







Year 10 Mathematics Curriculum


Unit:	Core knowledge/skill development: (Higher content in bold)	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
Congruence, similarity and enlargement (3 weeks)	Fluency and reasoning skills: Extend and formalise their knowledge of ratio and proportion. Identifying and make comparisons in lengths, areas and volumes using ratio notation and/or scale factors; Make links to similarity. Interpret and use fractional (and negative) scale factors for enlargements. Apply the concepts of congruence and similarity, including the relationships between lengths, (areas and volumes) in similar shapes Use mathematical language and properties precisely.	Building on their experience of enlargement and similarity in previous years, this unit extends students' experiences and looks more formally at dealing with topics such as similar triangles. Parallel line angle rules are revisited to support establishment of similarity. Higher level content extends enlargement to explore negative scale factors, and also looks at establishing that a pair of triangles are congruent through formal proof.	End of unit assessment	Key words: Enlarge Scale Factor Origin Ratio Object Image	 Precision: The ability to work effectively within the rules of the domain. Complex and multi-step problem Solving: The ability to break down a task, decide on a suitable approach, and then act.  Agile learners; Working with an enquiring mind.	Mathswatch lesson and homework tasks.


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	<p>Make and test conjectures about the generalisations that underlie patterns and relationships. Develop their mathematical knowledge through solving problems and evaluating the outcomes, including multi-step problems.</p>					



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Trigonometry (3 weeks)	Fluency and reasoning skills: <ul style="list-style-type: none"> • Extend and formalise knowledge of ratio and proportion, including trigonometric ratios • Apply Pythagoras' Theorem and trigonometric ratios to find angles and lengths in right-angled triangles in two {and three} dimensional figures • know the exact values of $\sin \theta$, $\cos \theta$, $\tan \theta$ for required angles • {know and apply the sine rule and cosine rule to find unknown lengths and angles} • {know and apply to calculate the area, sides or angles of any triangle} 	Trigonometry is introduced as a special case of similarity within right-angled triangles. Emphasis is placed throughout the steps on linking the trig functions to ratios, rather than just functions. This key topic is introduced early in Year 10 to allow regular revisiting e.g. when looking at bearings. For the Higher tier, calculation with trigonometry is covered now and graphical representation is covered in Year 11	End of unit assessment	Enlarge Scale Factor Ratio Corresponding Constant	 <p>Strategy planning: The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an appropriate way to think about the work.</p>  <p>Complex and multi-step problem solving: The ability to break down a task, decide on a suitable approach, and then act.</p>  <p>Agile learners;</p>	Mathswatch lesson and homework tasks.


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	<ul style="list-style-type: none"> • develop mathematical knowledge through solving problems and evaluating the outcomes, including multi-step problems • 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 solutions may have been affected by any modelling assumptions • select appropriate concepts, methods and techniques to apply to unfamiliar 				Working with an enquiring mind.	



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	and non-routine problems; interpret solutions in the context of the given problem					
Representing solutions of equations and inequalities (3 weeks)	Fluency and reasoning skills: • consolidate algebraic capability from key stage 3 and extend understanding of algebraic simplification and	Students will have covered both equations and inequalities at key stage 3, and this unit offers the opportunity to revisit and reinforce standard techniques	End of unit assessment	Variable Solve Solution Equation Expression	 Strategy planning: The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an	Mathswatch lesson and homework tasks.


Unit:	Core knowledge/skill development: (Higher content in bold)	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	manipulation to include quadratic expressions. <ul style="list-style-type: none"> • translate simple situations or procedures into algebraic expressions or formulae; derive an equation, solve the equation and interpret the solution • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem. • recognise, sketch and interpret graphs of linear functions, • factorising quadratic expressions of the form $x^2 + bx + c$ (Higher only at this 	and deepen their understanding. Looking at the difference between equations and inequalities, students will establish the difference between a solution and a solution set; they will also explore how number lines and graphs can be used to represent the solutions to inequalities. As well as solving equations, emphasis needs to be placed on forming equations from given information. This provides an excellent opportunity to revisit other topics in the curriculum such			appropriate way to think about the work.  Agile learners; Working with an enquiring mind.	




Unit:	Core knowledge/skill development: (Higher content in bold)	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
	stage) • solve quadratic equations algebraically by factorising (Higher only at this stage) • solve linear inequalities in one {or two } variable{s}, {and quadratic inequalities in one variable }; represent the solution set on a number line, {using set notation and on a graph }	as angles on a straight line/in shapes/parallel lines, probability, area and perimeter etc. Factorising quadratics to solve equations is covered in the Higher strand here and is revisited in the Core strand in Year 11				
Simultaneous equations: (3 weeks)	Fluency and reasoning skills: • consolidate their algebraic capability from key stage 3 and extend their understanding of algebraic simplification and manipulation to	Students now move on to the solution of simultaneous equations by both algebraic and graphical methods. The method of substitution will be dealt with before elimination, considering the	End of unit assessment	Possible Solutions Infinite Finite Variables Equations	 Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.	Mathswatch lesson and homework tasks.




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	include quadratic expressions <ul style="list-style-type: none"> • 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 • translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution • select appropriate concepts, methods and techniques to apply to unfamiliar 	substitution of a known value and then an expression. With elimination, all types of equations will be considered, covering simple addition and subtraction up to complex pairs where both equations need adjustment. Links will be made to graphs and forming the equations will be explored as well as solving them. The Higher strand will include the solution of a pair of simultaneous equations where one is a quadratic, again dealing with factorisation only at this stage.			<p>Strategy planning: The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an appropriate way to think about the work.</p>  <p>Critical or logical thinking: The ability to deduce, hypothesise, reason, seek supporting evidence.</p>  <p>Agile learners; Working with an enquiring mind.</p>	


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	and non-routine problems; interpret their solution in the context of the given problem. <ul style="list-style-type: none"> • solve two simultaneous equations in two variables (linear/linear {or linear/quadratic}) algebraically; • recognise, sketch and interpret graphs of linear functions and quadratic functions 					
Angles and Bearings (2 weeks)	Fluency and reasoning skills: <ul style="list-style-type: none"> • interpret and use bearings • compare lengths...using scale factors • apply Pythagoras' Theorem and trigonometric ratios to find angles and 	As well as the formal introduction of bearings, this block provides a great opportunity to revisit other materials and make links across the mathematics curriculum. Accurate drawing and use of	End of unit assessment	Compass Point Angle Turn Three letter notation	 <p>Precision: The ability to work effectively within the rules of the domain.</p> <p>Complex and multi-step problem solving: The ability to break down a task, decide on a</p>	Mathswatch lesson and homework tasks.



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	lengths in right-angled triangles {and, where possible, general triangles} in two dimensional figures <ul style="list-style-type: none"> • {know and apply the sine rule and cosine rule to find unknown lengths and angles} • use mathematical language and properties precisely • reason deductively in geometry, number and algebra, including using geometrical constructions • make and use connections between different parts of mathematics to solve problems. 	scales will be vital, as is the use of parallel line angles rules; all of these have been covered at Key Stage 3. Students will also reinforce their understanding of trigonometry and Pythagoras from earlier this year, applying their skills in another context as well as using mathematics to model real-life situations.			suitable approach, and then act.  Agile learners; Working with an enquiring mind.	
Working with circles (2 weeks)	Fluency and reasoning skills: <ul style="list-style-type: none"> • identify and apply circle definitions and 	This block also introduces new content whilst making use of and	End of unit assessment	Radius Diameter Chord Centre		Mathswatch lesson and homework tasks.



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	<p>properties, including: centre, radius, chord, diameter, circumference, tangent, arc, sector and segment</p> <ul style="list-style-type: none"> • calculate arc lengths, angles and areas of sectors of circles • calculate surface areas and volumes of spheres, pyramids, cones and composite solids • apply and prove the standard circle theorems concerning angles, radii, tangents and chords, and use them to prove related results 	<p>extending prior learning. The formulae for arc length and sector area are built up from students' understanding of fractions. They are also introduced to the formulae for surface area and volume of spheres and cones; here higher students can enhance their knowledge and skills of working with area and volume ratios. Higher tier students are also introduced to four of the circle theorems; the remaining theorems will be introduced in Year 11 when these four will be revisited.</p>		<p>Tangent Arc Sector Segment</p>	<p>Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.</p> <p>Strategy planning: The ability to approach new learning experiences by actively attempting to connect it to existing knowledge or concepts and hence determine an appropriate way to think about the work.</p>  <p>Agile learners; Working with an enquiring mind.</p>	



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<p>Vectors (2 weeks)</p>	<p>Fluency and reasoning skills:</p> <ul style="list-style-type: none"> describe translations as 2D vectors apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors; {use vectors to construct geometric arguments and proofs}. 	<p>Students will have met vectors to describe translations during Key Stage 3. This will be revisited and used as the basis for looking more formally at vectors, discovering the meaning of $-a$ compared to a to make sense of operations such as addition, subtraction and multiplication of vectors. This will connect to exploring 'journeys' within shapes linking the notation AB with $b - a$ etc. Higher tier students will then use this understanding as the basis for developing geometric proof,</p>	<p>End of unit assessment</p>	<p>Column vector Direction Scalar Size Magnitude</p>	 <p>Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.</p>  <p>Connection finding: The ability to use connections from the past experiences to seek possible generalisations.</p>  <p>Agile learners; Working with an enquiring mind.</p>	<p>Mathswatch lesson and homework tasks.</p>

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		making links to their knowledge of properties of shape and parallel lines				
Ratios and fractions (2 weeks)	Fluency and reasoning skills: • Consolidating subject content from key stage 3: ➤ Use ratio notation, including reduction to simplest form. ➤ Divide a given quantity into two parts in a given <i>part : part</i> or <i>part : whole</i> ratio; express the division of a quantity into two parts as a ratio. ➤ Relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions.	This block builds on KS3 work on ratio and fractions, highlighting similarities and differences and links to other areas of mathematics including both algebra and geometry. The focus is on reasoning and understanding notation to support the solution of increasingly complex problems that include information presented in a variety of forms. The bar model is a key tool used to support representing and	End of unit assessment	Ratio Simplest form Convert Unit Equivalent	 Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.  Connection finding: The ability to use connections from the past experiences to seek possible generalisations.  Agile learners;	Mathswatch lesson and homework tasks.

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	<p>➤ Use compound units such as speed, unit pricing and density to solve problems.</p> <ul style="list-style-type: none"> • Compare lengths, areas and volumes using ratio notation and/or scale factors; make links to similarity. • Apply the concepts of congruence and similarity, including the relationships between lengths, {areas and volumes} in similar figures. 	<p>solving these problems.</p>			<p>Working with an enquiring mind.</p>	
<p>Percentages (2 weeks)</p>	<p>Fluency and reasoning skills:</p> <ul style="list-style-type: none"> • consolidating subject content from key stage 3: ➤ interpret these multiplicatively, express one quantity as a percentage of 	<p>Although percentages are not specifically mentioned in the KS4 national curriculum, they feature heavily in GCSE papers and this block builds on</p>	<p>End of unit assessment</p>	<p>Fraction Decimal Percentage Equivalent Convert</p>	 <p>Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from</p>	<p>Mathswatch lesson and homework tasks.</p>


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	another, compare two quantities using percentages, and work with percentages greater than 100% ➤ solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics • set up, solve and interpret the answers in growth and decay problems, including compound interest {and work with general iterative processes }	the understanding gained in KS3. Calculator methods are encouraged throughout and are essential for repeated percentage change/growth and decay problems. Use of financial contexts is central to this block, helping students to maintain familiarity with the vocabulary they are unlikely to use outside school			one circumstance to another.  Agile learners; Working with an enquiring mind.	
Probability (2 weeks)	Fluency and reasoning skills:	This block also builds on KS3 and provides a good	End of unit assessment	Numerator Denominator Exact value		Mathswatch lesson and homework tasks.


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	<ul style="list-style-type: none"> • apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one • use a probability model to predict the outcomes of future experiments; understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size • calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions 	context in which to revisit fraction arithmetic and conversion between fractions, decimals and percentages. Tables and Venn diagrams are revisited and understanding and use of tree diagrams is developed at both tiers, with conditional probability being a key focus for Higher tier students.		LCM Simplest form	<p>Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.</p>  <p>Connection finding: The ability to use connections from the past experiences to seek possible generalisations.</p>  <p>Agile learners; Working with an enquiring mind.</p>	



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	<ul style="list-style-type: none"> • {calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams} 					
<p>Collecting, representing and interpreting data. (4 weeks)</p>	<p>Fluency and reasoning skills:</p> <ul style="list-style-type: none"> • consolidating subject content from key stage 3: ➤ use describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data ➤ construct and interpret appropriate tables, charts, and diagrams, including 	<p>This block builds on KS3 work on the collection, representation and use of summary statistics to describe data. Much of the content is familiar, both from previous study within and beyond mathematics (including Geography and Science) and from everyday life. The steps have been chosen to balance consolidation of</p>	<p>End of unit assessment</p>	<p>Population Sample Representative Biased Random</p>	 <p>Critical or logical thinking: The ability to deduce, hypothesise, reason, seek supporting evidence.</p>  <p>Agile learners; Working with an enquiring mind.</p>	<p>Mathswatch lesson and homework tasks.</p>




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	frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data ➤ describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete, continuous and grouped data; and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) • infer properties of populations or distributions from a	existing knowledge with extending and deepening, particularly in terms of interpretation of results and evaluating and criticising statistical methods and diagrams. For students following Higher tier, there is additional content relating to continuous data including histograms, cumulative frequency diagrams, box plots and associated measures such as quartiles and the interquartile range. Again the emphasis with these topics should be on interpretation				



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	sample, whilst knowing the limitations of sampling <ul style="list-style-type: none"> • interpret and construct tables and line graphs for time series data • {construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use} • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation 	(particularly in making comparisons) and not just construction. A possible approach to teaching this unit would be project-based, where students collect primary data (or select samples from secondary data) from which they make and test hypotheses, thus giving a purpose to the creation and analysis of the diagrams and measures involved.				

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	involving discrete, continuous and grouped data, {including box plots} <ul style="list-style-type: none"> • apply statistics to describe a population • interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (including modal class) and spread {including quartiles and inter-quartile range} 					
Non-calculator methods (2 weeks)	<ul style="list-style-type: none"> • consolidate their numerical and mathematical capability from key stage 3 • calculate exactly with fractions, {surds} and multiples of π; 	This block revises and builds on KS3 content for calculation. Mental methods and using number sense are to be encouraged alongside the formal	End of unit assessment	Add Subtract Balance Adjust Credit/Debit Profit Loss	 Complex and multi-step problem solving: The ability to break down a task, decide on a suitable approach, and then act.	Mathswatch lesson and homework tasks.

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	{simplify surd expressions involving squares and rationalise denominators} • {change recurring decimals into their corresponding fractions and vice versa} • apply and interpret limits of accuracy when rounding or truncating, {including upper and lower bounds} • 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	methods for all four operations with integers, decimals and fractions. Where possible this should be covered through problems, particularly multi-step problems in preparation for GCSE. The limits of accuracy of truncation are explored and compared to rounding, and Higher tier students will look at all aspects of irrational numbers including surds.			 <p>Agile learners; Working with an enquiring mind.</p>	

Unit:	Core knowledge/skill development: (Higher content in bold)	Sequence:	Assessment:	Literacy, numeracy, PSHE, FBV, other links	ACP and VAA development:	Home learning and enrichment
<p>Types of number and sequences: (2 weeks)</p>	<ul style="list-style-type: none"> consolidating subject content from key stage 3: <ul style="list-style-type: none"> factors, multiples, primes, HCF and LCM describe and continue sequences recognise and use sequences of triangular, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a positive rational number {or a surd}) {and other sequences} deduce expressions to calculate the nth term of linear {and 	<p>This block again mainly revises KS3 content, reviewing prime factorisation and associated number content such as HCF and LCM. Sequences is extended for Higher Tier to include surds and finding the formula for a quadratic sequence.</p>	<p>End of unit assessment</p>	<p>Integer Factor Multiple Area Factorise Prime</p>	<p> Complex and multi-step problem solving: The ability to break down a task, decide on a suitable approach, and then act.</p> <p> Agile learners; Working with an enquiring mind.</p>	<p>Mathswatch lesson and homework tasks.</p>

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	quadratic} sequence					
Indices and roots (2 weeks)	<ul style="list-style-type: none"> recognise and use sequences of square and cube numbers {estimate powers and roots of any given positive number} calculate with roots, and with integer {and fractional} indices calculate with numbers in standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer simplifying expressions involving sums, products and powers, including the laws of indices 	<p>This block consolidates the previous two blocks focusing on understanding powers generally, and in particular in standard form. Negative and fractional indices are explored in detail. Again, much of this content will be familiar from KS3, particularly for Higher tier students, so this consolidation material may be covered in less than two weeks allowing more time for general non-calculator and problem-solving</p>	End of unit assessment	Square Cube Root Prime Prime factorisation Integer	 <p>Meta-cognition: The ability to knowingly use a wide range of thinking approaches and to transfer knowledge from one circumstance to another.</p>  <p>Connection finding: The ability to use connections from the past experiences to seek possible generalisations.</p>  <p>Agile learners; Working with an enquiring mind.</p>	Mathswatch lesson and homework tasks.

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		practice. To consolidate the index laws, these can be revisited in the next block when simplifying algebraic expressions.				
<p>Manipulating expressions (2 weeks)</p>	<ul style="list-style-type: none"> • simplify and manipulate algebraic expressions (including those involving surds {and algebraic fractions}) by factorising quadratic expressions of the form $x^2 + bx + c$ • know the difference between an equation and an identity • argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct 	<p>This final block of year 10 builds on the Autumn term learning of equations and inequalities, providing revision and reinforcement for Foundation tier students and an introduction to algebraic fractions for those following the Higher tier. This also allows all students to revise fraction arithmetic to keep their skills sharp. Algebraic argument and proof</p>	<p>End of unit assessment</p>	<p>Expression Term Simplify Coefficient Power Like / unlike</p>	 <p>Critical or logical thinking: The ability to deduct, hypothesise, reason, seek supporting evidence.</p> <p>Complex and multi-step problem solving: The ability to break down a task, decide on a suitable approach, and then act.</p> 	<p>Mathswatch lesson and homework tasks.</p>

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	arguments {and proofs}	are considered, starting with identities and moving on to consider generalised number.			Agile learners; Working with an enquiring mind.	