, multiples and primes
		• **Factors and multiples**
		  o Finding the lowest common multiple
		  o Finding factors and using divisibility tests
		  o Finding the highest common factor
		• **Primes**
		  o Finding prime numbers
		  o Prime factor decomposition
		Fractions
		• **Writing and comparing fractions**
		  o Finding fractions of shapes
		  o Constructing fractions
		  o Finding equivalent fractions
		  o Simplifying fractions
		  o Ordering fractions
		  o Converting between mixed numbers and improper fractions
		• **Adding and subtracting fractions**
		  o Adding and subtracting fractions
		  o Adding and subtracting mixed numbers
		Brackets
		• **Single brackets**
		  o Using the distributive law
		  o Expanding single brackets
		  o Expanding single brackets and simplifying expressions
		  o Factorising into one bracket
		Angles
		• **Angles**
		  o Types of angles
		  o Estimating angles
		  o Measuring angles
		  o Drawing angles
		• **Finding unknown angles**

		○ Angles on a line and about a point ○ Vertically opposite angles ○ Angles in triangles **Handling data and statistical diagrams** • **Averages and range** ○ Calculating the range ○ Calculating the median ○ Finding the mode ○ Calculating the mean • **Tables and charts** ○ Interpreting frequency tables and two-way tables ○ Drawing and interpreting tally charts ○ Drawing and interpreting pictograms ○ Drawing bar charts ○ Interpreting bar charts • **Collecting and presenting data** ○ Collecting and recording data using tables ○ Presenting data and making conclusions ○ Finding averages from frequency tables ○ Choosing suitable averages and solving problems **Proportion** • **Proportion word problems** ○ Solving proportion problems **Fractions, decimals and percentages** • **Multiplying and dividing fractions** ○ Reciprocals ○ Multiplying fractions ○ Dividing fractions ○ Multiplying with mixed numbers ○ Dividing with mixed numbers • **Fractions of amounts** ○ Fractions of amounts without a calculator ○ Fractions of amounts with a calculator • **Fractions, decimals and percentages** ○ Converting between fractions and decimals

		○ Converting between fractions, decimals and percentages ○ Ordering fractions, decimals and percentages ○ Writing numbers as percentages of other numbers **Probability** • **Theoretical probability** ○ Using probability phrases ○ Writing probabilities as fractions ○ Writing probabilities as fractions, decimals and percentages ○ Probabilities of mutually exclusive events ○ Sample space diagrams

Year 8	**Core aims:** **To build on knowledge of fractions, decimals to perform operations involving percentages with an without a calculator** **To extend skills begging with the manipulation of algebra to their uses in solving equations, simplifying indices, sequences, inequalities, double brackets and fundamental algebraic fractions** **To take knowledge of 2D shapes and extend those processes to 3D shapes**	
	Key knowledge: • **With key concepts of numeracy algebra covered as a prerequisite in year 7, students are now able to access algebraic concepts at an increasing level of challenge. These algebraic skills are predominantly covered in the Autumn and Summer terms.** • **A relatively small quantity of spatial reasoning and geometry questions covered in year 7 are now in a position to be extended in year 8. This includes taking knowledge of 2-dimensional shapes and extending it to 3-dimensional shapes.** • **Students are introduced to ratio as a concept for sharing and how it relates to fractions, decimals and percentages leading on towards scale diagrams.**	**Key skills:** **Percentages** • **Percentages of amounts** o Finding percentages of amounts without a calculator o Finding percentages of amounts with a calculator • **Percentage change** o Percentage change without a calculator o Percentage change with a calculator **Money** • **Calculating with money** o Value for money **Indices** • **Index laws** o Index rules with positive indices o Index rules with negative indices o Simplifying expressions using index laws o Simplifying algebraic fractions by cancelling common factors **Equations** • **Solving equations** o Solving equations of the form (x+a)/b=c o Solving linear equations involving brackets o Solving equations with the unknown on both sides o Solving equations with the unknown in the denominator o Constructing and solving equations **Sequences** • **Term-to-term rules** o Term-to-term rules for numerical sequences

		○ Term-to-term rules for sequences of patterns • **Position-to-term rules** ○ Substituting into position-to-term rules ○ Position-to-term rules for arithmetic sequences ○ Position-to-term rules for sequences of patterns **Ratio** • **Ratio** ○ Writing and simplifying ratios ○ Writing ratios in the form 1:n ○ Converting between ratios, fractions and percentages ○ Using equivalent ratios to find unknown amounts ○ Sharing amounts in a given ratio • **Scale diagrams** ○ Drawing and interpreting scale diagrams **Rounding** • **Significant figures** ○ Rounding integers using significant figures ○ Rounding decimals using significant figures ○ Estimating calculations **Coordinates** • **Coordinates and midpoints** ○ Calculating midpoints ○ Solving shape properties involving coordinates **Area** • **Area and units** ○ Finding the area of parallelograms ○ Finding the area of trapeziums ○ Converting units of area **Circles** • **Area and circumference** ○ Identifying parts of circles ○ Finding the circumference of circles ○ Finding the area of circles **Standard form** • **Standard form and ordinary numbers** ○ Using standard form with positive indices ○ Using standard form with negative indices

		Venn diagrams
		• **Venn diagrams**
		  o Venn diagrams
		  o Probabilities from Venn diagrams
		• **Factors, multiples and primes**
		  o Finding the HCF and LCM using prime factor decomposition
		3D shapes
		• **Nets**
		  o Properties of 3D shapes
		  o Nets of 3D shapes
		Surface area and volume
		• **Surface area**
		  o Finding the surface area from a net
		  o Finding the surface area of cubes and cuboids
		  o Finding the surface area of prisms
		• **Volume**
		  o Finding the volume of cubes and cuboids
		  o Finding the volume of prisms
		  o Converting units of volume
		Linear graphs
		• **Plotting graphs and finding equations**
		  o Plotting horizontal and vertical lines
		  o Plotting straight line graphs
		  o Finding equations of straight line graphs
		Transformations
		• **Transforming shapes**
		  o Translation
		  o Reflection
		Angles
		• **Finding unknown angles**
		  o Angles in quadrilaterals
		  o Combining angle facts
		  o Angles on parallel lines
		  o Using quadrilateral properties to find angles
		  o Angles in polygons
		Statistical diagrams
		• **Drawing and interpreting statistical diagrams**
		  o Drawing pie charts
		  o Interpreting pie charts
		  o Drawing line graphs
		  o Interpreting line graphs

		○ Drawing stem-and-leaf diagrams ○ Interpreting stem-and-leaf diagrams ○ Finding averages from diagrams **Inequalities** • **Linear inequalities** ○ Reading and drawing linear inequalities on number lines ○ Solving single inequalities **Brackets** • **Double brackets** ○ Expanding double brackets **Algebraic fractions** • **Fractions review** ○ Calculating with fractions • **Algebraic fractions** ○ Simplifying algebraic fractions by factorising ○ Adding and subtracting algebraic fractions **Recurring decimals** • **Fractions and recurring decimals** ○ Using recurring decimal notation ○ Converting fractions to recurring decimals

Year 9	**Core aims:** **To begin to work with skills involved in manipulating equations of a quadratic order. This includes expanding brackets, factorising and their graphs.** **To be able to understand topics which require accurate drawing and the use of mathematical equipment. This involves accurate use of a ruler, protractor and pair of compasses.** **To gain a secure understanding of topics involving 2D and 3D space such as: constructions, circles, Pythagoras, angles and bearings, transformations, similarity and congruence.**	
	Key knowledge: • **Skills centring around fractions, decimals and percentages are revised, secured and extended first in the Autumn term** • **Year 9 sees an increase in algebraic skills to new types of equations notably quadratic equations and their graphs** • **Throughout the year students are taught skills involving 2 Dimensional space notably reflection, rotation and the use of mathematical equipment such as rulers, compasses and protractors. These skills include: constructions, transformations and angles and bearings** • **The summer term devotes significant time to data handling including: Types of data, graphs of data, and averages**	**Key skills:** **Fractions and percentages** • **Fractions, decimals and percentages review** o Converting between fractions, decimals and percentages o Ordering fractions, decimals and percentages o Finding fractions of amounts without a calculator o Finding fractions of amounts with a calculator o Finding percentages of amounts without a calculator o Finding percentages of amounts with a calculator o Simple interest calculations • **Percentage change** o Percentage change without a calculator o Percentage change with a calculator o Finding original values in percentage calculations o Finding the percentage an amount has been changed by **Probability** • **Theoretical and experimental probability** o Expected results from repeated experiments o Calculating experimental probabilities o Frequency trees **Standard form** • **Calculations with standard form**

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		○ Multiplying and dividing numbers in standard form ○ Adding and subtracting numbers in standard form ○ Standard form with a calculator **Inequalities** • **Linear inequalities** ○ Solving inequalities with the unknown on both sides ○ Solving double inequalities ○ Constructing and solving inequalities **Quadratic equations** • **Factorising and solving quadratic equations** ○ Factorising quadratic equations of the form x^2+bx+c ○ Factorising the difference of two squares ○ Factorising to solve quadratic equations of the form x^2+bx+c=0 **Formulae** • **Rearranging formulae** ○ **Changing the subjects of formulae** **Constructions** • **Constructing bisectors and perpendicular lines** ○ Constructing bisectors of angles ○ Constructing perpendicular bisectors and lines **Circles** • **Circles and cylinders** ○ Finding the arc length of sectors ○ Finding the area of sectors ○ Finding the surface area of cylinders ○ Finding the volume of cylinders **Rounding** • **Error intervals** ○ Finding error intervals ○ Truncating decimals ○ Finding error intervals for truncated numbers **3D shapes** • **Representations of 3D shapes** ○ Plans and elevations

		Pythagoras' theorem
		• **Pythagoras' theorem in 2D**
		  o Using Pythagoras' theorem in 2D
		Ratio and proportion
		• **Ratio**
		  o Writing and simplifying ratios
		  o Sharing amounts in a given ratio
		• **Proportion word problems**
		  o Solving direct proportion word problems
		  o Solving inverse proportion word problems
		  o Currency conversion
		Linear graphs
		• **Equations of linear graphs**
		  o Finding equations of straight line graphs
		  o Interpreting equations of straight line graphs
		Compound measures
		• **Speed and rates**
		  o Calculating with speed
		  o Calculating with rates
		Motion-time graphs
		• **Distance-time graphs**
		  o Plotting distance-time graphs
		  o Interpreting distance-time graphs
		  o Calculating speed from distance-time graphs
		  o Plotting distance-time graphs using speeds
		Quadratic graphs
		• **Plotting and interpreting quadratic graphs**
		  o Plotting graphs of quadratic functions
		  o Interpreting graphs of quadratic functions
		  o Solving quadratic equations graphically
		Angles and bearings
		• **Angles**
		  o Combining angle facts
		  o Angles on parallel lines
		  o Using quadrilateral properties to find angles
		  o Angles in polygons
		• **Bearings**
		  o Measuring and drawing bearings
		  o Calculating bearings

		Transformations
		• **Transforming shapes**
		  o Rotation
		  o Enlargement by a positive scale factor
		  o Mixed transformations
		Similarity and congruence
		• **Similarity**
		  o Understanding similarity
		  o Finding unknown sides in similar shapes
		• **Congruence**
		  o Understanding congruence
		  o Congruent triangles
		  o Constructing triangles
		Handling data and statistical diagrams
		• **Collecting and presenting data**
		  o Types of data
		  o Comparing populations using diagrams
		  o Choosing suitable averages and solving problems
		• **Scatter graphs**
		  o Plotting scatter graphs
		  o Interpreting scatter graphs
		  o Using lines of best fit
		• **Grouped data**
		  o Interpreting frequency tables with grouped data
		  o Finding averages from grouped data
		  o Drawing and interpreting frequency polygons
		Vectors
		• **Column vectors**
		  o Understanding column vectors
		  o Adding and subtracting column vectors
		  o Multiplying column vectors by a scalar
		  o Identifying parallel vectors

Year 10	**Core aims:** **To secure understanding of 2D shapes and extend to volumes and surface areas of 3D shapes.** **To apply algebraic skills to topics such as simultaneous equations, equations of straight lines, sequences and plotting real life graphs.** **To have an understanding of maths involved in straight line graphs, real life graphs and velocity-time graphs.**	
	Key knowledge: • **By following an aspirational curriculum, the first 2 terms in year 10 is the final time where core knowledge is taught to all students before Tier of entry is considered. This allows all students to have the chance to perform at their best before begging a path which may deviate from their peers.** • **To make an accurate assessment of students to inform the best Tier of entry for success.** • **The remaining core algebraic concepts are delivered, notably: Simultaneous equations, formula, and graph work revolving around straight line graphs, real life graphs and velocity-time graphs**	**Key skills:** **Percentages** • **Percentage change** o Compound interest calculations o Growth and decay **Surface area and volume** • **Surface area** o Finding the surface area of pyramids o Finding the surface area of cones o Finding the surface area of spheres o Finding the surface area of frustums o Finding the surface area of composite shapes • **Volume** o Finding the volume of pyramids o Finding the volume of cones o Finding the volume of spheres o Finding the volume of frustums o Finding the volume of composite shapes **Formulae** • **Rearranging formulae** o Changing the subjects of formulae **Trigonometry** • **Right-angled trigonometry** o Understanding sin, cos, tan o Finding unknown sides in right-angled triangles o Finding unknown angles in right-angled triangles

		○ Using the exact values of trigonometric ratios ○ Angles of elevation and depression ○ Calculating with trigonometry and bearings **Constructions** • **Constructions and loci** ○ Constructing loci **Linear graphs** • **Equations of linear graphs** ○ Finding the equation of a straight line from its gradient and a point ○ Finding the equation of a straight line from two points on the line ○ Equations of parallel lines ○ Equations of parallel and perpendicular lines **Real-life graphs** • **Plotting and interpreting real-life graphs** ○ Plotting linear real-life graphs ○ Using and interpreting linear real-life graphs ○ Finding equations of linear real-life graphs ○ Sketch graphs of water flows **Set notation** • **Venn diagrams and set notation** ○ Venn diagrams with set notation ○ Using set notation **Tree diagrams** • **Independent and dependent events** ○ Tree diagrams for independent events ○ Tree diagrams for dependent events **Compound measures** • **Density and pressure** ○ Calculating with density ○ Calculating with pressure **Ratio** • **Working with ratios and algebra** ○ Combining ratios ○ Calculating with ratios and algebra ○ Changing ratios **Graphs** • **Velocity-time graphs**

- Plotting velocity-time graphs
- Calculating acceleration from velocity-time graphs

- **Cubic, reciprocal and exponential graphs**
  - Graphs of cubic functions
  - Graphs of reciprocal functions
  - Graphs of exponential functions

FOUNDATION

Sequences

- **Arithmetic and geometric sequences**
  - Position-to-term rules for arithmetic sequences
  - Position-to-term rules for sequences of patterns
  - Position-to-term rules for geometric sequences

Handling data

- **Sampling**
  - Sampling and bias

Proportion

- **Direct and inverse proportion**
  - Interpreting direct proportion equations
  - Interpreting inverse proportion equations
  - Graphs of direct and inverse proportion

Transformations

- **Transforming shapes**
  - Combining transformations

Rounding

- **Error intervals**
  - Finding error intervals
  - Finding error intervals for truncated numbers

Indices

- **Index laws**
  - Index rules with positive indices
  - Index rules with negative indices
  - Simplifying expressions using index laws

Brackets

- **Expanding and factorising brackets**
  - Expanding double brackets
  - Factorising quadratic expressions of the form x^2+bx+c
  - Factorising the difference of two squares
  - Factorising to solve quadratic equations of the form x^2+bx+c=0

Handling data and statistical diagrams

- **Grouped data**
  - Interpreting frequency tables with grouped data
  - Finding averages from grouped data
- **Drawing and interpreting statistical diagrams**
  - Drawing stem-and-leaf diagrams
  - Interpreting stem-and-leaf diagrams
  - Drawing line graphs
  - Interpreting line graphs
  - Drawing and interpreting frequency polygons

HIGHER

Sequences

- **Quadratic and geometric sequences**
  - Position-to-term rules for quadratic sequences
  - Position-to-term rules for geometric sequences
  - Special sequences

Handling data

- **Sampling**
  - Sampling and bias
  - Capture-recapture

Proportion

- **Direct and inverse proportion**
  - Constructing direct proportion equations
  - Constructing inverse proportion equations
  - Graphs of direct and inverse proportion

Transformations

- **Transforming shapes**

		○ Enlargement by a positive or negative scale factor ○ Combining transformations **Rounding** • **Bounds** ○ Finding bounds for calculations **Indices** • **Index laws** ○ Estimating roots and powers ○ Indices of the form 1/a ○ Indices of the form a/b **Recurring decimals** • **Fractions and recurring decimals** ○ Converting fractions to recurring decimals ○ Converting recurring decimals to fractions **Brackets** • **Expanding and factorising brackets** ○ Expanding triple brackets ○ Completing the square ○ Factorising quadratic expressions of the form ax^2+bx+c ○ Factorising to solve quadratic equations of the form ax^2+bx+c=0 **Handling data and statistical diagrams** • **Cumulative frequency graphs** ○ Drawing cumulative frequency graphs ○ Interpreting cumulative frequency graphs • **Box plots** ○ Drawing box plots ○ Interpreting box plots ○ Comparing populations using box plots and cumulative frequency graphs

Year 11 Foundation

Core aims:

To consolidate factors and multiples and then use them to solve Highest Common Factor and Lowest Common Multiple style problems. This will involve prime factor decomposition for larger questions.

To work rules of indices and solving equations involving 2 step methods, brackets and unknowns on both sides.

To work with right angled triangles and use Pythagoras and trigonometry to find missing information.

To start to consolidate and make links between several areas of maths so that students can grasp what skills that they have learnt might be appropriate to solve problems.

To secure knowledge of 2D and 3D shape. This includes work with angles, volume and surface area.

To know probabilities sum to 1 and to use this to find experimental and theoretical probabilities.

Breaking down exam style problems

Developing revision strategies

To write full and clear solutions to obtain full marks

Key knowledge:

- **To take the concepts of number, data, geometry and algebra to their highest level within the scope of the foundation scheme of work.**
- **To spend time re-teaching topics identified as weaknesses from internal GCSE past papers.**
- **To be prepared for the GCSE examinations through familiarity of exam style questions, exam papers, mark schemes, and assessments in exam conditions**

Key skills:

Factors, multiples and primes

- **HCF and LCM**
  - Finding the lowest common multiple
  - Finding the highest common factor
  - Prime factor decomposition
  - Finding the HCF and LCM using prime factor decomposition

Fractions

- **Fractions and mixed numbers**
  - Ordering fractions and mixed numbers
  - Adding and subtracting mixed numbers
  - Multiplying with mixed numbers
  - Dividing with mixed numbers

Expressions

		• **Simplifying expressions**
		  ○ Simplifying expressions using index laws
		  ○ Simplifying algebraic fractions by cancelling common factors
		Equations
		• **Solving equations**
		  ○ Solving equations with two or more steps
		  ○ Solving equations with the unknown on both sides
		  ○ Solving equations with the unknown in the denominator
		  ○ Constructing and solving equations
		  ○ Factorising to solve quadratic equations of the form x^2+bx+c=0
		  ○ Solving quadratic equations graphically
		• **Simultaneous equations**
		  ○ Solving simultaneous equations using elimination
		  ○ Solving simultaneous equations using substitution
		  ○ Solving simultaneous equations graphically
		  ○ Constructing and solving simultaneous equations
		Right-angled triangles
		• **Pythagoras' theorem and trigonometry**
		  ○ Using Pythagoras' theorem in 2D
		  ○ Finding unknown sides in right-angled triangles
		  ○ Finding unknown angles in right-angled triangles
		  ○ Using the exact values of trigonometric ratios
		  ○ Angles of elevation and depression
		  ○ Calculating bearings

		○ Calculating with trigonometry and bearings **Surface area and volume** • **Surface area** ○ Finding the surface area of cones and spheres ○ Finding the surface area of frustums ○ Finding the surface area of composite shapes • **Volume** ○ Finding the volume of cones and spheres ○ Finding the volume of frustums ○ Finding the volume of composite shapes **Angles** • **Finding unknown angles** ○ Combining angle facts ○ Angles on parallel lines ○ Using quadrilateral properties to find angles ○ Angles in polygons **Statistical diagrams** • **Drawing and interpreting statistical diagrams** ○ Drawing pie charts ○ Interpreting pie charts ○ Plotting scatter graphs ○ Interpreting scatter graphs ○ Using lines of best fit **Probability** • Theoretical and experimental probability ○ Probabilities of mutually exclusive events ○ Sample space diagrams ○ Expected results from repeated experiments ○ Venn diagrams with set notation ○ Using set notation ○ Tree diagrams for independent events

		○ Tree diagrams for dependent events ○ Experimental probabilities **Inequalities** • Linear inequalities ○ Solving inequalities with the unknown on both sides ○ Solving double inequalities ○ Constructing and solving inequalities **Vectors** • **Vector problems** ○ Adding and subtracting column vectors ○ Multiplying column vectors by a scalar ○ Identifying parallel vectors ○ Solving geometric problems using vectors **Percentages** • **Percentage change** ○ Percentage change with a calculator ○ Finding original amounts in percentage calculations ○ Finding the percentage an amount has been changed by ○ Compound interest calculations ○ Growth and decay **Compound measures** • **Calculating with compound measures** ○ Calculating with speed ○ Calculating with rates ○ Calculating with density ○ Calculating with pressure **Ratio and proportion** • **Working with ratios and algebra** ○ Combining ratios ○ Calculating with ratios and algebra ○ Changing ratios

		• **Proportion word problems**
		  o Solving direct proportion word problems
		  o Solving inverse proportion word problems
		  o Currency conversion
		Standard form
		• **Calculating with standard form**
		  o Multiplying and dividing numbers in standard form
		  o Adding and subtracting numbers in standard form
		  o Standard form with a calculator
		Sequences
		• **Arithmetic and geometric sequences**
		  o Position-to-term rules for arithmetic sequences
		  o Position-to-term rules for sequences of patterns
		  o Position-to-term rules for geometric sequences
		  o Special sequences
		
		Linear graphs
		• **Equations of linear graphs**
		  o Plotting straight line graphs
		  o Finding equations of straight line graphs
		  o Interpreting equations of straight line graphs
		  o Finding the equation of a straight line from its gradient and a point
		  o Finding the equation of a straight line from two points on the line
		  o Equations of parallel lines

Year 11 Higher

Core aims:

To apply the four basic operations of addition, subtraction, multiplication and rationalising surds

To work with non-right angled triangles applying the sine and cosine rules

To draw and interpret histograms

To revise and extend inequalities to involve quadratic inequalities

To become fluent in function notation and apply algebra concepts to this new form of representing algebra

To understand that some equations do not have solutions and how to use iterative processes to find approximate answers.

To start to consolidate and make links between several areas of maths so that students can grasp what skills that they have learnt might be appropriate to solve problems.

Breaking down exam style problems

Developing revision strategies

To write full and clear solutions to obtain full marks

Key knowledge:

- **To take the concepts of geometry and algebra to their highest level**
- **To spend time re-teaching topics identified as weaknesses from internal GCSE past papers.**
- **To be prepared for the GCSE examinations through familiarity of exam style questions, exam papers, mark schemes, and assessments in exam conditions**

Key skills:

Surds

- **Calculating with surds**
  - Multiplying and dividing surds
  - Simplifying surds
  - Adding and subtracting surds
  - Expanding brackets with surds
- **Rationalising denominators**
  - Rationalising denominators containing a single term
  - Rationalising denominators containing two terms

Algebraic fractions

- **Calculating with algebraic fractions**
  - Simplifying algebraic fractions by factorising into one bracket
  - Simplifying algebraic fractions by factorising into two brackets

		○ Adding and subtracting algebraic fractions ○ Multiplying algebraic fractions ○ Dividing algebraic fractions **Equations** • **Solving quadratic equations** ○ Factorising to solve quadratic equations of the form ax^2+bx+c=0 ○ Solving quadratic equations by completing the square ○ Solving quadratic equations using the quadratic formula ○ Constructing and solving quadratic equations ○ Solving quadratic equations graphically • **Simultaneous equations** ○ Solving simultaneous equations involving quadratics ○ Solving simultaneous equations involving quadratics graphically **Pythagoras' theorem and trigonometry** • **Trigonometric ratios and graphs** ○ Using the exact values of trigonometric ratios ○ Graphs of trigonometric functions • **Non right-angled trigonometry** ○ The sine rule ○ The cosine rule ○ The area rule • **3D Pythagoras' theorem and trigonometry** ○ Using Pythagoras' theorem in 3D ○ Trigonometry in 3D shapes **Circle geometry** • **Circle theorems** ○ Angles in segments and cyclic quadrilaterals

		○ Circle theorems for chords and tangents ○ Alternate segment theorem ○ Angles subtended at the centre or circumference of a circle **Statistical diagrams** • **Histograms** ○ Drawing histograms with equal class widths ○ Drawing histograms with unequal class widths ○ Interpreting histograms ○ Calculating averages from histograms **Probability** • **Conditional probability** ○ Conditional probabilities from tables ○ Conditional probabilities from Venn diagrams ○ Using the conditional probability formula ○ Conditional probabilities from tree diagrams ○ Using the product rule for counting **Inequalities** • **Linear and quadratic inequalities** ○ Graphs of linear inequalities ○ Solving quadratic inequalities **Functions** • **Substituting into functions** ○ Substituting into functions ○ Substituting into composite functions • **Finding composite and inverse functions** ○ Finding composite functions ○ Finding inverse functions **Transformations** • **Transforming graphs** ○ Translating graphs ○ Reflecting graphs ○ Transforming graphs **Iteration** • **Using iterative formulae** ○ Using recurrence relations ○ Substituting into iterative formulae

		o Finding approximate solutions to equations using iteration **Algebraic proof** • **Writing algebraic proofs** o Writing algebraic proofs **Similarity** • **Area and volume of similar shapes** o Finding the perimeter and area of similar shapes o Finding the surface area and volume of similar shapes **Geometric proof** • **Vector proofs** o Solving geometric problems using vectors o Geometric proofs with vectors • **Writing geometric proofs** o Geometric proofs with angle facts o Geometric proofs with congruence and similarity o Proving the circle theorems **Graphs** • **Non-linear graphs** o Estimating gradients of non-linear graphs using tangents o Calculating distances from velocity-time graphs o Estimating areas under non-linear graphs o Equations of circles and tangents

RATION; CURRICULUMS; COMMUNITY.