Year 9 Maths Overview

		HT1 DEVELOPING NUMBER ALGEBRAIC TECHNIQUES REASONING WITH ALGEBRA	HT2 REASONING WITH ALGEBRA CONSTRUCTING IN TWO AND THREE DIMENSIONS	HT3 REASONING WITH NUMBER	HT4 REASONING WITH NUMBER REASONING WITH GEOMETRY	HT5 REASONING WITH GEOMETRY REASONING WITH PROPORTION	HT6 REASONING WITH PROPORTION PROBABILITY REPRESENTATIONS
		Included in every Maths lesson: Recall multiplication and division facts up to 12×12 and recognise products in multiplication tables as multiples of the corresponding number.					
Learning outcomes/composite knowledge: Pupils will be able to…		**LO1: Number Sense (Y8)** To revisit number to embed fluency **LO2: Understand and use algebraic notation (Y7)** To understand and use algebraic notation **LO3: Brackets, Equations and Inequalities (Y8)** To develop knowledge of algebraic techniques	**LO1: Forming and Solving Equations** To be able to form and solve equations **LO2: Three Dimensional Shapes** To work with three-dimensional shapes **LO3: Constructions and Congruency** To understand and implement constructions and congruency	**LO1: Numbers** To develop knowledge of the number system **LO2: Using Percentages** To further understanding of percentages	**LO1: Maths and Money** To apply mathematical understanding to real-life monetary problems **LO2: Deduction** To extend and apply knowledge of angles and shapes to more complex problems **LO3: Rotation and Translation** To describe and implement different trans formations	**LO1: Vectors** To work with vectors **LO2: Pythagoras' Theorem** To understand and implement Pythagoras' theorem **LO3: Solving Ratio and Proportion Problems** To revisit ratio and proportion	**LO1: Rates** To explore inverse relationships graphically and formulaically **LO2: Probability** To work with probability, recording, describing and analysing the frequency of outcomes **LO3: Algebraic Representations** To interpret and create different types of graphs
Knowledge Components	Declarative Knowledge:	**LO1: Number Sense (Y8)** • I know what rounding means • I know what significant figures are • I know what estimate means • I know what the order of operations is I know what the metric units of weight and capacity are **LO2: Understand and use algebraic notation (Y7)** • I know what inverse means. • I know the meaning of equality • I know what like and unlike terms are. • I know what substitute means **LO3: Brackets, Equations and Inequalities (Y8)** • I know what an expression is • I know what a factor is • I know what equations and inequalities are	**LO1: Forming and Solving Equations** • I know what an equation is I know what an inequality is **LO2: Three Dimensional Shapes** • I know the names of 2D and 3D shapes • I know the difference between a prism and a non-prism • I recognise nets of 3D shapes • I know what plans and elevations are • I know what surface area and volume are **LO3: Constructions and Congruency** • I know what the different types of angles are • I know what a scale drawing is • I know what equidistant means • I know what perpendicular means • I know what a bisector is • I know what congruent means	**LO1: Numbers** • I know what integers, real and rational numbers are • I know what standard and ordinary forms are **LO2: Using Percentages** • I know what percentage change is	**LO1: Maths and Money** • I know different monetary terms • I know the difference between simple and compound interest **LO2: Deduction** • I know what parallel means • I know the basic angle rules • I know what a conjecture is **LO3: Rotation and Translation** • I know what line symmetry is • I know what rotate means • I know the directions clockwise and anti-clockwise	**LO1: Vectors** • I know what a vector is **LO2: Pythagoras' Theorem** • I know what a square number is • I know what a square root is • I know what a right-angle is • I know what Pythagoras' theorem is **LO3: Solving Ratio and Proportion Problems** • I know what a ratio is • I know what proportion means • I know the difference between direct and indirect proportion	**LO1: Rates** • I know what inverse means • I know the difference between speed, distance, time, density, mass and volume **LO2: Probability** • I know what probability is • I know what frequency means **LO3: Algebraic Representations** • I know what reciprocal means • I know what an inequality is

	Procedural Knowledge:	**LO1: Number Sense (Y8)**
		• I know how to round numbers to:
		  ○ Powers of 10
		  ○ 1 significant figure
		  ○ A given number of decimal places
		• I know how to order positive and negative integers, decimals and fractions
		• I know how to estimate the answer to a calculation
		• I know how to calculate using the order of operations
		• I know how to calculate with money
		• I know how to convert metric units of weight and capacity
		• I know how to solve problems involving time and the calendar
		
		LO2: Understand and use algebraic notation (Y7)
		• I know how to find the output of a single function machine
		• I know how to use inverse operations to find the input given the output
			LO1: Forming and Solving Equations
			• I know how to solve one- and two-step equations and inequalities
			• I know how to solve inequalities with negative numbers
			• I know how to solve equations and inequalities with unknowns on both sides
			• I know how to solve equations and inequalities in context
			• I know how to substitute into formulae and equations
			• I know how to rearrange formulae
			
			LO2: Three Dimensional Shapes
			• I know how to create nets of 3D shapes
			• I know how to draw plans and elevations
			• I know how to find the area of 2D shapes
			• I know how to find the surface area of cubes, cuboids and triangular prisms
			• I know how to find the volume of 3D shapes
			
			LO3: Constructions and Congruency
			• I know how to draw and measure angles
				LO1: Numbers
				• I know how to work with directed number
				• I know how to solve problems with integers and decimals
				• I know how to find the HCF and LCM
				• I know how to add, subtract, multiply and divide fractions
				• I know how to solve problems with fractions
				• I know how to work with numbers in standard form
				
				LO2: Using Percentages
				• I know how to use the equivalence of fractions, decimals and percentages
				• I know how to calculate percentage increase and decrease
				• I know how to express a change as a percentage
				• I know how to solve 'reverse' percentage problems
				• I know how to solve percentage problems with and without a calculator
					LO1: Maths and Money
					• I know how to solve problems with bills and bank statements, VAT and exchange rates
					• I know how to calculate simple and compound interest
					• I know how to calculate wages and taxes
					• I know how to solve unit pricing problems
					
					LO2: Deduction
					• I know how to calculate angles in parallel lines
					• I know how to solve angles problems using chains of reasoning and with algebra
					• I know how to form conjectures with angles and shapes
					
					LO3: Rotation and Translation
					• I know how to identify the order of rotational symmetry of a shape
					• I know how to compare and contrast rotational symmetry with line symmetry
					• I know how to rotate a shape about a point on a shape
						LO1: Vectors
						• I know how to represent vectors
						• I know how to use and read vector notation
						• I know how to draw and understand vectors multiplied by a scalar
						• I know how to draw and understand addition and subtraction of vectors
						
						LO2: Pythagoras' Theorem
						• I know how to find squares and square roots
						• I know how to identify the hypotenuse of a right-angled triangle
						• I know how to determine whether a triangle is right-angled
						• I know how to calculate the hypotenuse of a right-angled triangle
						• I know how to calculate missing sides in right-angled triangles
						• I know how to use Pythagoras' theorem on coordinate axes
						• I know how to explore proofs of Pythagoras' theorem
							LO1: Rates
							• I know how to solve speed, distance and time problems with and without a calculator
							• I know how to use distance/time graphs
							• I know how to solve problems with density, mass and volume
							• I know how to solve flow problems and their graphs
							• I know how to work with rates of change and their units
							
							LO2: Probability
							• I know how to calculate single event probability
							• I know how to calculate relative frequency
							• I know how to work with expected outcomes
							• I know how to calculate the probability if independent events
							• I know how to use diagrams to work out probabilities
							
							LO3: Algebraic Representations

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		Included in every Maths lesson: Recall multiplication and division facts up to 12×12 and recognise products in multiplication tables as multiples of the corresponding number.					

		• I know how to use diagrams and letters to generalise number operations
		• I know how to use diagrams and letters with single function machines
		• I know how to substitute values into single operation expressions
		• I know how to find numerical inputs and outputs for a series of two function machines
		• I know how to use diagrams and letters with a series of two function machines
		• I know how to substitute values into two-step expressions
		• I know how to generate sequences given an algebraic rule
		• I know how to represent one- and two-step functions graphically
		
		LO3: Brackets, Equations and Inequalities (Y8)
		• I know how to form algebraic expressions
		• I know how to use directed number with algebra
		• I know how to multiply out a single bracket
		• I know how to factorise into a single bracket
		• I know how to expand multiple brackets and simplify
		• I know how to solve equations, including with brackets
		• I know how to form and solve equations with brackets
		• I understand and know how to solve simple inequalities
		• I know how to form and solve inequalities
		• I can identify and use formulae, expressions, identities and equations
			• I know how to construct and interpret scale drawings
			• I know how to find the locus:
			  ○ Of distance from a point
			  ○ Of distance from a straight line
			  ○ Equidistant from two points
			  ○ Of distance from two lines
			• I know how to construct a perpendicular:
			  ○ Bisector
			  ○ From a point
			  ○ To a point
			• I know how to construct an angle bisector
			• I know how to construct triangles from given information
			• I can identify congruent figures
			• I know how to explore congruent triangles
			• I know how to identify congruent triangles
					• I know how to rotate a shape about a point not on a shape
					• I know how to translate points and shapes by a given vector
					• I know how to compare rotation and reflection of shapes
						LO3: Solving Ratio and Proportion Problems
						• I know how to solve problems with direct and inverse proportion
						• I know how to work with direct proportion and conversion graphs
						• I know how to solve ratio problems given the whole or part
						• I know how to solve 'best buy' problems
							• I know how to draw and interpret quadratic graphs
							• I know how to interpret graphs, including reciprocal and piece-wise
							• I know how to represent inequalities

National Curriculum reference	Link to Mathematics programme of study: key stage 3 – National curriculum in England: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/239058/SECONDARY_national_curriculum_-_Mathematics.pdf						
Common misconceptions	Link to Mathematics guidance: Key Stage 3 Non-statutory guidance for the national curriculum in England: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1056795/KS3_NonStatutory_Guidance_Sept_2021_FINAL_NCETM.pdf Contains lots of information and examples of common difficulties and misconceptions per topic						