KEY STAGE 5 MATHS LONG-TERM PLAN

	Number	Algebra	Ratio and Proportion	Geometry and Measure	Statistics and Handling Data
EYFS	Count confidently and understand the numbers to 10.	Understand the relationships between numbers and make connections and patterns with numbers.		Develop reasoning skills with space, shape and measure. Build understanding of the 3-D world.	
KS1	Count, read and write numerals to 100. Count in multiples of 2, 3, 5 and 10. Identify and represent numbers using objects. Read, write and calculate, including problem solving, addition, subtraction, multiplication and division statements. Recognise halves, thirds and quarters and calculate simple fractions of an amount. Recognise equivalent fractions and decimals.	Order and arrange combinations of mathematical objects in patterns and sequences.		Compare, describe and solve practical problems involving measure. Measure and record units of measure and their symbols including length, mass, money and time. Begin to tell the time. Recognise the names and properties of common 2-D and 3-D shapes. Solve simple problems involving shape and measure.	

	Recognise place value for 2 and 3-digit numbers. Use <, > and = signs.				
KS2	Count in multiples of 4, 6, 7, 8, 9, 25, 50, 100, 1000. Multiplication facts up to 12x12. Recognise place value in 3-digit numbers. Read, write, compare and order numbers up to 1000000. Solve number problems. Add, subtract, multiply and divide mentally and using written methods. Use inverse operations to check answers. Manipulate and calculate with fractions including, addition and subtraction, fractions of amounts and dividing a fraction by a whole number. Recognise and convert between mixed	Use simple formulae. Generate and describe linear number sequences. Express missing number problems algebraically. Find pairs of numbers that satisfy an equation with two unknowns. Enumerate possibilities of combinations of two variables.	Solve problems involving the relative sizes of 2 quantities using known multiplication facts. Solve problems involving percentages, including comparison. Solve problems involving scale factor.	Measure, compare, add and subtract measures. Understand and find perimeter and area of squares, rectangles, parallelograms and triangles and their units. Tell the time and understand Roman numerals and convert between 12-hour and 24-hour times. Draw and make 2-D and 3-D shapes and their nets. Understand, measure and identify right angles, acute, obtuse and reflex angles. Know and use angle rules Recognise horizontal, vertical, parallel and perpendicular lines. Convert between different units of measure. Use estimations of different measures. Classify geometric shapes based on their properties. Illustrate and name parts of circles. Identify lines of symmetry.	Interpret and present data using bar charts, time graphs, pie charts, pictograms and tables. Use a scale in charts. Interpret and solve problems with timetables. Calculate and interpret the mean as an average.

	numbers and improper fractions. Understanding and interpretation of negative numbers. Rounding to the nearest decimal place, 1, 10, 100, 1000, 10000, 100000. Identify and find multiples, factors and primes including common multiples and factors. Recognise percentages. Convert between fractions, decimals and percentages.			Describe and plot co-ordinates. Understand approximate equivalences between metric and imperial units. Carry out and describe translations and reflections.	
KS3	Understand, represent and apply number. Use the 4 operations. Understand fractions, decimals and percentages. Apply understanding of number to solve complex problem solving questions in an unfamiliar context.	Understand and manipulate expressions, equations etc. Solve equations and inequalities. Draw different types of graphs. Recognise and use different types of sequences. Understand the meaning of the equation of a graph.	Understand and use ratio and proportion. Apply knowledge of ratio and proportion to solve more complex problems.	Calculate perimeter and area of common 2D shapes and volume and surface area of common 3D shapes. Construct and transform 2D shapes. Know and understand the properties of 2D and 3D shapes. Know and use angle facts including with parallel lines. Understand and use Pythagoras' theorem to find	Understand and use experimental and theoretical probability for single events. Draw, interpret and compare frequency tables and diagrams. Calculate averages and range for a set of data. Draw, use and interpret scatter diagrams. Solve probability problems algebraically.

		Find and use the nth term of a sequence. Use algebraic knowledge to solve problems.		the hypotenuse and know the trig ratios. Know and use the criteria for congruent triangles. Solve problems involving geometric reasoning.	Know what can and cannot be inferred in statistical settings. Calculate averages and range for a set of algebraic terms. Know and understand extrapolation.
KS4	Understand, represent and calculate with numbers, including decimals, fractions and surds. Calculate and solve problems involving percentages. Understand and use primes, factors and multiples including LCM and HCF. Know and use the laws of indices including standard form. Use rounding and error intervals, including truncation and solve problems involving upper and lower bounds.	Know and use algebraic conventions and apply to solving equations and inequalities. Manipulate and solve quadratic expressions and equations. Re-arrange the subject of a formulae, including complex operations. Plot and understand the equations of straight line graphs, including parallel and perpendicular lines. Plot and understand a range of graphs including; quadratic, cubic, reciprocal, exponential, trigonometric and circles. Manipulate and solve simultaneous equations. Find and use the nth term of a sequence including	Understand and use ration including with fractions and percentages to solve problems. Use compound units. Compare lengths, areas and volume of similar shapes. Understand and use direct and inverse proportions. Calculate using rates of change. Solve problems including repeated growth and decay (compound interest). Find and interpret the gradient of a point on a curve. Work with the iterative process.	Understand and use the angle rules, including the circle theorems. Identify and apply the properties of circles. Know and apply formulae to calculate area and volume. Know, use and apply Pythagoras' Theorem and the trigonometric ratios including the exact values. Use and apply the sine and cosine rules of trigonometry. Apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors	Relate relative frequencies to probability theory and expected outcomes. Enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams. Calculate the probability of independent and dependent combined events. Infer properties of populations or distributions from a sample, while knowing the limitations. Interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and

		arithmetic, quadratic and geometric.			pictograms, vertical line charts, tables, line graphs, cumulative frequency diagrams, box plots and histograms. Interpret, analyse and compare the distributions of data sets. Use and interpret scatter graphs of bivariate data.

Year 12 Maths

Module Title: Algebra, Co-ordinate Geometry, Calculus, Proof and Statistics	Module Title: Calculus, Mechanics, Hypothesis Testing, Logarithms and Exponentials	Module Title: Functions, Radians, Exponentials and Further Statistics
Learning Intent for this module: Students will recap the methods and laws associated with surds and indices as well as algebraic manipulation. This knowledge will be extended to include all polynomials. Students will use a range of co-ordinate geometry formulae and will be expected to solve geometrical problems. Students will be introduced to the binomial expansion.	Learning Intent for this module: Students will extend their techniques in calculus to include integration. They will look at the method and purpose. Students will revise and extend their knowledge of vectors. They will learn how to find the magnitude and direction as well as solve geometrical problems. Students will begin the Mechanics section of the course. They will study kinematics, including the	Learning Intent for this Module: Students will complete the Mechanics section of the AS Maths course. They will understand how forces are applied when two objects are involved. Students will also complete the Pure Mathematics section of the AS Maths course and will study exponential models. This will extend their knowledge of the use of logarithms.

Students will learn how to differentiate and apply their knowledge for a range of purposes. Students will study the topic of proof. This will underpin the work they will complete in all other aspects of the course. Students will work with data, this will be numerically and in diagrams. Students will calculate probabilities, including with the binomial distribution.	application of calculus. They will then learn when and how to use the SUVAT formulae. They will also study Newton's laws of force and motion. Students will complete the Statistics component of the course with sampling and hypothesis testing with the Binomial Distribution. Students will revisit trigonometry and will extend their knowledge of the trigonometric functions to include the graphs and some common trig identities. Students will be introduced to logarithms and will begin to understand and use them.	Students will spend some time revising AS topics in preparation for the end of year examinations. Students will begin to study content from the A-Level course. They will study functions including definition of functions, types of functions and domain and range. Students will study the radian angle unit and applications of this. Students will also extend their knowledge of vectors to include 3-D vectors in a mechanics context. Students will complete the A-Level statistics section of the course. They will learn and use the conditional probability formulae. They will also be introduced to the Normal Distribution and associated calculator functions and will discover further types of hypothesis testing for sample means and product moment correlation co-efficients.
Key Content to be learned: *Teacher 1* • Quadratic Functions • Polynomials • Using Graphs • Co-ordinate Geometry • Differentiation • Applications of Differentiation *Teacher 2* • Proof • Indices and Surds	Key content to be learned: *Teacher 1* • Vectors • Integration • Kinematics • Motion with Constant Acceleration • Force and Motion *Teacher 2* • Statistical Hypothesis Testing • Trigonometric Functions and Equations • Triangle Geometry • Logarithms	Key Content to be learned: *Teacher 1* • Objects in Contact • Functions • Radians • Applications of Vectors *Teacher 2* • Exponential Models • Conditional Probability • The Normal Distribution • Further Hypothesis Testing

• Probability • Working with Data • Binomial Expansion		
Key tasks for this module: • Key Task 1 – Quadratics and Polynomials • Key Task 2 – Probability • Key Task 3 – Co-ordinate Geometry • Key Task 4 – Summative Assessment • Key Task 5 – Differentiation	Key tasks for this module: • Key Task 1 – Statistical Hypothesis Testing • Key Task 2 – Integration • Key Task 3 – Trigonometry • Key Task 4 – Summative Assessment - Paper 1 • Key Task 5 – Summative Assessment – Paper 2	Key tasks for this module: • Key Task 1 – Force and Motion and Objects in Contact • Key Task 2 – Logarithms and Exponentials • Key Task 3 – The Normal Distribution • Key Task 4 – End of Year Exam – Paper 1 • Key Task 5 – End of Year Exam – Paper 2

Year 13 Maths

Module Title: Trigonometry, Differentiation, Functions, Sequences and Series, Rational Functions and Proof	Module Title: Integration, Differential Equations, Mechanics, Rational Functions and Numerical Methods	Module Title: Mechanics, Statistics and Revision
Learning Intent for this module: Students will further their knowledge of trigonometry by studying further identities as well as their uses and applications. Students will then discover further differentiation techniques and their applications.	Learning Intent for this module: Students will extend their knowledge of the integration techniques to include more complex functions. They will apply this knowledge to forming and solving differential equations.	Learning Intent for this Module: Students will complete the A-Level course content for Mechanics after they have studied forces in context and moments.

Students will revisit functions and extend this to further transformations of graphs. Students will study arithmetic and geometric sequences as well as the associated formulae and how to use it to solve problems. Students will extend their proof knowledge to include proof by contradiction. Students will learn how to express a fraction using partial fractions as well as their uses.	Students will begin the Mechanics element of Year 2 when they study projectiles. Students will complete their work on Rational Functions and will use and apply the General Binomial Expansion. Students will discover parametric equations and applications of calculus methods relating to this. Students will complete the Pure Mathematics content of Year 2 when they study Numerical Methods. This include iterative methods, Newton-Raphson as well as the Trapezium Rule.	Students will revisit the Year 2 Statistics topics with particular focus on The Normal Distribution and Further Hypothesis Testing. Students will now consolidate their learning cross the course. Particular revision will focus on areas for improvement identified in mock 2.
Key Content to be learned: *Teacher 1* • Radians • Further Trigonometry • Calculus of Exponential and Trigonometric Functions • Further Differentiation • Further Applications of Calculus - Properties of Curves • Further Applications of Calculus - Related Rates of Change *Teacher 2* • Functions • Further Transformations of Graphs • Sequences and Series • Proof • Rational Functions and Partial Fractions	Key content to be learned: *Teacher 1* • Further Integration Techniques • Further Applications of Calculus - More Complicated Areas • Differential Equations • Applications of Vectors • Projectiles *Teacher 2* • General Binomial Expansion • Parametric Equations • Numerical Solutions of Equations • Numerical Integration	Key Content to be learned: *Teacher 1* • Forces in Context • Moments • Revision *Teacher 2* • Conditional Probability • The Normal Distribution • Further Hypothesis Testing • Revision
Key tasks for this module: • Key Task 1 – Further Trigonometry • Key Task 2 – Sequences and Series	Key tasks for this module: • Key Task 1 – Rational Functions and General Binomial Expansion	Key tasks for this module: • Key Task 1 – Mechanics Assessment

• Key Task 3 – Further Differentiation • Key Task 4 – Mock 1 Paper 1 • Key Task 5 – Mock 1 Paper 2	• Key Task 2 – Further Integration • Key Task 3 – Numerical Methods • Key Task 4 – Mock 2 Paper 1 • Key Task 5 – Mock 2 Paper 2	