Curriculum Overview 2023 2024

Mathematics Department

Department	Mathematics
Head of Department	REC
Department Members	CKE, FKA, FAA, ABE, THN, CAH, STA, LTA
Accommodation and Resources	Bottom floor of N block. We have many resources available to enhance our teaching including manipulatives, visualisers, fraction walls, 3D shapes which unfold to become nets, clinometers for practical trigonometry lessons, specialist paper resources (isometric paper, graph paper) and a selection of text books to cover the breadth of the curriculum.

Curriculum Intent	Our aim is to provide learners with a deep conceptual understanding of mathematics. This will then enable them to articulate their learning confidently. A sequence of small steps is used to ensure that content is mastered before moving on. Students will then be able to apply their understanding to problem solving and develop the independence needed for further study. We emphatically reject the idea that people just can't do maths. The habits of thinking mathematically are life-enriching. Because it is vital to be numerate to participate fully in society and democratic processes: our economy depends on a numerate workforce and a significant number of specialists in maths and science-related subjects. So, when we are thinking about the 'Intent' of our programme, it is all about finding ways to ensure that every young person, regardless of background, has a rich and meaningful mathematics education.

Curriculum Implementation

Key Stage 3:

What my child will learn in Year 7

Year 7	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	**Number System 1**	**Number System 2 Algebra**	**2D Geometry**	**The Cartesian Plane**	**Fractions**	**Ratio and Proportion**
Previous knowledge recalled	**Number System** -Times table -Long multiplication and division method	**Number** Understanding negative numbers on a number line **Algebra** -Explain what are like terms Understanding inequality signs	**2D Geometry** -Recognise 2D shapes -Understand angles are formed when two lines meet at a point -Recognise acute, obtuse	**The Cartesian Plane** -Plotting and reading co-ordinates -Understand what is meant by midpoint -recognising 2D shapes	**Fractions** -Understand what the numerator and denominator represent in terms of part and whole -know what is meant by	**Ratio and Proportion** -Reading recipes -Addition Multiplication -Division

			and reflex angles		improper fraction and mixed number -know place value in decimal and percentage is out of 100	
New Knowledge	**Number System** -Representation of arrays in multiplication **Axioms** -Understand the difference between factors and multiples	**Number** -Using all four operations involving negative numbers **Algebra** -Collecting like terms by simplifying expression -Solving equations using one and two step/s -Representing and reading inequalities -Solving inequalities-Use of a compass	**2D Geometry** -Calculate angles in triangles -Quadrilaterals and polygons -Understand the difference between a quadrilateral and a polygon -Construct triangles with given sides -Use of a compass	**The Cartesian Plane** -Calculating the midpoint of a line on the cartesian plane -Plotting vertical and horizontal lines -Calculating area and perimeter of 2D shapes -Transforming shapes on the cartesian plane	**Fractions** -Calculate fractions using all four operations -Convert between fractions Decimals and percentages Calculate fractions of amounts	**Ratio and Proportion** -Simplify ratios -Share a quantity in a given ratio -Using multiplication/ division to calculate accurate proportion of ingredients in a recipe
Key Knowledge Assessment	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments
Links to literacy and numeracy	**Number System** Commutative -Product -Quotient -Divisor -Divisible -Prime -Multiples -Factors -Highest common factor -Lowest common multiple	balancing method of solving equations **Reading**: Read worded problems to be able to form equations	Use of protractor to measure accurately **Speaking**: Explain in detail how angles have been calculated and triangles have been constructed	Division, rotational symmetry, reflectional symmetry **Extended writing**: Write in detail the x and y lines and the transformations of shapes	Equivalent fraction, use of all four operations **Speaking**: Explain the processes used to calculate fractions and converting between fractions, decimals and percentages	Multiplication and division, scale factors **Extended writing**: Write comparisons and write down findings after calculating ratio and proportion

	Reading: Solve problems relating to real life examples **Numeracy** Times tables					
Extra-Curricular opportunities	Maths clinics every lunch time in N1 to support students with curricular or extra-curricular maths. Exploring the possibility of beginning a Financial maths club. Exploring the interest in beginning a maths games club for KS3 students					
Links to careers/ aspirations	Computer security, Jeweller, air traffic controller, dietician, encryption, cryptography, CAD engineer, construction worker, plumber, graphic designer, banking, finance, baker, chef.					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding things tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

What my child will learn in Year 8

Year 8	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	**Equations and Inequalities**	**Graphical Representations**	**Proportional Reasoning**	**Data**	**Angles**	**Area, volume and surface area**
Previous knowledge recalled	**Equations and inequalities** -Understand algebraic vocabulary - Be able to carry out all four operations	**Graphical representations** -Understand how to plot co-ordinates -Know what is the x axis and y axis -Know equations of lines passing through x and y axis	**Ratio and proportional reasoning** -Understand that numbers in a ratio represents parts and together they make the whole -Times table -Use of all four operations	**Averages** -Ability to use all four operations Understanding of rounding **Displaying data** -Able to read and use a protractor	**Angles** -Properties of shapes - Understand parallel lines and perpendicular lines - Name 2D shapes	**Area, volume and surface area** -Ability to recognise 3D objects -Understand what is meant by edges, faces and vertices -Calculate area of 2D shapes -Calculate area of compound shapes
New Knowledge	**Equations and inequalities**	**Graphical representations**	**Ratio and proportional reasoning**	**Averages** -Calculate the averages of a set of data	**Angles** -Calculate interior and exterior	**Area, volume and surface area**

	-Solve equations and inequalities with variables on one side and both sides Form and solve equations in 2D shapes	-Finding the gradient of a line -Identifying the intercept -Completing a table of values and plotting linear graphs -Naming a line in the form y=mx+c -Properties of parallel and perpendicular lines	-Simplifying ratios -Writing ratios in the form 1:n -Sharing a quantity with a given ratio -Calculating ratios in reverse Understanding proportional relationships -Use of recipes, best buys, exchange rates	**Displaying data** -Be able to represent data in the form of bar charts, two-way tables, pictograms, pie charts, stem and leaf diagrams -Interpret data representation	angles in quadrilaterals and polygons -Use the formula (n-2)x180 to calculate total angles in any polygon -Recognise angles in parallel lines	Understanding nets of 3D shapes -Calculate area and volume of 3D shapes -Calculate surface area of triangular prisms and cuboids
Key Knowledge Assessment	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments
Links to literacy and numeracy	Use inequality symbols, use of BIDMAS, use of indices, expand brackets **Verbal**: able to explain the processes used to solve equations and inequalities	Using the four operations, drawing graphs, use of a ruler, drawing lines **Reading**: able to read questions and answer them mathematically	Use of scale factors, times table, use of and understanding division **Reading and writing**: understanding the worded problems and writing a conclusion after a series of calculations	Calculate averages and range, use of all four operations, use of a protractor and a ruler **Reading and writing:** ability to read and appropriately represent data, write findings after calculating averages, ability to write comparison of data	Recall properties of triangles, name angles **Writing**: able to write mathematical reasons for calculating specific angles	Multiplication, identifying 2D faces of 3D objects **Reading**: understand the text to be able to use the correct formula for calculating are and volume of 3D shapes
Extra-Curricular opportunities	Maths clinics every lunch time in N1 to support students with curricular or extra-curricular maths. Exploring the possibility of beginning a Financial maths club. Exploring the interest in beginning a maths games club for KS3 students					
Links to careers/ aspirations	Computer programmer, architect, builder, real estate, insurance underwriters, production engineers, stock analyst, investment broker, painter, carpet layer, tiler					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding things tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey					

	Leadership- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.

What my child will learn in Year 9

Year 9	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	**Probability**	**Linear equations and simultaneous equations**	**Geometry of triangles**	**Ratio and Proportion**	**Quadratics**	**Reasoning with numbers**
Previous knowledge recalled	**Fractions and decimals** -Multiply fractions -Add and subtract decimals -Addition and subtraction of integers	**Equations** -Use all four operations -Simplify expressions **Graphs** -Understand substitution -Calculate using negative numbers -Plot and draw straight line graphs	**Angles** -Know the sum of angles on a straight line -Know that vertically opposite angles are equal -Know the sum of angles in quadrilaterals -Calculate angles in regular polygons **Pythagoras** -Understand what it means to square a number and square root a number	**Ratio and proportion** -Understanding of highest common factor -Know the difference between fractions and ratio	**Algebra** -Use substitution to calculate values -Rearrange formulae **Quadratics** -Expand single and double brackets -Factorise single brackets	**Indices** -Understand square numbers and square roots **Standard Form** -Calculate with base 10 **Growth and decay** Calculate percentages of amounts
New Knowledge	**Probability** -Understanding of theoretical and experimental probability -Drawing and interpreting sample space diagrams, two-way tables,	**Equations** -Solve equations with variables on both sides -Solve simultaneous equations algebraically **Graphs** -Solve simultaneous equations graphically	**Angles** -Calculate angles in irregular polygons -Recognise and understand congruent triangles using angles and sides -Understand similar	**Ratio and proportion** -Simplify ratios -Share a quantity with a given ratio -Reverse ratios -Calculate proportion in recipes, best buys,	**Quadratics** -Substitute x values into a quadratic formula -Complete a table of values for a quadratic function -Plot and draw quadratic graphs	**Indices** -Understand the rules of indices -Calculate using fractional and negative indices -Simplify surds -Use of surd notations

	frequency trees, tree diagrams and Venn diagrams Calculate probabilities	-Solve inequalities algebraically	triangles using scale factor **Pythagoras** -Label a right-angle triangle in terms of a, b, c -Calculate the length of a side and an angle size using Pythagoras' Theorem	exchange rates		**Standard form** -Convert between ordinary numbers and standard form -Multiply and divide standard form **Growth and decay** -Use multipliers to calculate percentage change
Key Knowledge Assessment	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments	Mid-term knowledge checks and end of term assessments
Links to literacy and numeracy	Add and multiply fractions Understanding fractions, decimals and percentages **Extended writing**: writing conclusions Writing comparisons	Function machines Substitution **Reading:** Interpreting linear graphs Reading problem solving questions to apply algebraic skills	Rearrange formula Recall angles Square numbers Square root numbers **Oral:** Communicate detailed explanations of why an angle is the size it is using correct terminology	Four operations Basic understanding of fractions being parts of a whole Find a scale factor **Reading and writing:** Problem solve with ratio and proportion Write conclusions based on mathematical calculations	Use all four operations Use a ruler **Reading:** Solve problems using mathematical calculations	Square roots Square numbers Multiply by 10 Divide by 100 **Reading and writing:** Solve problems in real life contexts Write conclusion after mathematical calculations
Extra-Curricular opportunities	Maths clinics every lunch time in N1 to support students with curricular or extra-curricular maths. Exploring the possibility of beginning a Financial maths club. Exploring the interest in beginning a maths games club for KS3 students					
Links to careers/ aspirations	Government employment, financial engineering, accountants, auditors, aviation, electricians, interior decorator, hair stylist, audio engineers, agriculture, astronomy, property developer					

Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding things tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.

Extended Learning Opportunities for Key Stage 3	Students are encouraged to continue with Sparx Maths XP Boost to enhance their learning.	

Key Stage 4:

What my child will learn in Year 10

Year 10	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	-Angles -Circle Theorems -Probability	-Developing Algebraic Thinking	-Direct and Inverse Proportion -Pythagoras & Trigonometry	Transformations -Vectors -Fractions, Decimals & Percentage Review	-Functions -Further Graphs	-2D & 3D Shapes -Averages and Statistical skills & diagrams
Previous knowledge recalled	**Angles** -Angle sums -Addition -Subtraction -Angle categories -Properties of shapes **Probability** -Addition of Fractions -Multiplication of Fractions -Frequency Trees -Sample Space Diagrams -Probability Trees	**Algebraic Thinking** -Simplifying expressions -Solving simple equations -Substitution -Rearranging formulae -Expanding brackets -Linear factorisation -Inequalities	**Proportion** -Simplifying ratio -Reading graphs -Drawing cartesian graphs (4 quadrants) -Calculating percentages -Expressing one quantity as a percentage of another. **Pythagoras** -Pythagoras' Theorem **Trigonometry** -Trigonometric ratios	**Transformations** -Drawing and reading a Cartesian Graph -Single transformations -Mirror lines -Coordinates **Fractions** -Addition & subtraction of Fractions -Multiplication & division of Fractions -Simplifying fractions -Mixed number to Improper Fractions -Four operations with decimals -Calculate percentages	**Further Graphs** -Drawing and interpreting Cartesian Graphs -Reading coordinates -Parts of a circle -Key parts of a line	**2D & 3D Shapes** -Properties of 2D shapes -Properties of 3D shapes -Nets of shapes -Area of shapes -Perimeter of shapes -Volume of shapes -Surface area of simple shapes -Addition **Averages** -Ordering integers, fractions, decimals & percentages -Averages
New Knowledge	**Angles** -Circle Theorems -Proofs -Tangents to Circles **Probability** -Probability from	**Algebraic Thinking** -Unknowns on both sides -Quadratics -Complex formulae -Identities	**Proportion** -Direct proportion -Indirect proportion -Graphs of proportionality	**Transformations** -Combined Transformations -Fractional and Negative enlargements	**Functions** -Identify intercepts -Calculate gradients -Function notation -Quadratic functions	**2D & 3D Shapes** -Link between face, edges and vertices -Surface area of complex shapes

	Mathematical Diagrams -Expected Outcomes -Hypothesis setting and testing	-Simultaneous Equations -Approximate solutions -Soling/simplifying inequalities	-Gradient as rate of change -Percentage change **Pythagoras** -Applied Pythagoras' Theorem including in 3D **Trigonometry** -Finding missing angles using Trigonometric ratios -Trigonometry in 3D -Trigonometric graphs	-Column Vector notation -Manipulation of Vectors -Resultant Vectors -Parallel and co-linear Vectors -Vector Proofs **Fractions** -Percentage Change	-Inverse functions -Composite functions **Further Graphs** -Cubic Graphs -Reciprocal Graphs -Equation of a circle -Equation of a tangent to a circle	-Volume of complex shapes -Area and Perimeter of compound shapes -Volume and surface area of compound shapes **Averages** -Use and interpretation of statistical diagrams -Measures of spread -Averages from grouped data -Estimated mean
Key Knowledge Assessment	Mid-term and End of term assessments	Mid-term and End of term assessments	Mid-term and End of term assessments	Mid-term and End of term assessments	Mid-term and End of term assessments	Mid-term and End of term assessments
Links to literacy and numeracy	**Literacy:** Reading- Ability to extract and process what the question is asking the learner to undertake. Real life situations. **Numeracy:** Numerical dexterity.	**Literacy:** Reading- Read worded problems to be able to form equations. **Numeracy:** Balancing method of solving equations	**Literacy:** Processing- Deciphering three dimensional problems to solve. Geometrical reasoning. **Numeracy:** Properties of shapes Justifying answers	**Literacy:** Interpretation Deciphering geometric problems to perform necessary steps. **Numeracy:** Simple arithmetic applied to advanced techniques	**Literacy:** Processing- Interpreting mathematical situations and displaying them graphically. **Numeracy:** Substitution into formulae to find unknowns	**Literacy:** Discussion- Using statistical measures to draw and present conclusions in a logical manner. **Numeracy:** Arithmetic Logic
Extra-Curricular opportunities	Higher level problem solving lunch, exploring links with computing to begin coding club.					
Links to careers/ aspirations	Finance, Stock Market, Aerospace Engineer, Airline Pilot, Architect, Marketing, Product Design, Video Game Designer, Computer Coder, App Designer, Professional chiefs, Mathematicians, Bakers, Real estate workers					

Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.

What my child will learn in Year 11

Year 11	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	-Indices -Standard Form -Surds -Transformations	-Constructions and geometry -Proof	-Linear Functions -Statistical Charts and techniques	-GCSE Preparation		
Previous knowledge recalled	**Indices** -Powers of 10, 100, 1000 -Squares and cubes -Multiplying and dividing decimals -Square roots -Cube roots **Standard Form** -Powers of 10, 100, 1000 -Decimal places -Multiplying -Dividing **Surds** -Square roots -Factors -Prime numbers -Factor pairs -Manipulation of fractions **Transformations** -Mirror lines -Angles -Coordinates -Scale factors -Labelling axis	**Constructions & Geometry** -Identification of shapes -Properties of shapes -Angles in shapes -Area -Perimeter -Use of compass -Measuring angles with protractor -Using a ruler -Classification of triangles **Proof** -Algebraic manipulation -Problem solving skills	**Linear Functions** -Function machines -Drawing Cartesian graphs -Plotting coordinates -Equation of a line (elements) **Statistical Charts and Techniques** -Drawing axis -Reading from graphs and charts -Addition and subtraction -Definitions of averages -Plotting coordinates	**Tailored revision of topics based on Assessment gap analysis.**		

New Knowledge	**Indices** -Roots as indices -Negative indices -Fractional indices -Laws of indices **Standard Form** -Converting into standard form -Converting into ordinary numbers -Calculating in standard form **Surds** -Simplifying surds -Calculating with surds -rationalising denominators **Transformations** -Performing multiple transformations -Describing transformations -Enlargements -Fully describing multiple transformations	**Constructions & Geometry** -Bisecting an angle -Bisecting a line -Dissecting a line at a given point -Constructing a triangle given certain conditions -Constructing a locus of points -Calculating area of less common shapes -Calculating perimeter of less common shapes -Working with compound shapes -Solving real-life geometry problems **Proof** -Use of algebra to prove -Difference between demonstration and proof	**Linear Functions** -Plotting lines from their functions -Identifying linear, quadratic, cubic graphs -Identifying trigonometric graphs -Identifying points of interest from graphs and/or functions **Statistical Charts and Techniques** -Analysing bar charts -Analysing pictograms -Analysing pie charts -Working with grouped data -Constructing frequency polygons -Constructing & reading boxplots -Comparing data sets displayed in various formats -Constructing and reading cumulative frequency graphs -Capture recapture -Constructing and reading histograms -Constructing and reading			

			time series graphs -Constructing and using scatter graphs.			
Key Knowledge Assessment	Mid-term and End of term assessments	November PPE	End of term Assessment	March PPE	Final Exams	
Links to literacy and numeracy	**Literacy:** Reading and processing the question to ensure delivery of the correct method and solution. **Numeracy:** Continual reinforcement of the four operations.	**Literacy:** Prepare to identify the language give in order to perform the correct construction. Familiarisation of names and properties of shapes. **Numeracy:** Differentiating between the various geometric operations eg Perimeter and area.	**Literacy:** Understand real world statistical data and apply common sense to check answers. Comparisons and conclusions. **Numeracy:** Understanding the effect of changing elements of functions. Using raw data and percentages including percentage change.			
Extra-Curricular opportunities	Maths enrichment workshops, Lunch time higher level problem solving group, exploring a link with computing department for coding club.					
Links to careers/ aspirations	Finance, Stock Market, Aerospace Engineer, Airline Pilot, Architect, Marketing, Product Design, Video Game Designer, Computer Coder, App Designer, Teaching, Mathematicians, Bakers, Property sales and development.					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

Extended Learning Opportunities for Key Stage 4	UKMT participation in Year 10. Work experience in a relevant field in Year 10. After school workshops throughout Year 11. Maths clinics available every lunch time throughout the Key Stage.	

Key Stage 5:

What my child will learn in Year 12- Pure

Year 12	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	-Algebraic expressions -Quadratics -Equations and Inequalities	-Graphs and Transformations -Straight line graphs -Circles	-Algebraic Fractions -Binomial Expansions: Binomial Theorem)	Trigonometry ratios -Trig Identities and Equations	-Differentiation -Integration	-Logarithm -Vectors Revision/PPE
Previous knowledge recalled	**Quadratic Equations:** -Recall the standard form of quadratic equations and how to solve them. **Vertex Form:** -Understand the vertex form of a quadratic equation and its properties. **Discriminant:** -Know the discriminant and how it relates to the nature of the solutions. **Inequalities:** -Understand the representation and solution of quadratic inequalities. **Quadratic Functions:** Recall the graph of a quadratic function and its key features.	**Graphing Circles:** -Know how to graph circles on the coordinate plane **Circle Properties:** -Understand properties such as diameter, circumference, and area. **Distance Formula:** - Recall the distance formula used to find the distance between points in the plane.	**Simplification:** -Know how to simplify algebraic fractions by cancelling common factors. Addition and Subtraction: -Understand how to add and subtract algebraic fractions with different denominators. Equations with **Algebraic Fractions:** -Recall solving equations that involve algebraic fractions. **Binomial Coefficients:** -Remember the coefficients in the binomial expansion, often represented by "n choose k."	**Trigonometric Ratios:** -Recall the definitions of sine, cosine, and tangent in right triangles. **Angle Measures:** -Understand degrees and radians as units for measuring angles. **Special Triangles:** -Know the properties of 30-60-90 and 45-45-90 triangles.	**Differentiation Derivative Basics:** - Understanding the concept of a derivative, which measures the rate of change. **Differentiation Rules:** -Recall fundamental rules such as the power rule and chain rule. **Integration:** -Understanding the concept of an integral as a limit of Riemann sums. **Antiderivatives:** -Recall the connection between antiderivatives and integrals.	**Vector Basics:** Magnitude Direction Representation of vectors **Operations:** -Addition -subtraction -scalar -multiplication
New Knowledge	**Completing the Square:** -Teach the process of completing the square to rewrite quadratic equations in vertex form	**Polar Coordinates: -** Extend knowledge to representing circles in polar coordinates.	**Complex Fractions:** - Introduce complex or compound fractions and how to simplify them.	**Unit Circle:** -Introduce the unit circle and its relationship to trigonometric functions.	**Differentiation: Maximum and Minimum:** -Recall how derivatives are used to find maximum and minimum	**Logarithms and Vectors:** -Real-world applications in physics, engineering

	Quadratic Formula: -Explain the quadratic formula as a method to solve quadratic equations -Extend knowledge to solving quadratic inequalities using sign analysis and number line plots -Introduce systems of quadratic equations and inequalities.	**Graphing Software:** -Familiarise students with graphing software or calculators for visualising circle properties and transformations.	**Partial Fractions:** -Teach the process of decomposing a complex fraction into simpler partial fractions. Rational **Expressions:** -Explain the concept of rational expressions and how they relate to algebraic fractions. **Expanding Binomials:** -Know how to expand binomial expressions using the binomial theorem. **General Binomial Expansion Formula:** -Remember the formula for expanding (a + b)^n.	**Trigonometric Graphs:** -Know how to graph trigonometric functions, including amplitude and period.	points in functions. Integration Improper **Integrals:** -Introduce the concept of improper integrals and how to evaluate them.	
Key Knowledge Assessment	Topic tests and end of term assessments	Topic tests and end of term assessments	Topic tests and end of term assessments	Topic tests and end of term assessments	Topic tests and end of term assessments	PPEs
Links to literacy and numeracy	**Literacy:** Reading and processing the question to ensure delivery of the correct method and solution. **Numeracy:** Consolidation of the key crossover skills from Higher GCSE	**Literacy:** Familiarisation of the key vocabulary to ensure correct method is applied. **Numeracy:** Extension of the key principles and guidance as to where they	**Literacy:** Reading and processing the question to ensure delivery of the correct method and solution. **Numeracy:** Building upon the foundations established in term 1 and 2	**Literacy:** Familiarisation of the key vocabulary to ensure correct method is applied. **Numeracy:** Extension of the key principles and guidance as to where they	**Literacy:** Reading and processing the question to ensure delivery of the correct method and solution. **Numeracy:** Introduction of new skills and processes and purposeful	**Literacy:** Familiarisation of the key vocabulary to ensure correct method is applied. **Numeracy:** Extension of the key principles and guidance as to where they

		fit in and where they are heading		fit in and where they are heading	practise of these.	fit in and where they are heading
Extra-Curricular opportunities	Links with UKC to be explored. Trips and visits.					
Links to careers/ aspirations	Engineering and Physics, Financial Analysis, Economics, Data Analyst, Data Scientist, Geospatial Analyst, GIS Specialist, Quantum Computing Scientist, Engineer					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

What my child will learn in Year 12- <u>STATISTICS and MECHANICS</u>

Year 12	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	**-Data collection -Measures of location and spread**	**Representation of data -Correlation**	**-Probability -Statistical distribution**	**-Hypothesis testing -Modelling in Mechanics**	**-Constant Acceleration -Forces and motion**	**-Variable acceleration -Revision/PPE**
Previous knowledge recalled	**Data Collection** Recall A foundational understanding of basic statistical concepts and methods, such as mean, median, and standard deviation. **Measure of location and spread:** Recall statistical measures of location, such as mean and	**Representing data:** Recall basic descriptive statistics, including data representation through graphs and charts **Correlation:** Recall foundamental understanding of statistical concepts, particularly measures of	**Probability:** A solid grasp of foundational probability concepts, including basic probability rules and understanding of probability distributions and tree diagrams **Statistical distribution:**	**Hypothesis Testing:** A solid recall of basic statistical concepts, including hypothesis formulation, p-values, and significance levels, from GCSE level **Modelling in mechanics:** Recall fundamental principles in mechanics, such as	**Constant acceleration:** - Recall the fundamental concepts in physics, including equations of motion and the principles of constant acceleration from GCSE **Forces and motion:** understanding of Newtonian mechanics,	**Variable acceleration:** A foundational comprehension of core principles in physics, including differential calculus and the fundamental equations of motion, is necessary for a comprehensive exploration of the Year 12

	median, and measures of spread, like standard deviation.	association and scatterplots	Recall fundamental statistical concepts, including probability distributions and key characteristics such as mean and standard deviation.	Newton's laws and vector analysis	encompassing concepts like force, mass, and acceleration from GCSE	topic on variable acceleration
New Knowledge	**Data Collection** Understand how to collect data ethically and interpret skewness	**Correlation:** To understand the differences between **correlation** and **causations.**	**Statistical distribution:** understanding of probability distributions, allowing students to comprehend how data is spread and the likelihood of specific outcomes	**Hypothesis testing:** Understanding significant levels and interpreting P-Values	**Constant acceleration**: To understand the proficiency of Kinetic equations and its real-life application.	**Variable acceleration:** To understand how to apply differential calculus to understand and analyse changing rates of motion.
Key Knowledge Assessment	-Mid-term assessment -End of term assessment -AFL	-Mid-term assessment -End of term assessment -AFL	-Mid-term assessment -End of term assessment -AFL	-Mid-term assessment -End of term assessment -AFL	-Mid-term assessment -End of term assessment -AFL	-Mid-term assessment -End of term assessment -AFL
Links to literacy and numeracy	**Literacy:** The ability to interpret and communicate findings effectively, ensuring clear and accurate explanations	**Literacy:** Students enhance their literacy in statistics by developing the ability to interpret correlation coefficients.	**Literacy:** Students gain literacy skills by learning to interpret and understand the characteristics of various statistical distributions,	**Literacy:** Students to articulate and evaluate assumptions about population parameters before	**Literacy:** Students enhance literacy by interpreting and grasping the kinematic equations, enabling a clear understandin	**Literacy:** Students are able to articulate and analyse the changing relationships between displacement,

	of the spread of data. **Numeracy:** Interpreting numerical data representations, like histograms or box plots	**Numeracy:** Students learn to analyse patterns, identify trends, and make informed judgments about the strength and direction of correlations based on the visual representation of data points.	including measures like mean, median, and standard deviation **Numeracy:** Understanding probability, a key aspect of data spread analysis, involves numeracy skills for calculating probabilities.	statistical analysis. **Numeracy:** Students gain numeracy skills related to mathematical modelling, allowing them to express and analyse the relationships between variables	g of how objects move under constant acceleration. **Numeracy:** students apply mathematical formulas to analyse and calculate quantities related to constant acceleration, fostering a hands-on understanding of mathematical concepts.	velocity, and time. **Numeracy:** students apply mathematical calculations to analyse scenarios involving variable acceleration, allowing them to make precise calculations and draw quantitative conclusions about changing motion.
Extra-Curricular opportunities	Online mathematics exploration with the University of Kent.					
Links to careers/ aspirations	Achieving proficiency in A-level statistics and mechanics not only provides a strong foundation for pursuing a career in data science or engineering but also aligns seamlessly with my aspirations to contribute innovatively to technological advancements and analytical problem-solving.					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

What my child will learn in Year 13 Pure

Year 13	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	Sequence and Series	Binomial Expansion	Trigonometry Functions Trigonometry Modelling & Radians	Differentiations Integration	Numerical Methods Vectors	
Previous knowledge recalled	**Sequences:** Recall the concept of a sequence as an ordered list of numbers. **Arithmetic Sequences:** Understand the properties of arithmetic sequences, including common differences. **Geometric Sequences:** Know the characteristics of geometric sequences, including common ratios	**Pascal's Triangle:** Understand how binomial coefficients are arranged in Pascal's Triangle. **Expanding Binomials:** Know how to expand binomial expressions using the binomial theorem.	**Trigonometric Identities:** Remember fundamental identities like the Pythagorean identities. **Solving Triangles:** Recall methods for solving triangles, including the Law of Sines and Law of Cosines.	**Derivatives of Common Functions:** Knowing derivatives of common functions like trigonometric, exponential, and logarithmic functions. **Integration Techniques:** Recall various techniques for finding integrals, such as substitution and integration by parts.	**Approximation:** Recall the core concept of approximating solutions to mathematical problems. **Iterative Methods:** Understand the use of iteration to approach solutions. **Linear Systems:** Recall methods for solving systems of linear equations. **Vectors:** Dot Product Cross Product Definitions and geometric interpretation (3D).	
New Knowledge	**Convergence and Divergence:** Teach the concepts of convergent and divergent sequences and series. **Geometric Series:** Explore the properties	**Binomial Expansion:** Introduce the extension of the binomial theorem for more than two terms. Learn how binomial expansion is used in probability,	**Inverse Trigonometric Functions:** Explain arcsin, arccos, and arctan as inverse functions. Extend knowledge with advanced identities,	**Implicit Differentiation:** Teaching techniques for differentiating implicitly defined functions. **Integration:** Extend integration to multiple	**Numerical Methods:** Learn linear and polynomial interpolation to estimate values between data points. Explain methods for approximatin	

	and sum formulas for geometric series.	statistics, and combinatorics .	such as double angle and half-angle identities.	dimensions with double and triple integrals. Explore how integrals are used in solving differential equations.	g definite integrals, such as the trapezoidal rule and Simpson's rule. **Vectors:** Vector space Linear independence Vector functions (3D)	
Key Knowledge Assessment	Topic tests and end of term assessments	Topic tests and end of term assessments	PPEs	Topic tests and end of term assessments	FINAL EXAMS	
Links to literacy and numeracy	**Literacy:** Familiarisation with the wording of exam questions **Numeracy:** Relentless practise of applying the correct numerical process in order to answer the question effectively	**Literacy:** Familiarisation with the wording of exam questions **Numeracy:** Relentless practise of applying the correct numerical process in order to answer the question effectively	**Literacy:** Familiarisation with the wording of exam questions **Numeracy:** Relentless practise of applying the correct numerical process in order to answer the question effectively	**Literacy:** Familiarisation with the wording of exam questions **Numeracy:** Relentless practise of applying the correct numerical process in order to answer the question effectively	**Literacy:** Exploring all past papers to increase confidence with subject specific vocabulary and awareness. **Numeracy:** Relentless practise of applying the correct numerical process in order to answer the question effectively	
Extra-Curricular opportunities	Links with UKC to be explored. Trips and visits.					
Links to careers/ aspirations	financial engineering, actuarial science, engineering, robotics, designing mechanical systems, physics, climate modelling, materials science					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

Extended Learning Opportunities for Key Stage 5	After school sessions held each week A Level teachers available during study times to enrich learning experience or consolidate previous learning.

What my child will learn in Year 13 Statistics and Mechanics

Year 13	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title	**-Regression, correlation and Hypothesis testing**	**-Conditional probability** **-Normal distribution**	**-Moments**	**-Forces and frictions**	**-Projectiles and further Kinematics**	**-Revision and assessment**
Previous knowledge recalled	**Regression and correlation:** A foundational understanding of basic statistical concepts, including correlation coefficients and scatterplots	**Conditional probability:** Students will revisit the concept of mutually exclusive events and how it relates to conditional probability	**Moments:** Students will recall a fundamental understanding of forces, equilibrium conditions, and basic vector concepts is crucial as foundational knowledge for comprehending moments in physics	**Forces and frictions:** Recall how frictional forces impact the equilibrium and motion of objects from Year 12	**Projectiles:** Students will learn the dynamics of their motion, launch angles, and velocities, and apply mathematical principles to analyse and predict the trajectory. **Further Kinematics:** Apply mathematical principles to analyse displacement, velocity, and acceleration in various scenarios	Mixed exercises from each chapter Past exams questions

New Knowledge	**Hypothesis testing:** Interpreting results by referring to key words such as null hypotheses and p-values	**Normal distribution:** Students will learn the bell-shaped curve, mean, standard deviation, and the empirical rule. .	**Moments:** Apply moment concepts to practical scenarios, such as beam analysis and structural equilibrium, enhancing problem-solving skills in real-world engineering contexts	**Forces and frictions:** Analyse the interplay between forces and frictions, understanding how frictional forces influence the equilibrium and motion of objects, with a focus on practical applications and problem-solving in real-world scenarios	**Projectiles:** Students will learn the dynamics of their motion, launch angles, and velocities, and apply mathematical principles to analyse and predict the trajectory. **Further Kinematics:** Apply mathematical principles to analyse displacement, velocity, and acceleration in various scenarios	
Key Knowledge Assessment	-End of term -AFL	-End of term -AFL	-End of term -AFL	-End of term -AFL	-End of term -AFL	
Links to literacy and numeracy	**Literacy:** The ability to interpret and communicate findings effectively, ensuring clear and accurate explanations of the spread of data. **Numeracy:** Interpreting numerical data	**Literacy:** Students enhance their literacy in statistics by developing the ability to interpret correlation coefficients. **Numeracy:** Students learn to analyse patterns, identify	**Literacy:** Students gain literacy skills by learning to interpret and understand the characteristics of various statistical distributions, including measures like mean, median, and standard deviation	**Literacy:** Students to articulate and evaluate assumptions about population parameters before statistical analysis. **Numeracy:** Students gain numeracy skills related to	**Literacy:** Students enhance literacy by interpreting and grasping the kinematic equations, enabling a clear understanding of how objects move under constant acceleration.	

	representations, like histograms or box plots	trends, and make informed judgments about the strength and direction of correlations based on the visual representation of data points.	**Numeracy:** Understanding probability, a key aspect of data spread analysis, involves numeracy skills for calculating probabilities.	mathematical modelling, allowing them to express and analyse the relationships between variables	**Numeracy:** students apply mathematical formulas to analyse and calculate quantities related to constant acceleration, fostering a hands-on understanding of mathematical concepts.	
Extra-Curricular opportunities	Online mathematics exploration with the University of Kent.					
Links to careers/ aspirations	financial engineering, actuarial science, engineering, robotics, designing mechanical systems, physics, climate modelling, materials science					
Links to our Fulston FAMILY values	***Fortitude***- Having the resilience and determination to keep trying when we are finding it tough ***Ambition***- Striving for excellence and being aware of our gaps in understanding ***Mindful***- Developing our own metacognition so that we become independent life-long learners ***Integrity*** – Being diligent in our studies so that we are in control of our own journey ***Leadership***- Take the lead in class so that we set a good example to our peers ***Young Citizens***- Be aware of how our mathematical education fits in with the value we can add to our community.					

Extended Learning Opportunities for Key Stage 5	1. **Online Courses and Platforms:** • Platforms like Khan Academy, Coursera, or edX offer comprehensive online courses in A-level mathematics. These courses often include video lectures, interactive exercises, and assessments, providing students with an opportunity to reinforce their understanding of key concepts and explore additional topics beyond the standard curriculum. 2. **Tutoring and Study Groups:** • Engaging in personalized tutoring or joining study groups can provide a more interactive and collaborative learning experience. Tutors can offer individualized guidance; addressing specific challenges and helping students delve deeper into the subject. Study groups facilitate peer-to-peer learning,

	allowing students to share insights, discuss complex problems, and reinforce their understanding through collaborative efforts. 3. **Participation in Math Competitions:** • Involvement in mathematics competitions, such as the United Kingdom Mathematics Trust (UKMT) competitions or International Mathematical Olympiad (IMO) training, can offer a unique and challenging extension to the A-level maths curriculum.

Curriculum Impact	The aims and learning outcomes of this curriculum is to enable students to develop the ability to: • Rise to the challenge of demanding and fulfilling content, • Demonstrate the mathematical skills, knowledge and understanding that are as good as that of the highest performing jurisdictions in the world • Have a strong foundation for further academic and vocational study and for employment • Demonstrate the appropriate mathematical skills, knowledge and understanding to help them progress to a full range of courses in further and higher education. • This includes Level 3 mathematics courses as well as Level 3 and undergraduate courses in other disciplines such as biology, geography and psychology, where the understanding and application of mathematics is crucial • 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.