

Department Name: MATHEMATICS

Department's vision: The study of Mathematics contributes to the school curriculum by developing the ability to calculate; to reason logically, algebraically, and geometrically; to solve problems and to handle data.

Year Group	Half-Term 1	Half-Term 2	Half-Term 3	Half-Term 4	Half-Term 5	Half-Term 6
Year 7	<ul style="list-style-type: none"> Place Value Directed Number Angles 	<ul style="list-style-type: none"> Angles Fractions (RME) Transformations 	<ul style="list-style-type: none"> Mental and Written Methods Area (RME) 	<ul style="list-style-type: none"> Percentages (RME) Factors, multiples, powers and roots 	<ul style="list-style-type: none"> Factors, multiples, powers Algebra (RME) Probability 	<ul style="list-style-type: none"> Probability Discrete Data (RME)
What will students know by the end of the half-term...	Students will learn how to order, round and estimate calculations of numbers. They will also begin to use negative numbers in a variety of contexts. Basic angle facts from KS2 will be revisited and built on.	The first of the RME modules will promote a deeper understanding of fractions on how to share, add/subtract and multiply and divide them. The four transformations of translations, reflections, rotations and enlargements will be taught.	A mastery approach to addition, subtraction, multiplication and division will commence first. Then students start the next RME module allowing a deeper understanding of area of 2D shapes.	A key RME module on percentages, looking at percentage of amounts, increase/decrease and change. A module of recalling KS2 knowledge on factors, multiples and powers as well as starting prime factor decomposition	Algebra RME module which introduces grouping like terms and expanding brackets. It will move onto substituting, rearranging and solving equations. Probability of theoretical and experimental events.	Probability of sample space, Venn and tree diagrams. RME module on a range of data. Bar Charts, dot plots, stem and leaf and pictograms. Calculate averages and range of discrete data.
Year 8	<ul style="list-style-type: none"> Proportion (RME) Algebraic Manipulation Ratio (RME) 	<ul style="list-style-type: none"> Ratio (RME) Sequences 	<ul style="list-style-type: none"> Scatter Graphs Grouped Data (RME) 	<ul style="list-style-type: none"> Grouped Data (RME) Circles, Surface Area and Volume (RME) 	<ul style="list-style-type: none"> Graphs and rearranging formulae (RME) 	<ul style="list-style-type: none"> Further Fractions and FDP Constructions 3D Shapes
What will students know by the end of the half-term...	Both RME modules introduce ratio tables as process to manipulate simple direct and inverse proportion and simplifying and sharing in a ratio. Algebraic manipulation focuses on forming expressions, equations and formulas. Substitution and rearranging are also revisited.	The continuation of the RME Ratio module also introduces compound measures and best buy comparisons. An introduction to sequences is made looking at completing linear sequences, find the nth term of a linear sequences and using the nth term to find a term.	Scatter graphs and correlation of data. The Grouped Data RME module constructs Pie Charts, stem and leaf diagrams, and the appropriate use of averages to explain data.	RME module which focuses on exploring the links of π to the diameter of the circle. Exploring area, circumference of circles as well as find the surface area and volume of various 3D shapes.	RME module which introduces real-life graphs and how to draw and interpret them. Exploring the links between real-life graphs and how this can be applied to linear graphs and $y=mx+c$.	A revisit of compulsory GCSE information in fractions, FDP and 3D shapes before starting Year 9. Constructions and the use of a compass are introduced with angle/perpendicular bisectors.
Year 9H	<ul style="list-style-type: none"> Calculations Recurring Decimals Indices Standard Form 	<ul style="list-style-type: none"> Surds Congruence and Similarity Transformations 	<ul style="list-style-type: none"> Pythagoras Circles Area and Surface Area 	<ul style="list-style-type: none"> Volume Similar Shapes Trigonometry Statistics 	<ul style="list-style-type: none"> Statistical Diagrams 	<ul style="list-style-type: none"> Bearings & Angles Circle Theorems Algebra Manipulation Linear Equations
What will students know by the end of the half-term...	Students begin their GCSE journey by developing their number work in the first half term. Indices and surds are introduced early to supplement shape and algebra work coming up.	This half term sees the beginning of a string of shape work, starting with the definition of congruent and similar shapes. This knowledge will be extended onto shape transformations first seen in year 7.	Pythagoras' Theorem is introduced early in this half term. Its applications will be seen in area and surface area of shapes, but further depth of understanding of circles is explored before surface area to allow for analysis of further solids.	3D shapes content draws to a close with volume. Similar shapes are revisited as an important topic due to its applications: trigonometry, will be introduced in this half term. Data and statistics is seen near the end of the half term to provide some familiarity amongst new topics.	Large variety of statistical diagrams are seen in this half term, old and new. Old include scatter graphs, pie and bar charts. Whereas new graphs include cumulative frequency graphs, box plots and histograms.	Circle theorems, angles and bearings are covered. To prepare for the upcoming algebra content in year 10, students extend their understanding of algebra by learning various algebraic manipulation techniques, which are applied to linear equations.
Year 9F	<ul style="list-style-type: none"> Calculations Decimals and Fractions Indices with Multiples and Factors 	<ul style="list-style-type: none"> Standard Form Angles and 2D shapes Congruency and Similarity Transformations 	<ul style="list-style-type: none"> Transformations Pythagoras Trigonometry Algebra Manipulation 	<ul style="list-style-type: none"> Linear Equations Inequalities Statistics Statistical Diagrams 	<ul style="list-style-type: none"> Sequences Percentages Calculations 	<ul style="list-style-type: none"> Growth and Decay Area and Perimeter Circles Volume
What will students know by the end of the half-term...	A recap on the basic arithmetic needed for GCSE Foundation content. Exploring Laws of Indices and prime factor decomposition.	Converting large or small numbers into the condensed format of standard form. Recapping previous content on angles and 2d shapes, to allow for problem solving activities later in the GCSE content. Study what makes shapes similar or equal using congruency rules and scale factors.	Examine the four types of transformations, translations, reflections, rotations and enlargements as well as how to describe each. Investigating the lengths of sides and size of angles in right-angled triangles with Pythagoras and Trigonometry and applying these to real-life constructs.	Simplifying, expanding and solving in linear equations. Forming expressions, equations and formula and recognising the characteristics of each. Applying similar constructs of linear equations to inequalities and understanding how to represent them on a number line. Using averages on ungrouped and grouped data. Drawing bar charts, real-life graphs, scatter graphs and two-way tables	Utilising sequences to find missing terms, nth terms and a later term. Find percentages of amounts, an increase/decrease of amount, percentage multipliers.	Expanding on percentages by exploring simple and compound interest and applying this in monetary and other worldly constructs. Finding the area and perimeter of 2d shapes including circles. Finding the volume of various prisms and other 3D shapes such as spheres, pyramids.

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Year 10 H	<ul style="list-style-type: none"> Sequences Quadratics Algebraic Fractions 	<ul style="list-style-type: none"> Percentage Calculations Constructions and Loci Measures and Accuracy 	<ul style="list-style-type: none"> Compound Units Quadratics & Rearranging Functions Linear & Quadratics Graph 	<ul style="list-style-type: none"> Simultaneous Equations Probability 	<ul style="list-style-type: none"> Ratio Sketching Graphs 	<ul style="list-style-type: none"> Transforming Graphs Pythagoras and Trigonometry Recap Sine and Cosine Rules
What will students know by the end of the half-term...	<p>Find the nth term of linear and quadratic sequences as well exploring other sequences such as Fibonacci and geometric.</p> <p>Factorise, complete the square, and solve quadratics in a variety of ways.</p> <p>Simplify, add/subtract, multiple/divide and solve algebraic fractions.</p>	<p>Recap percentages through multipliers, compound interest and reverse percentages.</p> <p>Construct the four types of loci and apply these in diagrammatical problems.</p> <p>Round and approximate solutions as well as calculating with upper and lower bounds.</p>	<p>Competently apply the speed, density and pressure formulas and convert units of area and volume.</p> <p>Recap on expanding and factorising quadratics as well rearranging equations.</p> <p>Substituting into functions. Finding the inverse and forming composite functions.</p> <p>Using table of values and gradients/intercepts to draw linear graphs. Finding parallel and perpendicular equations. Drawing and sketching quadratic graphs.</p>	<p>Finding missing values by solving linear simultaneous equations. Deriving simultaneous equations through problem solving questions. Solving nonlinear simultaneous equations.</p> <p>Finding the probability of theoretical events. Using tree and Venn diagrams to find the probability of events.</p>	<p>Exploring sharing, reverse, combining and changing ratios. Applying ratios to equations and solving problems.</p> <p>Sketching linear, quadratic, cubic, reciprocal, exponential and trigonometrical graphs. Using trigonometrical graphs to solve trig equations</p>	<p>Manipulating and transforming graphs and their effect studied.</p> <p>Preparation of high level content involving Pythagoras and Trigonometry is reviewed before starting sine and cosine rules.</p> <p>Using non-right-angled triangles and finding missing lengths and angles through the sine and cosine rules.</p>
Year 10 F	<ul style="list-style-type: none"> Measures and Accuracy Probability Ratio 	<ul style="list-style-type: none"> Ratio Constructions and Loci Algebra Manipulation 	<ul style="list-style-type: none"> Linear Graphs Real Life Graphs Index Laws Trigonometry Quadratic Manipulation 	<ul style="list-style-type: none"> Solve Quadratic Equations Quadratics Graphs Sketching Graphs Simultaneous Equations 	<ul style="list-style-type: none"> Direct and Inverse Proportion Vectors Standard Form Recap 	<ul style="list-style-type: none"> Angles Recap Transformations recap Percentages Recap Area Recaps Circles Recap Volume Recap
What will students know by the end of the half-term...	<p>Logical reasoning and understanding of events occurring in a real life context is explored in probability. General number work is consolidated with a focus on ratio and proportion, beginning with units of measure and understanding of accuracy.</p>	<p>Maths get practical with the constructions and loci topic, accurately constructing various mathematical objects. After constructions, higher level abstract foundation content begins, starting with algebraic manipulation techniques such as expanding and factorising expressions.</p>	<p>Abstract and real life graphs are seen and related. Indices knowledge is developed with the inclusion of algebraic base numbers and exponents. Algebraic manipulation knowledge is built on to now include quadratic expressions.</p>	<p>Quadratic expressions work is built on the prior algebraic manipulation work to involve solving equations. Quadratic equations are linked to their graphs and implications such as solutions are studied. The shapes of other abstract graphs are seen after quadratics, including cubic and reciprocal graphs. Algebraic equations conclude with learning and understanding the techniques of solving simultaneous linear equations.</p>	<p>Core concepts of proportion are reviewed and algebraic notation is introduced for challenge. Vectors in a different context is seen and basic calculations are seen. The GCSE foundation Maths content conclude with vectors.</p>	<p>With GCSE content finished, various GCSE key formulae are revisited and applied to goal-free type questions to aid in developing problem solving skills.</p>
Year 11H	<ul style="list-style-type: none"> Sine and Cosine Rules Direct and Inverse Proportion Growth and Decay Vectors Inequalities 	<ul style="list-style-type: none"> Gradients and Rates of Change Pre Calculus Equation of a circle Proof 	<p>Curriculum content finished. Bespoke planning for weaker areas commences.</p>	<p>Summative assessment</p>	<p>Curriculum content finished. Bespoke planning for weaker areas continues.</p>	
What will students know by the end of the half-term...	<p>High level content is seen throughout this half term that would aid in the beginning of the Maths A-level course. A diverse range of topics will ensure appropriate prerequisite knowledge is retrieved to supplement and embed</p>	<p>The last of the Maths content is seen in this half term. These topics represent the pinnacle of the algebra and geometry branch of Pure Maths.</p>				

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Year 11F	Curriculum content finished. Bespoke planning for weaker areas commences.	Curriculum content finished. Bespoke planning for weaker areas continues.	Curriculum content finished. Bespoke planning for weaker areas continues.	Summative assessment	Curriculum content finished. Bespoke planning for weaker areas continues.	
What will students know by the end of the half-term...						
Year 12 A level	<u>Pure Maths:</u> <ul style="list-style-type: none"> Indices and surds Quadratic functions Coordinate geometry Binomial expansion Polynomials Differentiation 	<u>Pure Maths:</u> <ul style="list-style-type: none"> Applications of differentiation Integration Trigonometry Graphs and transformations Algebraic proof Vectors 	<u>Statistics:</u> <ul style="list-style-type: none"> Working with data Probability <u>Mechanics:</u> <ul style="list-style-type: none"> Kinematics Forces 	Summative assessment and feedback <u>Pure Maths:</u> <ul style="list-style-type: none"> Exponentials and logarithms <u>Statistics:</u> <ul style="list-style-type: none"> Familiarity with large data sets 	<u>Pure Maths:</u> <ul style="list-style-type: none"> Further transformation of graphs <u>Statistics:</u> <ul style="list-style-type: none"> Sampling techniques Hypothesis testing 	<u>Pure Maths:</u> <ul style="list-style-type: none"> Partial fractions Functions General binomial expansion Radians <u>Statistics:</u> <ul style="list-style-type: none"> Conditional probability
	Year 12 Maths begins with the review of bridging tasks from GCSE, necessary for the understanding and interpretation of core concepts such as differentiation.	The basic foundations of pure Maths is explored. The skills and techniques acquired from these topics will supplement the learning of applied Maths in the coming term.	Maths is applied to two different paths in Maths: statistics and mechanics. In statistics, students will review high-level GCSE content to bridge the gap and then study data handling and working with probability. In mechanics, students will study kinematics (study of motion) and forces (causes of motion).	With the conclusion of year 12 mechanics, pure content will resume with the introduction of logarithms, the inverse function of an exponential. In statistics, students will familiarise their data handling skills with large data sets.	With knowledge of most mathematical functions, transformations are applied to study the effects and results. Meanwhile in statistics, sampling techniques and hypothesis testing is introduced to model problems and probability.	Powerful algebraic techniques such as partial fractions are introduced. Further algebra competence is tested in the familiar functions and binomial expansion chapter to include higher level content. Rounding off the year, students are introduced to a new type of measure for angles: radian. Conditional probability in explored in all previous sections of statistics.
Year 12 Further A level	<u>Core Pure Maths:</u> <ul style="list-style-type: none"> Matrix calculations and transformations Complex number calculations and geometry 	<u>Core Pure Maths:</u> <ul style="list-style-type: none"> Sequences and series Proof by induction Vector geometry in 2D and 3D 	<u>Pure Maths:</u> <ul style="list-style-type: none"> Partial fractions Further differentiation rules and techniques Further integration techniques 	Summative assessment <u>Mechanics Major:</u> <ul style="list-style-type: none"> Kinematics Forces Model for friction Moments of forces Work, energy and power 	<u>Mechanics Major:</u> <ul style="list-style-type: none"> Impulse and momentum Centre of mass Dimensional analysis 	Summative assessment <u>Statistics Minor:</u> <ul style="list-style-type: none"> Discrete random variables Discrete probability distributions (binomial and Poisson) Bivariate data (correlation coefficients) Chi-squared tests
	Introduction to matrices: Be able to compute calculations, transformations and solve equations using matrices. Introduction to complex numbers: Understand the properties of the complex plane and make links with equations and their roots.	Series: Introduction to the "summation" notation and compute the sum of a series using standard results and the method of differences. Proof: Be able to construct a proof by mathematical induction on a variety of problems. Vectors: Extend knowledge of GCSE vectors to include equation of lines and planes.	Prepare for higher level content by studying the usefulness of partial fractions, various differentiation and integration techniques of every function seen so far.	Linking the kinematics and forces work done in regular Maths to extend to include work, energy and power and moments.	Continuation on the forces work to include impulse and momentum, centre of mass and rounding off with dimensional analysis and consistency.	Extend statistics knowledge to different types of statistical distributions, namely Poisson distribution. Will also explore the usefulness of bivariate data and chi-squared tests.

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Year 13 A level	<u>Pure Maths:</u> <ul style="list-style-type: none"> • Further trigonometry • Further differentiation • Further integration techniques <u>Statistics:</u> <ul style="list-style-type: none"> • Normal distribution <u>Mechanics:</u> <ul style="list-style-type: none"> • Forces in context (friction) 	Summative assessment <u>Pure Maths:</u> <ul style="list-style-type: none"> • Further applications of calculus (parametric equations) • Differential equations • Proof by contradiction <u>Mechanics:</u> <ul style="list-style-type: none"> • Moments • Application of vectors 	<u>Pure Maths:</u> <ul style="list-style-type: none"> • Sequences and series • Numerical methods <u>Mechanics:</u> <ul style="list-style-type: none"> • Projectiles <u>Statistics:</u> <ul style="list-style-type: none"> • Further hypothesis testing 	Summative assessment Bespoke delivery informed by summative assessment in preparation for external examinations.	Bespoke delivery informed by summative assessment in preparation for external examinations.	
	Advanced level calculus and trigonometry is introduced, aimed for students wishing to continue with STEM based subjects. In applied Maths, the normal distribution is explored and the concept of friction is incorporated into previous mechanics knowledge.	Core calculus techniques conclude with solving differential equations and applied to parametric equations. Further forces work include moments, torque and couples are introduced.	New notation for summing a sequence of numbers is seen in the “sequences and series” chapter to further hone one’s understanding of algebra. Pure Maths will then conclude with the study of numerical methods to solve problems. Mechanics will round off with 2D kinematics work in the form of projectiles. Hypothesis tests will be conducted with the knowledge of normal distributions.			
Year 13 Further A level	<u>Core Pure Maths:</u> <ul style="list-style-type: none"> • Matrices, series and proof by induction review • Further vectors • Maclaurin series • Polar coordinates • Hyperbolic functions 	Summative Assessment <u>Core Pure Maths:</u> <ul style="list-style-type: none"> • Further complex numbers • Further calculus • First order differential equations • Second order differential equations 	<u>Mechanics Major:</u> <ul style="list-style-type: none"> • Motion with a variable force • Circular motion • Hooke’s law • Modelling oscillations 	Summative assessment <u>Mechanics Major:</u> <ul style="list-style-type: none"> • Centre of mass involving 3D solids • Oblique impacts 	Bespoke delivery informed by summative assessment in preparation for external examinations.	
	Topics seen earlier in year 12 are now reviewed with additional challenge, such as the inclusion of partial fractions. New coordinate systems and hyperbolic functions are introduced to support future content.	High level calculus is introduced in the form of solving first and second order differential equation, including applying the Maths to systems of differential equations (e.g. predator-prey model in biology).	Further mechanics A2 begins with the use of chain rule to manipulate the definition of acceleration in terms of displacement. Brand new in depth analysis of circular motion, elastic energy and modelling oscillations is explored here.	The Further Maths course is rounded off with solving centre of mass problems involving 3D solids by the use of calculus, along with studying oblique impact of two particles.		

Key Stage Four Specification Link https://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300/specification-at-a-glance	Key Stage Five Specification Link A level Mathematics: https://www.ocr.org.uk/Images/308723-specification-accredited-a-level-gce-mathematics-a-h240.pdf Further Mathematics : https://www.ocr.org.uk/qualifications/as-and-a-level/further-mathematics-b-mei-h635-h645-from-2017/specification-at-a-glance/
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What will students see in their books or folders? <ul style="list-style-type: none"> • Worked examples to scaffold learning • Independent work that has been marked in green pen and corrections made • Regular prior knowledge quizzing that informs homework • Marking from staff in line with school policy 	This subject supports students’ reading and literacy through... <ul style="list-style-type: none"> • Use of key terminology both in class and in the Maths’ absolutes • Use of the UNPACK strategy to support with reading and interpreting text heavy questions • Staff model precise use of terminology and give reasons for methods used to solve problems • Students are supported, through questioning, to use key terminology and justify answers 	This subject supports students’ numeracy through... <ul style="list-style-type: none"> • Modelling key written techniques for number calculations • Consolidating number fluency regularly through prior knowledge quizzing • Regularly addressing the skills needed for non-calculator questions 	This subject promotes the following revision strategies as the most effective means of retaining content... <ul style="list-style-type: none"> • Revisiting of topics to promote long term retention as modelled by prior knowledge quizzing in class • Use your Maths book / videos to revisit the methods you are revising • Do at least 7 questions • Mark the questions correcting any errors • Come to the daily lunch support sessions for help. 	Opportunities for exploring this subject further are available through ... <ul style="list-style-type: none"> • The Mathematical Challenges run annually for all • Celebrating Pi day • Involvement in Maths Week England • The Half-termly Maths competitions open to all students 	The following trips run through this subject... To Mathematical Challenge Team Events
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