Maths
5-Year Overview

	Year 11	Year 10	Year 9	Year 8	Year 7
	Master	***Secure***	***Embed***	***Develop***	***Introduce***
Aims	• Further develop fluency, reasoning and competence in solving increasingly sophisticated problems in learned mathematical concepts as well as new learning • Recall and select the correct mathematical skills and apply them to GCSE exam questions • Confidently use the links between topics to further knowledge and answer GCSE exam questions • Consolidate their numerical and mathematical capability and extend their understanding of the number system to	• Further develop fluency, reasoning and competence in solving increasingly sophisticated problems in learned mathematical concepts as well as new learning • Recall and select the correct mathematical skills and apply them to GCSE exam questions • Confidently use the links between topics to further knowledge and answer GCSE exam questions • Consolidate their numerical and mathematical capability from key stage 3 and extend their understanding of	• Further develop fluency and reasoning in learned fundamentals of mathematics as well as new learning • Identify and apply links between topics and how they build on each other • Can solve problems by applying their mathematics to a variety of routine and nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.	• Further develop fluency in fundamentals of mathematics as well as new learning • Identify links between topics and how they build on each others • Through varied and frequent practice with increasingly complex problems over time, pupils will continue to develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately • Reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an	• Consolidate and develop fluency in fundamentals of mathematics studied at KS2. • Introduce and embed fluency in fundamentals of mathematics not yet learned • Through varied and frequent practice with increasingly complex problems over time, pupils will develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. • Consolidate their numerical and mathematical

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	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 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, to include	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}	• Consolidate their numerical and mathematical capability from Y7 and 8 and extend their understanding of the number system to include powers, roots {and fractional indices} • Consolidate their algebraic capability from Y7 and 8 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions • Extend fluency with expressions and equations from Y7 and 8 to include quadratic equations, simultaneous equations and inequalities	argument, justification or proof using mathematical language • Consolidate their numerical and mathematical capability from Y7 and extend their understanding of the number system to include powers, roots • Consolidate their algebraic capability from Y7 and extend their understanding of algebraic simplification and manipulation to include quadratic expressions • Extend fluency with expressions and equations from Y7 • Use mathematical language and properties precisely	capability from KS2 and extend their understanding of the number system to include powers, roots • Introduce the algebraic capability to understand algebraic simplification and manipulation, for higher ability, include quadratic expressions • Introduce fluency with expressions and equations • Use mathematical language and properties precisely • Introduce knowledge of ratio and proportion, in working with measures and geometry • Introduce the ability to identify variables and express relations

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	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 • 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 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 • Extend and formalise their knowledge of ratio and proportion, including trigonometric ratios, in working with measures and geometry, and in	• Use mathematical language and properties precisely • 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 • Consolidate their ability to identify variables and express relations between variables algebraically and graphically • Start to 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	• Apply their knowledge of ratio and proportion, in working with measures and geometry • Apply their ability to identify variables and express relations between variables algebraically and graphically • Start to make and test conjectures about the generalisations that underlie patterns and relationships • Introduce the ability to reason deductively in geometry, number and algebra • Start to consider the validity of an argument and the accuracy of a given way of presenting information.	between variables algebraically

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	• 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	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	construct arguments {and proofs} • Consolidate their ability to reason deductively in geometry, number and algebra, including using geometrical constructions • 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.		

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	• 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. • 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	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. • 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			

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	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 nonroutine problems; interpret their solution in the context of the given problem.	• 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 nonroutine problems; interpret their solution in the context of the given problem.			
Core knowledge/key concepts	• Recall mathematical concepts that build on prior learning and	• Introduce new mathematical concepts that build on prior	• Introduce new mathematical concepts	• Introduce new mathematical concepts	• Use prior knowledge in areas such as number, ratio and proportion,

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	apply them in the context of GCSE exam questions more regularly. • Recall, select and apply links between mathematical concepts to reason, explain and solve problems • To be confidently fluent in, be able to reason with and solve problems involving, topics that build to A-level	learning and the context of GCSE exam questions more regularly. • Select and apply links between mathematical concepts to reason, explain and solve problems • To embed fluency, reasoning and problem solving in topics that build to A-level	that build on prior learning • Use knowledge of links between mathematical concepts to reason, explain and solve problems • To identify and develop fluency and reasoning in topics that build to A-level	that build on prior learning • Use knowledge of links between mathematical concepts to reason and explain. • To identify and develop fluency in topics that build to A-level	and geometry to introduce and embed knowledge of algebra, statistics and probability. To develop fluency in all of these areas • To identify topics that build to A-level, particularly for high ability students
Skills and knowledge developed	• Learning in Y11 will be based on specific student needs, all topics previously covered in Y7,8,9 and 10 will be consolidated alongside exam practice in all these	• New learning will be based on the ability of the students, for some this will be in the Y7,Y8 and Y9 column, for the higher ability students	• New learning will be based on the ability of the students, for some this will be in the Y7 and Y8 column, for the higher ability students	• New learning will be based on the ability of the students, for some this will be in the Y7 column, for the higher ability students it will	**Number** • Money problems • Addition, subtraction, multiplication, division - In your head • Addition, subtraction, multiplication, division - written methods

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	areas. Time spent on these topics will reflect the proportion of marks available on the Edexcel GCSE exam papers
	• Number
	  ○ Foundation 28%
	  ○ Higher 18%
	• Algebra
	  ○ Foundation 23%
	  ○ Higher 33%
	• Geometry
	  ○ Foundation 18%
	  ○ Higher 23%
	• Ratio and Proportion
	  ○ Foundation 28%
		it will be those topics listed below
		Number
		• *Simple laws of surds
		• *Using surds in quadratics
		• *Rationalising denominators
		Algebra
		• *Factorising quadratics [e.g. 3x^2 + 3x + 3]
		• Simplify algebraic fractions
		• *4 Ops algebraic fractions
		• *Solving algebraic fractions
		• *Binomial expansion
		• *Iteration - rearrange and solve
		• *Solve quadratic equations by using the quadratic formula
		• *Solve quadratic equations by completing the square
		• *Solve further simultaneous
			it will be those topics listed below
			Number
			• Calculate with numbers in standard form
			• Reverse percentages
			• Calculate possible resulting errors expressed using inequality a<x≤b
			• Write upper and lower bounds
			• Calculate upper and lower bounds
			Algebra
			• *Use algebra to support and construct arguments and proof
			• *Change the subject of the formula - more than two steps
			• *Form and solve simultaneous equations
			• *Simple iteration - substitute into an equation
				be those topics listed below
				Number
				• Order of operations - including reciprocals
				• Using a calculator
				• Appreciate the infinite nature of the sets of integers, real and rational numbers.
				• Interpret and compare numbers in standard form
				• Indices and working with square and cube roots
				Algebra
				• *Expand 3 or more sets of brackets
				• *Factorise by finding the difference of two squares
				• Simplifying advanced algebra
				• Interpret mathematical relationships both algebraically and graphically
					• Order of operations without brackets
					• Function machines
					• Negative numbers - all operations
					• Order of operations
					• Addition, subtraction, multiplication, division - With decimals
					• Ordering positive numbers
					• Use the symbols =, ≠, <, >, ≤, ≥
					• List prime numbers
					• Find factors and multiples of a number
					• Ordering negative numbers
					• *Calculate powers and their roots
					• Find common factors, highest common factors
					• Find common multiples, lowest common multiple
					• *Recognise powers of 2, 3, 4, 5

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	○ Higher 23% • Probability and Statistics ○ Foundation 18% ○ Higher 18%	equations; know the equation of circle and find a tangent and intersecting points • *Solve quadratic inequalities • *Find the equation of the line through two given points or through one point with a given gradient • *Use y = mx + c to identify perpendicular lines; • *Sketch translations and reflections of a given function • *Find roots algebraically and turning points by completing the square • *Interpret the gradient at a point on a curve as the instantaneous rate of change; apply the concepts of average and instantaneous rate of change (gradients of chords and tangents)	• *Change the subject of the formula - using factorising • *Introduction to functions - formal notation • *Composite functions - formal notation • *Inverse functions - formal notation • Find the nth term of a quadratic sequence • Find the nth term of a geometric sequence • Plot and interpret graphs • Regions of graphs • Solving problems involving distance, speed and acceleration **Geometry** • *Vectors • Negative enlargements • Combinations of transformations • Calculate exactly with fractions, and multiples of pi	• *Rearrange the equation into the form y = mx+c • *Calculating gradient and intercepts from straight line graphs (number, graph and algebra methods) • *Using straight line graphs to find solutions to simultaneous equations • Interpret information from a complex real-life graph, read values and discuss trends • *Find where a quadratic curve crosses the y axis, x axis and its turning point graphically • *Sketch and interpret graphs of simple cubic functions, the reciprocal function **Geometry** • Comparing and converting speed	• Prime factorisation, including using product of prime factors **Algebra** • Simplifying basic algebra • Collecting like terms • Expanding single brackets • *Factorising single brackets • *Factorising single brackets with powers • *Expanding double brackets [e.g. (x + 2) (x - 5)] • *Expanding double brackets [e.g. (2x + 2) (4x - 5)] • Form algebraic expressions or formulae • *Factorising quadratics [e.g. x^2 -7x + 10] • *Factorise by finding the difference of two squares • Solve one step linear equations

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		in numerical, algebraic and graphical contexts • *Estimate gradients of curves and intrepret them on distance time graphs and velocity time graphs. • *Calculate the area under graphs and interpret them in the case of a velocity time graph **Geometry** • *Algebraic vectors • *Vector proofs • Missing area/volume-similar shapes • Apply pythagoras and trigonometry in 3D • *Use cosine and sine rule • *Apply area = 1/2 ab sin C to calculate the area, sides or angles of any triangle • *Sketch and interpret trigonometric graphs including transformations **Ratio and Proportion**	• Form and solve equations involving shape • Find arc lengths, angles and areas of sectors of circles • Surface areas and volumes of spheres, pyramids, cones and composite solids • Missing length-similar shapes • Apply pythagoras and trigonometry together • Understand and use circle theorems • Use a variety of circle theorems to prove results • *Know the exact values of sin θ and cos θ for θ=0°, 30°, 45°, 60° and 90°: know the exact value of tan θ =0°,30°,45° and 60° • Loci • Use basic congruence criteria for triangles (SSS, SAS,ASA, RHS)	• Surface area of prisms and cylinders • Areas of composite shapes including parts of circles • Use trigonometry to find missing sides • Use trigonometry to find missing angles • Perpendicular bisector of a line • Construct a perpendicular to a given line or from a point • Angle bisector • Use the perpendicular distance from a point to a line as the shortest distance to the line • Describe, sketch and draw using conventional terms and notations: regular polygons • Derive and illustrate properties of plane figures using appropriate language	• Substitute positive numbers • Solve two step linear equations • Substitute negative numbers • *Substitute decimals • *Substitute fractions • *Be able to form and solve equations • Solve linear equations with unknowns on both sides • Solve two step linear equations with negative and decimal solutions • Solve linear inequalities: represent the solution on a number line • *Solve a quadratic through factorising • *Solve two simultaneous equations in two variables • Be able to spot patterns

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		• Inverse and direct proportion equations **Statistics** • **Probability** • *Conditional probability (two-way tables, tree diagrams and Venn diagrams)	• Be able to use congruence, Pythagoras and trigonometry to solve problems **Ratio and Proportion** • Convert recurring decimals to fractions • Identify and work with fractions in ratio problems • Direct and indirect proportion on graphs • Inverse proportion • Solving problems with compound measures **Statistics** • Box plots with cumulative freq and comparing box plots • *Construct histograms • *Interpret histograms - including medians and totals **Probability** • *Independent tree diagrams • *Probabilities with Venn diagrams	• Construct congruent triangles • Plans and elevations **Ratio and Proportion** • Find percentage of amounts with or without a calculator • Express one quantity as a percentage of another • Simple interest • Compound interest, growth & decay • Combined density and pressure **Statistics** • Stem and leaf diagrams • Compound means • Box plots from a list • *Cumulative frequency graphs • Identify trends and patterns of a data set • Time series graphs • *Stratified sampling **Probability** • Apply systematic listing strategies including	• Recognise triangular, square, cube numbers and Fibonacci sequences • Generate terms of a sequence from a term-to-term rule • Find the nth term of an arithmetic sequence • Recognise terms in quadratic sequences • Generate terms of a sequence from a position-to-term rule • Recognise terms in geometric sequences • Use real life graphs • Use conversion graphs • Straight line graphs • Read information from straight line graphs • *Use the form y=mx+c to identify parallel lines • *Produce quadratic graphs **Geometry** • Telling the time • Question on time calculation

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			• *Dependent events including tree diagrams	use of the product rule for counting • Experimental probabilities • Linking experimental probability to theoretical probability • Mutually exclusive	• Complex time problems • Calculating speed • Draw and interpret speed, distance and time graphs • Comparing and converting speed • Plotting coordinates where x and y are both positive • Plotting coordinates in all 4 quadrants • Solving problems using coordinates • Translations with words • Reflections • Rotational symmetry and lines of symmetry • *Translations using vectors • Apply and describe rotations • Apply and describe reflection • Enlargements- with and without a centre of enlargement

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					• Fractional enlargements • Use units of measure • Area and perimeter of rectangles • Area and perimeter of triangles • Area and perimeter of parallelograms • Area and perimeter of composite shape (not circles) • Volume of cuboids • Surface area of cuboid • Calculate circumference of circles • Calculate area of circles • Area of trapezium • Volume of prisms and cylinders • Angles on a straight line • Angles at a point • Vertically opposite angles • Parallel lines and alternate and corresponding angles

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					• Angles in a triangle (with all angle rules combine with parallel Lines) • Angles in regular polygons • Pythagoras theorem • Read and use bearings • Identify congruent shapes • Know what parallel lines and perpendicular lines are • Label sides and angles of triangles [e.g. ABC] • Be able to describe and classify triangles and quadrilaterals • Be able to describe a 3D solid using vertices, edges and faces • Label a circle [e.g. radius, chord, segment] • Draw and measure line segments and angles • Scale drawings **Ratio and Proportion** • Halves and quarters of numbers

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					• Know hundreds, tens units, • Know tenths, hundredths • Order numbers using a number line • Round numbers and measures to the nearest unit, 10 or 100 • Order decimals • Convert a percentage to a fraction and vice versa • Find percentages of amounts • Find percentage of two quantities • Use standard units of mass, length, time, money with decimal quantities • Round numbers to 1 and 2 decimal places • Order fractions • Find square roots of any number, including rounding • Convert between terminating fractions and decimals

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					• Find percentage of amounts with or without a calculator • Express one quantity as a percentage of another • Percentage increase and decrease • Use standard units of mass, length, time, money with decimal quantities • Round numbers to 1,2 and 3 significant figures • Multiply and divide Fractions • Add and subtract Fractions • Fractions - add, subtract, multiply, divide and mixed numbers • Estimate calculations • Simplifying ratios • Changing between units of time, length, volume & mass • Scale factors and scale diagrams

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					• Express one quantity as a fraction of another • Dividing by a ratio • Understand relationship of two quantities can be expressed as a ratio • Relating fractions, ratios and percentages • Density and pressure **Statistics** • Mode • Median • Mean • Range • Choose the right average • Mean, median and mode of a table • Estimated mean of a table • Collect and sort data • Record results in simple lists or tables • Pictograms • Frequency tables • Bar charts • Compare charts and graphs

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					• Construct line charts • Understand unions / intersections from Venn diagrams • Pie charts • Two-way tables • Working between 2 types of chart • Construct scatter graphs and interpret **Probability** • Understand the terms random, fairness, equally and unequally likely events • Use probability words and scale • Frequency trees • Express probabilities as a decimal, fraction or percentage • All outcomes add to 1 • Sample spaces
Wider curriculum links to CC/SMSC/PD and CEIAG	• Time • Financial Literacy • Measures • Drawing and reading more complex graphs	• Time • Financial Literacy • Measures • Drawing and reading more complex graphs	• Time • Money • Measures • Drawing and reading more complex graphs	• Time • Money • Measures • Drawing and reading more complex graphs	• Time • Money • Measures • Drawing and reading graphs and scales in

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	and scales in other subjects across the curriculum • Use statistical analysis in other areas • Decision making and reasoning skills • Non-routine problem solving skills • Critical thinking skills • Communication – active listening, oral, written and non-verbal communication • Self management and self development	and scales in other subjects across the curriculum • Use statistical analysis in other areas • Decision making and reasoning skills • Non-routine problem solving skills • Critical thinking skills • Communication – active listening, oral, written and non-verbal communication	and scales in other subjects across the curriculum • Use statistical analysis in other areas • Decision making and reasoning skills • Non-routine problem solving skills • Communication – active listening, oral, written and non-verbal communication	and scales in other subjects across the curriculum • Use statistical analysis in other areas • Decision making and reasoning • Communication – active listening, oral, written and non-verbal communication	other subjects across the curriculum • Use statistical analysis in other areas • Communication – active listening, oral, written and non-verbal communication

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	Year 11	Year 10
	Master/Secure	*Embed/Develop*
Aims		
Core knowledge/key concepts		
Skills and knowledge developed		
Wider curriculum links to CC/SMSC/PD and CEIAG		

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