

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"> Negative numbers Algebraic expressions 	<ul style="list-style-type: none"> Types of numbers Decimal calculations Fractional operations 	<ul style="list-style-type: none"> Percentage calculations Fractions, decimals and percentages equivalence 	<ul style="list-style-type: none"> Solving linear equations Averages 	<ul style="list-style-type: none"> Perimeter and area 	<ul style="list-style-type: none"> Angles Probability Statistical graphs
What will students know by the end of the topic...	Students will be able to confidently apply negative number rules to the four operations. Students will begin to form algebraic expressions from a context and manipulate these, which will lead to students using these expressions when substituting values to calculate values.	Knowledge of types of numbers from KS2 such as factors, multiples and prime numbers are utilised at this time to write a number as a product of its prime factors. Competence in decimal and fractional calculations are worked on.	Deeper understanding of percentages are explored, such as calculating the original value before a percentage change. To round off the KS2 into KS3 number work, students must be able to fluently convert between fractions, decimals and percentages of different denominations.	Students are exposed to the method of balancing to solve a variety of 1-variable equations, this will eventually lead onto solving equations involving different operations. Understanding of the measures of location (mean/median/mode) are delved into, this will lead to calculations from a frequency table.	Properties of important 2D shapes such as triangles and quadrilaterals are explored, leading onto area and perimeter problems which includes formula for the area of parallelograms and trapezia. Compound area problems are considered the pinnacle of this topic.	Knowledge of KS2 angles are developed to include triangles and quadrilaterals, continuing into problem solving and forming and solving equations. The concept of probability is introduced, looking at theoretical probability of single and two events and experimental probability.
Year 8	<ul style="list-style-type: none"> Index laws Algebraic expressions 	<ul style="list-style-type: none"> Solving equation Rounding and estimation Circles 	<ul style="list-style-type: none"> Sequences Ratio 	<ul style="list-style-type: none"> Volume Pythagoras' Theorem Proportion 	<ul style="list-style-type: none"> Further percentages Angles in parallel lines Pie charts 	<ul style="list-style-type: none"> Further probability Scatter graphs Factors and multiples
What will students know by the end of the topic...	Number and algebra skills are interwoven within the index laws content. Prior knowledge on algebraic manipulation from year 7 is developed in year 8 algebraic manipulation involving expanding double brackets and factorising expressions involving a variety of factors. Problem solving involving number and algebra is seen.	Core solving equation skills are explored in this half term, this includes operations such as squares, roots and fractions. The most complex of these skills will be applied in problem solving contexts. Circles and their related formula are introduced, understanding of area and perimeter of circles are applied to sectors.	Patterns in numbers and shapes are used to derive algebraic expressions, these are used to generate a multitude of different sequences. Concept of ratio is introduced, where it is the act of comparing parts. Ratio is linked to proportion in the form of fractions, decimals and percentages. This will lead to more problem solving.	The concept of volume is introduced, comparing the volume with capacity, focusing on prisms including cylinders. Further geometry knowledge is seen in the form of Pythagoras' Theorem, using the theorem to calculate sides of right-angle triangles. The ratio table is utilised in proportion problems, this includes contexts such as recipes and best buys.	Efficiency in tackling percentage related problems are introduced in the form of decimal multipliers. Angles knowledge is developed from year 7 by including angle facts involving two or more sets of parallel lines. Multi-step angles problems are a focus point. Construction and interpretation of pie charts are seen.	Year 7 probability knowledge is extended to include mutually exclusive events, expected outcomes and tree diagrams. Scatter graphs and its uses are studied, includes types of correlation and lines of best fit. Further techniques involving factors and multiples such as listing and Venn diagrams are used to work out the LCM
Year 9	<ul style="list-style-type: none"> Decimals Rounding and Bounds Compound Measures 	<ul style="list-style-type: none"> Algebraic Expressions Changing the Subject Right Angled Trigonometry 	<ul style="list-style-type: none"> Surface Area Percentages Linear & Non-Linear Graphs 	<ul style="list-style-type: none"> Standard Form Angles in Polygons Algebraic Proportion 	<ul style="list-style-type: none"> Transformations Venn Diagrams 	<ul style="list-style-type: none"> Similarity & Congruency Constructions Scale Drawings & Bearings
What will students know by the end of the topic...	Students will consolidate Keys Stage 3 learning with Decimals & Rounding before learning how to use algebraic manipulation to covert recurring decimals to fractions, understand the limits of accuracy and Compound Measures such as Density & Pressure.	The algebra units will further skills first developed in Key Stage 3 such as expanding brackets and factorising. Students will encounter Trigonometry for the first time.	Students will extend their knowledge in Surface Area, Percentages and Linear Graphs to include more complex prisms and cylinders, Compound Interest & Depreciation and Plotting curved graphs such as Quadratics, Cubic and Reciprocal.	Standard Form builds on Laws of Indices from Key Stage 3. Further angle facts are discovered by investigating polygons with more than 4 sides. Proportion is revisited and taken further with Inverse Proportion and forming equations of proportionality.	In Transformations we will look at the effect that translations, rotations, reflections and enlargements have on the original image. Set notation is introduced to describe union and intersection, Venn Diagrams are also used to organise information.	We will look at what makes shapes congruent and similar and use scale factors to find unknown measurements. Compasses are used to produce bisectors and scale drawings. We will look at mathematics used in bearings as a measurement used to describe

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Year 10 H	<ul style="list-style-type: none"> • Rounding & Bounds • Compound Measures • Percentages 	<ul style="list-style-type: none"> • Quadratics • Changing the Subject • Linear & Non-Linear Graphs • Angles in Polygons • Algebraic Proportion • Scale Drawings & Bearings 	<ul style="list-style-type: none"> • Venn Diagrams • Indices & Surds • Advanced Trigonometry 	<ul style="list-style-type: none"> • Simultaneous Equations • Arcs, Sectors & Segments • Ratio 	<ul style="list-style-type: none"> • Congruency & Similarity • Probability 	<ul style="list-style-type: none"> • Equations & Inequalities • Volume & Surface Area • Sequences • Algebraic Fractions
What will students know by the end of the topic...	Students will consolidate Keys Stage 3 learning with Decimals & Rounding, understand the limits of accuracy and Compound Measures such as Density & Pressure. Percentages are revisited with further emphasis on Growth & Decay.	Algebraic manipulation in quadratics and formula as well as using different methods to find the solutions of quadratic equations. Plotting linear and non linear graphs, understand the effect that the gradient and y-intercept has. Discover the relationship between perpendicular and parallel gradients. Further angle facts are discovered by investigating polygons with more than 4 sides.	Set notation is introduced to describe union and intersection, Venn Diagrams are also used to organise information. Laws of indices are revisited and fractional and negative powers are investigated. Surds are introduced as a new concept building on indices and algebraic manipulation. The trigonometric ratios are developed to introduce rules for triangles that are not right angled.	Simultaneous equations are introduced and the manipulation needed to solve. Students will understand that these solutions are the coordinates where the two functions intersect. Area and circumferences of circles are taken further to find arc lengths and sector areas. Use of the trigonometric formula for area of a triangle is also needed. Writing and solving equations from ratios is a new skill that is developed.	We will look at what makes shapes congruent and similar and use scale factors to find unknown measurements. The effect of enlargements on area and volume is also investigated. Probability is revisited and is built on by understanding the difference between theoretical and experimental probability. Find the probability of 2 independent and dependent events with and without conditions.	Students will use solving equation skills to solve linear and quadratic inequalities and understand that the solution represents a set of values. Area and volume knowledge is built on by using formulae to find volumes and surface area of shapes that are not rectilinear. Non linear sequences are investigated and the nth term for quadratic and geometric sequences are used.
Year 10 F	<ul style="list-style-type: none"> • Rounding & Bounds • Compound Measures • Algebraic Expressions 	<ul style="list-style-type: none"> • Linear & Non-Linear Graphs • Algebraic Proportion • Venn Diagrams • Scale Drawings & Bearings 	<ul style="list-style-type: none"> • Circles • Further Linear Graphs • Ratio 	<ul style="list-style-type: none"> • Volume & Surface Area • Probability • Further Non-Linear Graphs 	<ul style="list-style-type: none"> • Loci • Factors, Multiples & Primes • Plans & Elevations 	<ul style="list-style-type: none"> • Indices & Roots • Pythagoras & Trigonometry • Inequalities • Sequences
What will students know by the end of the topic...	Students will consolidate Keys Stage 3 learning with Decimals & Rounding before understanding the limits of accuracy and Compound Measures such as Density & Pressure. Manipulation of algebraic expressions such as factorising and expanding brackets.	Plotting linear and non linear graphs, understand the effect that the gradient and y-intercept has. Discover the relationship between parallel gradients. Create and use formula for two variables that are in proportion to each other. Set notation is introduced to describe union and intersection,	Find the area of circumference of circles and manipulate the formula to find arc lengths and areas of sectors. Revisit linear graphs, finding the equation from limited information. Use multiplicate reasoning to solve recipe and best buy problems and revisit ratio from KS3 and the relationship between ratio, fractions and percentages.	Area and volume knowledge is built on by using formulae to find volumes and surface area of shapes that are not rectilinear. Probability is revisited and is built on by understanding the difference between theoretical and experimental probability. Find the probability of 2 independent with the use of tree diagrams.	Use compasses and ruler to produce bisectors and scale drawings meeting given criteria. Revisit Factors, multiples and primes from KS3 to solve problems involving Lowest Common Multiple and Highest Common Factors. Produce 3D sketches from the plan and elevations and vice versa.	Revisit Indices and roots from KS3 and recapping Pythagoras and Trigonometry with focus on real life problems. Students will use solving equation skills to solve linear inequalities and understand that the solution represents a set of values.
Year 11H	<ul style="list-style-type: none"> • Direct and Inverse Proportion • Growth and Decay • Vectors • Gradients and Rates of Change 	<ul style="list-style-type: none"> • Pre Calculus • Equation of a circle • Proof • Numerical Methods 	Bespoke Lessons addressing misconceptions.	Bespoke Lessons addressing misconceptions.	Bespoke Lessons addressing misconceptions.	
What will students know by the end of the topic...	High level content is seen throughout this half term that would aid in the beginning of the Maths A-level course.	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.	Focussed revision activities in preparation for GCSEs.	Focussed revision activities in preparation for GCSEs.	Focussed revision activities in preparation for GCSEs.	
Year 11F	<ul style="list-style-type: none"> • Sequences • Proportion • Vectors 	Bespoke Lessons addressing misconceptions.	Bespoke Lessons addressing misconceptions.	Bespoke Lessons addressing misconceptions.	Bespoke Lessons addressing misconceptions.	
What will students know by the end of the topic...	Recap sequences, finding and using the nth term of a linear sequence. Use multiplicate reasoning to solve recipe and best buy problems. Complete calculations to find the resultant and scalars of vectors.	Focussed revision activities in preparation for GCSEs.	Focussed revision activities in preparation for GCSEs.	Focussed revision activities in preparation for GCSEs.	Focussed revision activities in preparation for GCSEs.	

Year Group	Half Term One	Half Term Two	Half Term Three	Half Term Four	Half Term Five	Half Term Six
Year 12 A level	<u>Pure Maths:</u> <ul style="list-style-type: none">Quadratic functionsIndices and surdsPolynomialsGraphs and transformationsVectorsCoordinate geometry	<u>Pure Maths:</u> <ul style="list-style-type: none">DifferentiationIntegrationAlgebraic proofBinomial expansionTrigonometry	<u>Pure Maths:</u> <ul style="list-style-type: none">Exponentials and logarithms <u>Statistics:</u> <ul style="list-style-type: none">Working with dataBivariate dataLarge data sets <u>Mechanics:</u> <ul style="list-style-type: none">Kinematics	Summative assessment and feedback <u>Statistics:</u> <ul style="list-style-type: none">Probability <u>Mechanics:</u> <ul style="list-style-type: none">ForcesObjects in contact	<u>Pure Maths:</u> <ul style="list-style-type: none">Rational functionsPartial fractionsFunctionsRadian measures <u>Statistics:</u> <ul style="list-style-type: none">Hypothesis testingSampling techniques	Summative assessment and feedback <u>Pure Maths:</u> <ul style="list-style-type: none">TrigonometryBinomial expansionFurther differentiation <u>Mechanics:</u> <ul style="list-style-type: none">2D forcesMoments
	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, including interpretation within a large data set. In mechanics, students will study kinematics (study of motion) which will lead to forces (causes of motion).	Students will continue with their applied work, connecting concepts from kinematics and applying it to forces. In statistics, probability and their distributions are explored, which will lead to hypothesis testing.	A2 pure content begins with honing algebra techniques, dealing with rational functions and partial fractions. Meanwhile in statistics, sampling techniques and hypothesis testing is introduced to model problems and probability.	Familiar topics are revisited and further developed during this half term, paving the way for future content that requires the interleaving of these skills.
Year 12 Further A level	<u>Core Pure Maths:</u> <ul style="list-style-type: none">Matrix calculations and transformationsComplex number calculations and geometry	<u>Core Pure Maths:</u> <ul style="list-style-type: none">Sequences and seriesProof by inductionVector geometry in 2D and 3D	<u>Modelling with Algorithms</u> <ul style="list-style-type: none">AlgorithmsGraph theoryAlgorithms on networksCritical path analysisNetwork flows	<u>Modelling with Algorithms</u> <ul style="list-style-type: none">Linear programmingSimplex method	<u>Modelling with Algorithms</u> <ul style="list-style-type: none">Reformulation	Summative assessment <u>Statistics Minor:</u> <ul style="list-style-type: none">Discrete random variablesDiscrete 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.	One of the applied modules begin this half term. Various algorithms are explored in this half term and their techniques are applied to real life scenarios. Critical path analysis and network flows are used in business and other operational settings that will enhance logical reasoning.	The invention of computers had opened up this area of maths to flourish, linear programming problems are solved to determine optimal integer solutions, which can be further optimised using the powerful simplex algorithm.	To conclude the module, all previous algorithms and methods are reformulated to linear programming problems, this is so they can be solved and optimised using technology.	Extend statistics knowledge to different types of statistical distributions, namely Poisson distribution. Will also explore the usefulness of bivariate data and chi-squared tests and their links to hypothesis tests.
Year 13 A level	<u>Pure Maths:</u> <ul style="list-style-type: none">Further integrationParametric equationsDifferential equationsSequences and series <u>Statistics:</u> <ul style="list-style-type: none">Conditional probability	October/November mock examinations <u>Pure Maths:</u> <ul style="list-style-type: none">Numerical methodsAlgebraic proof <u>Statistics:</u> <ul style="list-style-type: none">Normal distributionHypothesis testing <u>Mechanics:</u> <ul style="list-style-type: none">Projectiles2D kinematics	Bespoke delivery informed by summative assessment in preparation for external examinations.	February/March mock examinations Bespoke delivery informed by summative assessment in preparation for external examinations.	Bespoke delivery informed by summative assessment in preparation for external examinations.	
	High level pure content in the form of integration and differential equations are tackled. Deeper understanding of sequences and series are explored, improving mathematical reasoning skills. Logical reasoning is tested in conditional probability.	The A-level Maths course is rounded off with numerical methods, important when exact solutions cannot be found. The most widely used statistical distribution is introduced and utilised in statistics. The use of vectors and calculus is extended to 2-dimensions in projectiles and kinematics.				

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Year 13 Further A level	<u>Core Pure Maths:</u> <ul style="list-style-type: none">Matrices, series and proof by induction reviewFurther vectorsMaclaurin seriesPolar coordinatesHyperbolic functions	Summative Assessment <u>Core Pure Maths:</u> <ul style="list-style-type: none">Further complex numbersFurther calculusFirst order differential equationsSecond order differential equations	<u>Mechanics Minor:</u> <ul style="list-style-type: none">Work, energy and powerImpulse and momentumCentre of massDimensional analysis	February/March mock examinations Bespoke delivery informed by summative assessment in preparation for external examinations.	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).	Concepts of mechanics from A-level Maths are developed further when studying impulse and momentum and centres of mass of laminas. Alternative principles are explored in the work, energy and power chapter, where kinetic and potential energy is introduced. The module is rounded off by deriving and analysing mathematical formula and its consistency.			

Key Stage Four Specification Link	Key Stage Five Specification Link
https://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8300/specification-at-a-glance	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-mel-h635-h645-from-2017/specification-at-a-glance/

What will students see in their books or folders? <ul style="list-style-type: none">Worked examples to scaffold learningIndependent work that has been marked in green pen and corrections madeRegular prior knowledge quizzing that informs homeworkMarking 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’ absolutesUse of the UNPACK strategy to support with reading and interpreting text heavy questionsStaff model precise use of terminology and give reasons for methods used to solve problemsStudents 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 calculationsConsolidating number fluency regularly through prior knowledge quizzingRegularly 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 classUse your Maths book / videos to revisit the methods you are revisingDo at least 7 questionsMark the questions correcting any errorsCome 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 allCelebrating Pi dayInvolvement in Maths Week EnglandThe Half-termly Maths competitions open to all students	The following trips run through this subject... UKMT Maths Challenge Team Maths Challenge Year 10 Maths Feast
					Stock Graphic representing department.