

Maths KS3 Curriculum Intent and Rationale:

Our curriculum aims to develop students that can investigate, hypothesize, prove and generalise using problem solving to reason in aspects of overarching mathematical components; number explorations, geometric reasoning, proportional investigations and graphical representations. It fully fosters a mastery approach to learning, to which knowledge is challenged, developed and secured by providing pupils with tasks that allow depth rather than breadth. We encourage students to use models and manipulatives to support the development of the mathematical components. We provide opportunity to apply learning to financial, career, logic and cross curriculum topics. Sequencing of tasks have been designed to maximise interleaving strategies by encouraging cross topics links and application. Pupils' progress will be maintained through frequent, accurate and effective formative assessments, to build retention of prior and current learning.

Due to the mastery approach adopted by the curriculum design, there is the expectation to intertwine as many topics as possible while learning the overarching component. Despite the overarching emphasis concentrating on, for example negative numbers, there is the opportunity to apply this concept to using algebraic terms and to explore negative number graphically, or within transformations to name a few. However, if the students have not mastered a key component, they do not move on. The calendar was produced to provide a potential timeline for a generic progression through the concept and aid the explicit incorporation of topics that intertwine with the component. This would not be suitable for all students so they would not progress until the key component is 'mastered,' by allowing more time for procedural practice, retrieval and investigation of methods.

It is a spiral curriculum. In each year group they are focusing on the same overarching subsection of mathematics; Algebraic representation, proportion reasoning, geometric understanding and number explorations. Year 7 has one less algebraic manipulation and this reflects the opportunity to cement the fundamentals of number and geometry before applying the algebraic manipulation of these concepts. This is also to take into account those students that are not secondary ready – allowing intervention for the primary objectives, whilst the remainder have the opportunity to gain a deeper knowledge through retention, complexity or application of concept.

The purpose of the **Year 7 & 8 curriculum** is to secure numeracy skills whilst exploring new concepts in mathematics, instilling a love of mathematics through an enrichment heavy curriculum which supports their learning in future years.

The **Year 7** curriculum commences with **negative number applications** to establish a deep understanding of the concept of negative numbers. Students are exposed to context that question their understanding, by exploring the uses of negative numbers and their importance in mathematical thinking.

They then move on to **Motor skills within Geometry and Statistics**. Students are exposed to mathematical equipment that allow them to explore concepts in geometry and statistics. They analyse data, learn the usefulness of tables or graphs and conclude evidence to interpret data. Knowledge of shape facts is explored in depth using practical examples to deduce angle facts and formula.

This is then followed by **Shape and Space awareness**. Developing from the previous unit, students explore fractions, decimals and percentages through shapes and proportional reasoning. Students apply number and geometric concepts to develop a deep understanding of area and volume as well as retrieving knowledge of how to complete operations with fractions.

Number Explorations develops from the previous unit. Students use their numeracy skills to explore number patterns in factors, multiples and primes. Creating links from pattern and sequences to generalise using algebraic terms and graphical representations.

Then in the **Proportions** unit students compare and understand different amounts, using ratio. Finally, in the **Algebra** unit students build on previous algebraic skills to explore sequences and graphical representations

Year 8 commences with **Number application using Probability**. Students express and compare probabilities using fractions, decimals and percentages. *They use* probability scale to express outcomes of likelihood and diagrams to show outcomes of events. Students also develop an understanding of set notation. They then move on to **Motor Skills with constructions** where students use mathematical equipment to answer a variety of questions involving angles and constructions

This is followed by **Algebraic Manipulation** where, building on prior knowledge, students investigate geometric and numerical problems using algebraic terms to generalise and conclude values. Then, building on prior knowledge, **Number Explorations, data in the real world**. explores the use of number across subjects and gaining an understanding of how this can be used in the real world.

Then, in the **Proportions** topic, students practice application of ratio to compare quantities of amounts, units or value including enlargement through scale factors. Finally, in **Algebraic Explorations**, students build on previous algebraic skills to create linear graphs and understand key concepts with straight line graphs

The purpose of **Year 9** is to apply numeracy skills to explore graphical and geometrical reasoning, whilst instilling a love of problem solving in mathematics in preparation for Key Stage 4 and beyond.

Year 9 commences with **Number Application** where students apply previous knowledge to explore patterns, theorems and relationships within geometry. This is followed by **Motor Skills: 2D and 3D shapes** where students use mathematical equipment to answer a variety of questions involving 3D shapes, conversion of units and congruency.

This is followed by **Algebraic Manipulation** where building on prior knowledge, students investigate geometric and numerical problems using algebraic terms to generalise and conclude values. This is followed by **Number Explorations, data in the real world**. Again, building on prior knowledge, students explore the use of number across subjects and gain an understanding of how this can be used in the real world.

Then in **Proportions: Ratios** in context students use application of ratio to solve problems using similar shapes, conversion graphs and compound measures. Finally, in **Algebraic Explorations: Equations**, students recap knowledge throughout the year on graphical representations using algebra.

In summary:

Our curriculum is taught by these underpinned themes: It is taught by an adapted mastery approach which takes into consideration the sequence and progression from one topic into another and to further develop into the teaching of Year 11. Again, it is taught by motivating and engaging learners, using a series of active teach materials and resources, hence engaging learners to achieve to their full potential. To simply put it, we make the lessons 'fun', engaging and challenging learners through games, activities etc. We also use

the idea of contextualisation i.e. relating maths to solve real-life situations. So, the students don't just see the abstract nature of maths, but they can easily relate to solve world problems that they meet daily, such as choosing the value of money and applying discounts in percentages etc when they go for shopping.

Find below the Composites and the Rationale:

Composites and Rationale

Unit 1: Number and the Number System

The first and most important unit to develop is the number and the number system where students are taught to develop their core knowledge of mathematics where topics such as the four operations of maths such as addition, subtraction, multiplication and division. We then cover areas such as percentages, fractions, multiples, factors, indices, standard form, bounds, surds, and rounding. We believe students will use these skills in the later units. Again, studying these units will help students recall and apply their basic number skills in the real world such as applying discounts in shops etc

Unit 2: Manipulating algebra

Another most important unit to cover in our curriculum is algebra. Algebra covers more than 40% in the new GCSE exams and therefore it is imperative we start developing pupils' understanding and further deepen their knowledge right from year 7 to year 10 and then apply this in year 11. This range of topics are from collecting terms and expanding brackets, factorising into single brackets, solving equations etc. They then apply these basic skills to rearrange formulae and equations, factorising and solving quadratics (which is another vast area in the new GCSE exams) and functions when they are in year 10. Manipulating algebra skills is also often assessed in recall and retrieval in lessons to ensure these skills are practised throughout the year.

Unit 3: Properties of Shape (Angles and Length)

In this unit, students are given the opportunity to explore the geometric properties of angles in shapes such as polygons, and angles on parallel lines. Pupils also are given the opportunity to explore properties of shapes and this will further develop in year 9 and 10 to apply in concepts such as Pythagoras' Theorem and Trigonometry. In year 10, the more able pupils are further challenged to apply these concepts and algebra to prove congruency and similar shapes.

Unit 4: Ratio and proportion

One of the most often asked questions in the New GCSE higher maths paper is ratios and they come in diverse forms; hence it is imperative to start building pupils' knowledge and interest in this unit of work. Pupils will explore a variety of ways ratio can be used in different contexts. They are also taught how direct and inverse proportions are used in solving problems through standard calculations and also in algebraic methods.

Unit 5: Sequences

In this unit, pupils will build their knowledge of algebraic manipulations to understand the diverse types of sequences and how to identify the rules or patterns that were used to create them. It starts with basic linear sequences and progress to Fibonacci sequences and then further develop into quadratic sequences in year 10. Again, pupils will understand how to find the general formula or the n th term used to generate the sequences such as $3n$ and $4n-3$, for example, to generate these sequences and to further develop to know how to apply these formulae to generate the sequences when the n th term is given.

Unit 6: Area and Perimeter

In this unit, pupils will learn and explore the properties of area and perimeter. Here the idea of number and algebra come into play, where pupils can apply their knowledge of forming equations and expressions from algebra and then solving them to find the area or perimeter depending on the question. Pupils will begin to explore the existence of pi and learn that the circumference of any circular shape divided by its diameter always give the value of pi which is approximated to be 3. 142...This unit further develop into volume, surface area and compound measures in unit 10 and will be applied again in unit 12(Circle Theorems).

Unit 7: Linear Functions and Straight-Line graphs

In this unit, pupils will learn how to plot points to determine parallel and perpendicular lines and to know the nature and properties. They will further deepen their knowledge by applying algebra to write the equations of parallel and perpendicular lines. This unit further develops pupils' knowledge of Pythagoras' Theorem in context to find the distance between two points. It is in this unit that pupils will learn how to draw Straight line graphs and this will further help them to understand how to find the gradient and y-intercept of straight-line graphs.

Unit 8: Representing and Interpreting Data

This unit will help pupils to build their statistical measures and how to interpret data. In this modern age of 'fake news', it is imperative to back your analysis with a supporting data to prove your claim. In year 7, pupils explore the concepts of averages and spread in relation to discrete data. Again, pupils develop this knowledge over the 4 years to interpreting grouped data and to performing complex analysis on a variety of statistical diagrams such as box plot or histograms or extract estimates of measures. Pupils will learn how to critically compare two sets of data and produce a valid inference and hence conclude from the facts given. This unit has a lot of cross curricular links with Geography and Science.

Unit 9: Transformations and Other Graphs

In this unit, pupils will explore on the four types of geometric transformations such as reflection, rotation, translation and enlargement of shapes. Pupils will learn how to describe the different transformations types and their effect on shapes and how they can apply in real life situations. Whilst pupils in year 9 will learn and explore on nonlinear graphs such as quadratic and cubic graphs, pupils in year 10 will apply this knowledge in algebraic transformations of graphs.

Unit 10: Surface Area, Volume, and Compound Measures.

In this unit, pupils will build the knowledge and understanding gained from Unit 4 and the algebra units to further explore the surface area and volume of 3D shapes. Here they will learn the difference between prisms and pyramids by the use of cross sections to find the volume of prisms and other rectilinear shapes. They will further develop the volume and surface area of cones, pyramids, frustums and spheres. Here Pythagoras' Theorem and Trigonometry will be applied in 3D shapes in year 10 (Higher Tier only). Again, pupils will learn how to apply similar shapes and algebra to solve problems. Pupils will also explore compound measures, allowing them to apply knowledge in volume from this unit to solve problems with density and with knowledge of area, they can solve pressure problems.

Unit 11: Probability and Venn Diagrams

In this unit, pupils will explore probability and its applications. Here they will use the knowledge of fractions, decimals, percentages, ratio, and equations to calculate probability. From year 7, pupils will begin to explore the probability scale and the fundamental rules of probability such as mutually exclusive events, the addition and the multiplication rule. Pupils' knowledge will be further developed to apply tree diagrams to solve problems (Higher tier in year 9 and 10). Again, pupils will further develop their knowledge of set problems and Venn diagrams and apply in probability problems.

Unit 12: Constructions and Loci

In this unit, pupils will know the difference between drawing and constructions. Starting from year 8 and further develop in year 9 and 10, they will learn how to use a pair of compasses to construct triangles by using these rules: Side, Angle, Side (SAS), Angle, side, Angle (ASA) and Side, Side, side (SSS). They will learn how to use the compasses to construct perpendicular and angle bisectors. Again, pupils will learn how to draw circles by a given radius or diameter. This unit will be further applied in unit 13 in Circle theorems.

13: Constructions and Circle Theorems

In this unit, pupils will apply the knowledge and understanding gained from unit 6 to name parts of a circles and how they are related in the various Circle theorems. Pupils will explore and use angle rules, constructions and equations to further develop the understanding of the Circle Theorems and apply in solving geometrical problems.

Maths KS4 Curriculum Intent and Rationale.

The aims and objectives of the qualification are to enable students to: develop fluent knowledge, skills and understanding of mathematical methods and concepts. Acquire, select and apply mathematical techniques to solve problems. Reason mathematically, make deductions and

inferences, and draw conclusions. Comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context.

The purpose of the EDEXCEL Mathematics GCSE is to provide a strong foundation for further academic and vocational study and for employment, to give students the appropriate mathematical skills, knowledge and understanding to help them progress to a full range of courses in further and higher education.

All students study the five topic areas; Number Algebra; Ratio; Proportion and Rates of Change; Geometry and Measure; Statistics and Probability. The most able students follow the higher route map, the least able the foundation route map.

Route maps are amended regularly to allow the teaching of topics not yet mastered by students as evidenced in regular assessments. Initial route maps are below:

	Higher Route Map	Foundation Route Map
Term 1	Percentages, Decimals, Interest, Fractions, Prime Factors, HCF, LCM, Indices Proportion, Standard Index Form, Reciprocals, Factorising, Expanding Brackets, Forming and Solving Equations. Proofs, Completing the Square, Quadratic Formula, Simultaneous Equations, Straight Line Graphs, Sequences, Area, Perimeter and Volume,	Percentages, Decimals, Interest, Fractions, Prime Factors, HCF, LCM, Indices Proportion, Standard Index Form, Reciprocals, Factorising, Expanding Brackets, Forming and Solving Equations. Straight Line Graphs, Sequences, Area, Perimeter and Volume,
Term 2	Pythagoras Theorem, Trigonometry, Sine and Cosine Rules, Angle Rules, Bearings and Scale Drawings Constructions, Similar and Congruent Shapes, Change the Subject of a Formula, Surds, Rationalising the Denominator,	Pythagoras Theorem, Trigonometry, Angle Rules, Bearings and Scale Drawings Constructions, Similar and Congruent Shapes, Change the Subject of a Formula,
Term 3	Compound Measures, Bounds, Error Intervals, Iteration, Functions, Transformations, Graphs, Trapezium Rule, Vectors, Vector Geometry, Graphs of Trigonometry Functions, Estimating	Compound Measures, Error Intervals, Functions, Transformations, Graphs, Vectors, Estimating
Term 4	Handling Data, Averages, Graphs, Frequency Polygons, Pie Charts, Stem and Leaf, Box Plots, Histograms, Cumulative Frequency Curves, Probability, Venn Diagrams, Transformations, Circle Theorems	Handling Data, Averages, Graphs, Frequency Polygons, Pie Charts, Stem and Leaf, Box Plots, Histograms, Cumulative Frequency Curves, Probability, Transformations.