St. Sampson's High School			
Subject Curriculum Overview			
Department	Mathematics	**HoD**	Gareth Jones

Intent	*Mathematics introduces students to concepts, skills and thinking strategies that are essential in everyday life and support learning across the curriculum. Mathematics helps students make sense of numbers, patterns and shapes they see in the world around them and provides ways of handling data in an increasingly digital world. It makes a crucial contribution to their development as rounded individuals and assists them to solve a problem and make new connections and unexpected discoveries.*		

Big Ideas	- To explain logically their strategies and solutions using mathematical language and give reasons to justify. - To provide real life contexts for mathematical learning e.g. real life problems, world of work, financial literacy, patterns in nature - To understand, investigate and apply the range of ways maths can be used to solve practical problems. - To explore number through practical and visual resources, models and equipment including structured maths equipment. - Use mathematical literacy, estimation, problem-solving and organising work, etc. - To use known facts and the inverse to check. - To recognise and use the appropriate method of calculation - mental, written or calculator. - To explore the history and development of maths in different cultures and periods of time and investigate the work of famous mathematicians - To explore data handling through practical and visual resources, models and equipment including structured maths equipment.	**Key tier 2 and 3 vocabulary**	***Tier 2 – Cross Curricular Academic Words***	
			Estimate - To make an approximate or rough calculation often based on rounding.	*Expression -* One or a group of mathematical symbols representing a number or quantity. It doesn't contain an equal's sign.
			Evaluate - To evaluate an expression means to find a numerical value for it, to 'work it out'.	*Factor -* One of two or more expressions that are multiplied together to get a product.
			Expand - To multiply out the brackets.	*Intercept -* The x-intercept of a line or curve is the point where it crosses the x-axis, and the y- intercept of a line or curve is the point where it crosses the y-axis.
			Simplify - To reduce the fraction or to remove the brackets and unnecessary terms and numbers.	*Mean -* In a data set, the sum of all the data points, divided by the number of data points; average.
			Substitute - The replacement of a term in an equation by another that is known to have the same value.	*Mode -* A type of average; the number (or numbers) that occurs most frequently in a set of data.
			Chord - A line segment that connects two points on a curve	*Multiple -* A multiple of a number is the product of that number and any other whole number. Zero is a multiple of every number.
			Constant - A value that does not change.	*Product -* The result of two numbers being multiplied together.
			Event - In probability, a set of outcomes.	
			Tier 3 – Subject Specific Technical Words	

		● To experience data handling through a range of contextual indoor and outdoor experiences. ● To use digital technology to collect, store, present and analyse relevant and contextual data.		*Factorise -* To write the number as a product of its factors. 'Put back into brackets'.	*Parallel -* Two lines are parallel if they are in the same plane and never intersect.
				Bisect - To divide into two equal parts.	*Perpendicular -* Two lines are perpendicular if the angle between them is 90 degrees.
				Congruent - Figures or angles that have the same size and shape.	*Polygon -* A closed plane figure made up of several line segments that are joined together.
				Equation - A mathematical statement that says that two expressions have the same value; any number sentence with an =.	*Prime number -* A number whose only factors are itself and 1.
				Formula - An equation that states a rule or a fact.	*Reciprocal -* The number which, when multiplied times a particular fraction, gives a result of 1.
				Frequency - The number of times a particular item appears in a data set.	*Similar -* Two polygons are similar if their corresponding sides are proportional.
				Hypotenuse - The side opposite the right angle in a right triangle.	*Variable -* A letter used to represent a number value in an expression or an equation.
				Inverse - Opposite. -5 is the additive inverse of 5, because their sum is zero. 1/3 is the multiplicative inverse of 3, because their product is 1.	

| **Enrichment or Opportunities for out of class learning** | *Support at lunchtimes for Extended Learning activities.*
HPAP lunchtime club for KS3
After school revision sessions for KS4 students.
KS4 masterclasses for HPAP. |
| **Links to Rights Respecting School** | *Article 17 – Mathematics encourages students to assess the reliability of information and data published in the media and other sources.* |

By age 11 students should	**Knowledge**	Students should have become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
	Understanding	Students should be able to **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
	Skills	Students can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

KS3	Year 7		Year 8		Year 9	
Implement Autumn	Sequences	Place value and ordering integers and decimals	Ratio and scale	Working in the Cartesian plane	Straight line graphs	Three dimensional shapes
	Understand and use algebraic notation		Multiplicative change	Representing Data	Forming and solving equations	Constructions and Congruency
	Equality and Equivalence	Fraction, decimal and percentage equivalence	Multiplying and dividing fractions	Tables and Probability	Testing conjectures	
Assessment Autumn	End-of topic quizzes /20 marks & Autumn 1 - SATS Internal Assessment Paper		End of topic quizzes /20 marks & Autumn 2 – SATS Internal Assessment Paper		End of topic quizzes /20 marks & Autumn 2 – SATS Internal Assessment Paper	
Implement Spring	Solving problems with addition & subtraction	Four operations with directed number	Brackets, equations and inequalities	Fractions and percentages	Numbers	Deduction
	Solving problems with multiplication and division		Sequences	Standard index form	Using percentages	Rotation and translation
	Fractions & percentages of amounts	Addition and subtraction of fractions	Indices	Number sense	Maths and money	Pythagoras' Theorem
Assessment Spring	End of topic quizzes /20 marks		End of topic quizzes /20 marks		End of topic quizzes /20 marks	
Implement Summer	Constructing, measuring and using geometric notation	Developing number sense	Angles in parallel lines and polygons	The data handling cycle	Enlargement and similarity	Solving problems using graphs, tables and algebra
		Sets and probability	Area of trapezia and circles		Solving ratio and proportion problems	

	Developing geometric reasoning	Prime numbers and proof	Line symmetry and reflection	Measures of location	Rates	Solving problems using graphs, tables and algebra

Assessment Summer	End of topic quizzes /20 marks & End of Year SATS Internal Assessment		End of topic quizzes /20 marks & End of Year SATS Internal Assessment		End of topic quizzes /20 marks & End of Year SATS Internal Assessment	

By age 14 students should	**Knowledge**	**Develop fluency** ♣ consolidate their numerical and mathematical capability from Key Stage 2 and extend their understanding of the number system and place value to include decimals, fractions, powers and roots ♣ select and use appropriate calculation strategies to solve increasingly complex problems ♣ use algebra to generalise the structure of arithmetic, including to formulate mathematical relationships ♣ substitute values in expressions, rearrange and simplify expressions, and solve equations ♣ move freely between different numerical, algebraic, graphical and diagrammatic representations [for example, equivalent fractions, fractions and decimals, and equations and graphs] ♣ develop algebraic and graphical fluency, including understanding linear and simple quadratic functions ♣ use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes, probability and statistics.
	Understanding	**Reason mathematically** ♣ extend their understanding of the number system; make connections between number relationships, and their algebraic and graphical representations ♣ extend and formalise their knowledge of ratio and proportion in working with measures and geometry, and in formulating proportional relations algebraically ♣ identify variables and express relations between variables algebraically and graphically ♣ make and test conjectures about patterns and relationships; look for proofs or counterexamples ♣ begin to reason deductively in geometry, number and algebra, including using geometrical constructions ♣ interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning ♣ explore what can and cannot be inferred in statistical and probabilistic settings, and begin to express their arguments formally.
	Skills	**Solve problems** ♣ develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems ♣ develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics ♣ begin to model situations mathematically and express the results using a range of formal mathematical representations ♣ select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems.

KS4	Year 10 (Foundation)		Year 11 (Foundation)	
Implement Autumn	Integers and place value	Fractions	Circles and cylinders	Similarity and congruence in 2D
	Decimals	Percentages	Statistical measures	Linear equations and inequalities

	Special numbers and powers	Linear equations and inequalities	Quadratic equations and graphs	Simultaneous equations
	Algebraic manipulation	Graphical representation of data	Interior and exterior angles of polygons	Pythagoras' Theorem and trigonometry
	Expressions, formulae and rearranging equations	Transformations	Measures, bearings and scale drawings	Arithmetic of fractions
Assessment Autumn	IGCSE exam paper (Foundation)	IGCSE exam paper (Foundation)	October Mock exams – 2 x IGCSE exam paper (Foundation)	
Implement Spring	Sequences	Interior and exterior angles of polygons	Set language, notation and Venn diagrams	Target revision based on paper analysis
	Sequences	Linear graphs	Special numbers and powers	Target revision based on paper analysis
	Measures, bearings and scale drawings	Arithmetic of fractions	Probability	Target revision based on paper analysis
	Measures, bearings and scale drawings	Indices and standard form	Percentages	Target revision based on paper analysis
	Symmetry, shapes, parallel lines and angle facts	Perimeter, area and volume	Ratio and proportion	Target revision based on paper analysis
Assessment Spring	IGCSE exam paper (Foundation)	IGCSE exam paper (Foundation)	January mocks – 2 x IGCSE exam paper (Foundation)	IGCSE past paper (Foundation)
Implement Summer	Ratio and proportion	Probability	Target revision based on paper analysis	Target revision based on paper analysis
	Circles and cylinders	Constructions and bearings	Target revision based on paper analysis	Target revision based on paper analysis
	Pythagoras' Theorem and trigonometry	Statistical measures	Target revision based on paper analysis	Target revision based on paper analysis

	Year 10 (Higher)		Year 11 (Higher)	
Assessment Summer	IGCSE exam paper (Foundation)	IGCSE exam paper (Foundation)	External exams - 2 x IGCSE exam paper (Foundation)	
KS4	**Year 10 (Higher)**		**Year 11 (Higher)**	
Implement Autumn	Decimals	Expressions, formulae and rearranging equations	Set language, notation and Venn diagrams	Advanced trigonometry
	Special numbers, powers and roots	Linear equations and inequalities	Statistical measures	Function notation
	Algebraic manipulation	Sequences	Quadratic equations and graphs	Vectors
	Expressions, formulae and rearranging equations	Transformations	Pythagoras' Theorem and trigonometry	Calculus
			Advanced trigonometry	Harder graphs and transformation of graphs
Assessment Autumn	IGCSE exam paper (Foundation)	IGCSE exam paper (Foundation)	October Mock exams – 2 x IGCSE exam paper (Foundation/Higher)	
Implement Spring	Graphical representation of data	Percentages	Geometry of shapes	Target revision based on paper analysis
		Ratio and proportion	Similar shapes	
	Statistical measures	Indices and standard form	Constructions and bearings	
	Fractions	Compound measures	Circle theorems	
Assessment Spring	IGCSE exam paper (Foundation)	IGCSE exam paper (Foundation/Higher)	January mocks – 2 x IGCSE exam paper (Foundation/Higher)	IGCSE past paper (Foundation/Higher)
Implement Summer	Geometry of shapes	Quadratic equations and graphs	Target revision based on paper analysis	Target revision based on paper analysis
	Real life graphs	Perimeter, area and volume		

			Linear graphs	Constructions and bearings	External exams - 2 x Maths IGCSE exam paper (Foundation/Higher)
			Quadratic equations and graphs		
Assessment Summer			IGCSE exam paper (Foundation/Higher)	IGCSE exam paper (Foundation/Higher)	External exams - 2 x Maths IGCSE exam paper (Foundation/Higher)
By age 16 students should	Knowledge		**Develop fluency** ♣ consolidate their numerical and mathematical capability from Key Stage 3 and extend their understanding of the number system to include powers, roots {and fractional indices} ♣ select and use appropriate calculation strategies to solve increasingly complex problems, including exact calculations involving multiples of π {and surds}, use of standard form and application and interpretation of limits of accuracy ♣ consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions, {and expressions involving surds and algebraic fractions} ♣ extend fluency with expressions and equations from key stage 3, to include quadratic equations, simultaneous equations and inequalities ♣ move freely between different numerical, algebraic, graphical and diagrammatic representations, including of linear, quadratic, reciprocal, {exponential and trigonometric} functions ♣ use mathematical language and properties precisely.		
	Understanding		**Reason mathematically** ♣ extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in working with proportional relations algebraically and graphically ♣ extend their ability to identify variables and express relations between variables algebraically and graphically ♣ make and test conjectures about the generalisations that underlie patterns and relationships; look for proofs or counter-examples; begin to use algebra to support and construct arguments {and proofs} ♣ reason deductively in geometry, number and algebra, including using geometrical constructions ♣ interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning ♣ explore what can and cannot be inferred in statistical and probabilistic settings, and express their arguments formally ♣ assess the validity of an argument and the accuracy of a given way of presenting information.		
	Skills		**Solve problems** ♣ develop their mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems ♣ develop their use of formal mathematical knowledge to interpret and solve problems, including in financial contexts ♣ make and use connections between different parts of mathematics to solve problems ♣ model situations mathematically and express the results using a range of formal mathematical representations, reflecting on how their solutions may have been affected by any modelling assumptions ♣ select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.		