

Programme of study for Year 10 Higher Maths

Autumn (1 st term)	Autumn (2 nd term)	Spring (1 st term)	Spring (2 nd Term)	Summer (1 st term)	Summer (2 nd term)
Other timescale: From: September To: October	Other timescale: From: October To: December	Other timescale: From: January To: February	Other timescale: From: February To: April	Other timescale: From: April To: May	Other timescale: From: June To: July
Topic / Key Question: <ul style="list-style-type: none"> - Graphs - Linear graphs and coordinate geometry - Quadratic, cubic and other graphs 	Topic / Key Question: <ul style="list-style-type: none"> - Transformations - Probability 	Topic / Key Question: <ul style="list-style-type: none"> - Quadratic and simultaneous equations 	Topic / Key Question: <ul style="list-style-type: none"> - Inequalities - Multiplicative reasoning - Construction, loci and bearings 	Topic / Key Question: <ul style="list-style-type: none"> - Congruence and similarity in 2D & 3D - Cumulative frequency, box plots and histograms - Graphs of trigonometric functions - Further trigonometry 	Topic / Key Question: <ul style="list-style-type: none"> - Further trigonometry continued
Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Skills: A01: Use, recall and apply standard techniques A02: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts

<p>Key Learning Outcomes: Plot points in all four quadrants.</p> <p>Draw + interpret straight-line graphs for real-life events.</p> <p>Draw distance/time & velocity/time graphs.</p> <p>Use graphs to find various measures (gradient).</p> <p>Find the coordinates of the midpoint of a line segment.</p> <p>Find the length of a line segment.</p> <p>Find the coordinate of points identified by geometrical information.</p> <p>Find the equation of a line from 2 coordinate points.</p> <p>Identify, plot and draw graphs of: $y = a$, $x = a$, $y = x$ and $y = -x$</p> <p>Find the gradient of a line segment.</p>	<p>Key Learning Outcomes: Recognise and describe rotations.</p> <p>Rotate 2D shapes from a centre of rotation point.</p> <p>Describe reflections and identify the equation of a line of symmetry.</p> <p>Reflect 2D shapes using specified mirror lines. Identify + describe single translations using column vectors.</p> <p>Translate a given shape by a vector.</p> <p>Enlarge a shape (no centre of Enlargement point).</p> <p>Describe + transform 2D shapes using enlargement stating SF (positive integer, positive, fractional & negative scale factor) & centre.</p> <p>Find areas after enlargement & compare before enlargement. Deduce area scale factor.</p> <p>Use rotation, reflection &</p>	<p>Key Learning Outcomes: Factorise quadratic expressions in the form $ax^2 + bx + c$.</p> <p>Set up and solve quadratic equations.</p> <p>Solving quadratic equations by factorising.</p> <p>Apply completing the square to quadratic expressions.</p> <p>Solve quadratic equations by completing the square (including rearranging the equation).</p> <p>Proving the quadratic formula through completing the square.</p> <p>Solve quadratic equations. By using the quadratic formula.</p> <p>Find exact solutions of 2 simultaneous equations through elimination.</p> <p>Find exact solutions of</p>	<p>Key Learning Outcomes: Show inequalities on a number line.</p> <p>Write down whole number values that satisfy the inequality.</p> <p>Solve simple linear inequalities & represent the solution set on a number line.</p> <p>Solve 2 linear inequalities in x, find the solution sets and compare them to see which value of x satisfies both.</p> <p>Solve linear inequalities in 2 variables algebraically.</p> <p>Use correct notation to show inclusive and exclusive inequalities.</p> <p>Express a multiplicative relationship between 2 quantities as a ratio or a fraction.</p> <p>Solve proportion problems using unitary methods.</p>	<p>Key Learning Outcomes: Use SSS, SAS, ASA and RHS to prove the congruence of triangles using formal arguments.</p> <p>Solving angle problems by first proving congruence.</p> <p>Prove that two shapes are similar by showing corresponding angles are equal or scale factor of the sides are in the same ratio.</p> <p>Use formal geometrical proof for the similarity of 2 given triangles</p> <p>Identify the SF an enlargement of a similar shape of the lengths of 2 corresponding sides.</p> <p>Understand the effect of enlargement on angles, perimeter, area & volume of shapes.</p> <p>Find missing lengths, areas & volumes of similar 3D solids.</p> <p>Solve problems involving frustums of</p>	<p>Key Learning Outcomes: Know and apply</p> <p>Area = $\frac{1}{2} ab \sin C$ to the area, sides or angles of any triangle.</p> <p>Know the sine and cosine rules, and use to solve 2D problems (including bearings). Use the sine and cosine rules to solve 3D problems.</p> <p>Understand the language of planes, and recognise the diagonals of a cuboid.</p> <p>Solve geometrical problems on coordinate axes.</p> <p>Understand, recall and use trigonometric relationships and Pythagoras' theorem in right angled triangles, and use these to solve problems in 3D configurations.</p> <p>Calculate the length of a diagonal of a cuboid.</p> <p>Find the angle between</p>
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<p>Identify m & c from $y = mx + c$.</p> <p>Find the equation of a line from a linear graph.</p> <p>Plot and draw linear graphs ($y = mx + c$).</p> <p>Find the equation of a line when the gradient is given.</p> <p>Plot and draw graphs in the form of $ax+by=c$ and state gradient.</p> <p>Identify direct proportion from a graph.</p> <p>Understand and state parallel + perpendicular gradients.</p> <p>Find the equation of a line of best fit.</p> <p>Recognise linear, quadratic, cubic, reciprocal and circle graphs.</p> <p>Generate points and plot graphs of quadratic functions.</p> <p>Find approximate solutions of a quadratic</p>	<p>translation to identify congruent shapes.</p> <p>Describe and transform 2D shapes by combining any of the 4 transformations.</p> <p>Write probability using fractions, percentages or decimals.</p> <p>Understand and use experimental and theoretical measures of probability, including relative frequency.</p> <p>Estimate the number of times an event will occur, given the probability and the number of trials. Find the probability of successful events (Several throws of a single dice).</p> <p>List all the outcomes for single events, and combined events systematically.</p> <p>Draw a sample space diagram and use them for adding probabilities.</p> <p>Know that the sum of the probabilities of all outcomes is 1.</p>	<p>2 simultaneous equations through substitution.</p> <p>Solve simultaneous equations by elimination or substitution: (linear/linear – linear/quadratic – linear/ $x^2 + y^2 = r^2$).</p> <p>Solve simultaneous equations graphically: (linear/linear – linear/quadratic – linear/ $x^2 + y^2 = r^2$).</p> <p>Setting up and solving a pair of simultaneous equations in 2 variables in the form: (linear/linear – linear/quadratic – linear/ $x^2 + y^2 = r^2$).</p>	<p>Work out which product offers best value and consider rates of pay.</p> <p>Understand repeated proportional change using a multiplier raised to a power (compound interest & depreciation).</p> <p>Understand and use compound measures and convert between metric speed measures.</p> <p>Convert between density measures & pressure measures.</p> <p>Use kinematics formulae to calculate speed & acceleration.</p> <p>Calculate an unknown quantity from quantities that vary in direct or inverse proportion.</p> <p>Recognise from a graph when values are in direct proportion and use graph to find k in</p>	<p>cones.</p> <p>Construct and interpret cumulative freq. tables/graphs.</p> <p>Find the median and quartiles values and interquartile range.</p> <p>Compare mean & range of 2 distributions, or median & interquartile range.</p> <p>Interpret box plots to find: median, quartiles, range & IQR.</p> <p>Construct & interpret histograms from class intervals with unequal width.</p> <p>Estimate the mean & median from a histogram or finding the frequency of a given interval.</p> <p>Recognise, sketch and interpret graphs of trigonometric functions (in degrees)</p> <p>$y = \sin x$, $y = \cos x$, $y = \tan x$</p> <p>Know the exact values</p>	<p>a line and a plane.</p>
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<p>equation from the corresponding quadratic graph.</p> <p>Interpret graphs of quadratic functions from real- life problems.</p> <p>From a table of values draw cubic functions.</p> <p>Interpret graphs of simple cubic functions and finding solutions to cubic equations.</p> <p>Draw graphs of reciprocal functions $y = \frac{1}{x}$ where $x \neq 0$.</p> <p>Draw circles, centre the origin, equation $x^2 + y^2 = r^2$</p>	<p>Use $1 - p$ as the probability of an event not occurring, where p is the probability of the event occurring.</p> <p>Work out the probabilities from Venn diagrams to represent real life situation and also abstract sets of numbers.</p> <p>Use union and intersection notation.</p> <p>Find a missing probability from a two way table, including algebraic terms.</p> <p>Understand conditional probability and decide if the 2 events are independent.</p> <p>Draw probability tree diagram and use this to find the probability and the expected number of outcomes.</p> <p>Calculate probability of independent and dependent combined events.</p> <p>Use two-way tables or tree diagrams to calculate</p>		<p>$y = kx$.</p> <p>Recognise when the values are in inverse proportion by reference.</p> <p>Relate algebraic solutions to graphical representations of the equations.</p> <p>Set up and use equations to solve word & other problems involving proportion + relate algebraic solutions to graphical representation of equations.</p> <p>Draw 3D shapes.</p> <p>Draw front, side elevations and plans of solid.</p> <p>Sketch 3D shape from a net</p> <p>Interpret maps and scale drawings</p> <p>Read & construct scale drawings, drawing lines + shapes to scale.</p> <p>Estimate lengths using</p>	<p>of $\sin \theta$, $\cos \theta$, $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and find them from graphs</p> <p>Apply the graph of $y = f(x)$ and the transformations $y = -f(x)$, $y = f(-x)$ for sine, cosine and tan functions $f(x)$.</p> <p>Apply to the graph $y = f(x)$ the transformations $y = f(x) + a$, $y = f(x + a)$ for sine, cosine & tan functions $f(x)$.</p> <p>Know and apply</p> <p>Area = $\frac{1}{2}ab \sin C$ to the area, sides or angles of any triangle.</p> <p>Know the sine and cosine rules, and use to solve.</p> <p>2D problems (including bearings).</p> <p>Use the sine and cosine rules to solve 3D problems.</p> <p>Understand the language of planes, and recognise the diagonals</p>	
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	conditional probability.		<p>scale diagram.</p> <p>Calculate bearings & solve bearing problems. Bisect a given angle.</p> <p>Construct angles of 45°, 90° and perpendicular, perpendicular bisector of line segment.</p> <p>Construct a region bounded by a circle & an intersecting line.</p> <p>Construct a given distance from a point and a given line.</p> <p>Construct equal 2 points or 2 line segments.</p> <p>Know perpendicular distance from a point is the shortest distance to the line.</p>	<p>of a cuboid.</p> <p>Solve geometrical problems on coordinate axes.</p> <p>Understand, recall and use trigonometric relationships and Pythagoras' theorem in right angled triangles, and use these to solve problems in 3D configurations.</p> <p>Calculate the length of a diagonal of a cuboid.</p> <p>Find the angle between a line and a plane.</p>	
<p>End of term 1 assessment to cover:</p> <ul style="list-style-type: none"> - Graphs - Linear graphs and coordinate geometry - Quadratic, cubic and other graphs - Transformations - Probability 		<p>End of term 2 assessment to cover:</p> <ul style="list-style-type: none"> - Quadratic and simultaneous equations - Inequalities- - Multiplicative reasoning - Construction, loci and bearings 		<p>End of year assessment to cover:</p> <ul style="list-style-type: none"> - Graphs - Linear graphs and coordinate geometry - Quadratic, cubic and other graphs - Transformations - Probability - Quadratic and simultaneous equations 	

				<ul style="list-style-type: none"> - Inequalities- - Multiplicative reasoning - Construction, loci and bearings - Congruence and similarity in 2D & 3D - Cumulative frequency, box plots and histograms - Graphs of trigonometric functions - Further trigonometry - Further trigonometry continued 	
<p>Rationale for sequence:</p> <p>Students recap and consolidate graph skills attained at KS3 on recognise, plot and sketch linear functions.</p> <p>Students also use linear graphs to estimate and predict values of y, given values of x and vice versa.</p> <p>In KS4 they spend autumn term 1 appreciating the basics of graphs, linear graphs coordinate and geometry and quadratics cubic, reciprocal and other graphs.</p> <p>In KS3 students have already obtained skills</p>	<p>Rationale for sequence:</p> <p>In autumn term 2 students move to transformations and probability.</p> <p>In KS4 students are enhancing all their skills on the following types of transformations: reflection, translation, enlargement and rotation.</p> <p>At KS3 students focus more on enlargement with a positive scale factor and a centre of enlargement. In KS4 students revisit these skills but deepen their knowledge by enlarging shapes with a negative scale factor where they are introduced to column vector notation.</p> <p>In KS4 students are expected to describe and</p>	<p>Rationale for sequence:</p> <p>In spring term 1 students move onto exploring algebra in more depth. They deepen their knowledge with quadratic and simultaneous equations.</p> <p>In KS3 students begin to factorise quadratic equations where the coefficient of x^2 is 1 and put these into brackets ready to solve.</p> <p>Here in the Spring Term 1 students use those skills obtained from KS3 to factorise quadratics where the coefficient of x^2 is more than 1 and put these into double</p>	<p>Rationale for sequence:</p> <p>In Spring term 2 students revisit inequalities but in more detail from their skills obtained in KS3.</p> <p>In KS3 students were introduced to solving simple one and two step inequalities and need to be able to show inequalities on a number line.</p> <p>From their previous skills students will revisit the above and widen their knowledge by moving onto solving 2 linear inequalities and finding solution sets to compare and see which integers satisfy both. They also</p>	<p>Rationale for sequence:</p> <p>In Summer 1 students move to congruency. In KS3 learners understand that if two 2-D shapes are congruent, corresponding sides and angles are equal and are able to solve problems using properties of angles, of parallel and intersecting lines and of triangles and other polygons.</p> <p>In KS3 student are familiar with explaining reasoning with diagrams and develop knowledge of lines, angles and polygons by: using the congruence Conditions (SSS, SAS,</p>	<p>Rationale for sequence:</p> <p>In summer 2 students explore more deeper into trigonometry.</p> <p>In KS3 students practice applying Pythagoras's theorem in 3D configurations. In KS4 learners sharpen these skills and have to understand, recall and use trigonometric relationships and Pythagoras' theorem in right angle triangles and use this to solve problems in 3D configurations. Learners are also introduced to calculating the length of a diagonal of a cuboid, finding angles between a line and a</p>

<p>on speed/distance time graphs and enhance skills this term. This term students are introduced to higher level velocity time graphs and explore working with areas under the graph.</p> <p>This term students are introduced on how to find midpoint and gradients using the formula and triangle method (change in y over change in x).</p> <p>Students revisit from KS3 skill on how to draw and label horizontal ($y=4$) and vertical lines ($x=2$). They will also be expected to understand the lines $y=x$ and $y=-x$. In KS4 we develop these skills by drawing skills by drawing linear graphs (with and without a table of values). Students enhance these skills then move onto drawing and plotting graphs in the form on $ax + by + c = 0$. Here they need to identify the</p>	<p>perform a combination of transformations.</p> <p>Previously in KS3 students learn how to work out the probability of an event or two events, experimental probability, use of a sample space diagram and are introduced to basic tree diagrams.</p> <p>Students in KS4 sharpen their probability skills by understanding concepts that probabilities sum to 1. So the probability of an event not happening is $1-p$.</p> <p>Students work out the probabilities from Venn diagrams to represent real life situations and also abstract sets of numbers.</p> <p>In KS3 students use Venn diagrams to find the HCF and LCM method and are introduced to union and intersection notation. In KS4 students will explore shading different regions on a Venn Diagram with the correct probability notation for example $(P(A \cap B'))$. Probability of A and B not happening.</p>	<p>brackets. Already at KS3 students are familiar with the concept of difference of two squares and how to factorise them.</p> <p>In KS3 students previously only focus on solving linear simultaneous equations strictly using the method of elimination and come across how to solve them graphically.</p> <p>In KS4 students now strengthen this by revising the above skills and solving harder simultaneous equations using the method of substitution. Here they broaden their algebra skills by beginning to solve quadratic simultaneous equations with a linear one, where some require one additional step to rearrange for either x or y.</p> <p>There are 3 techniques on how to solve a quadratic which is the</p>	<p>begin to solve linear inequalities in 2 variables algebraically using all their previous algebra skills obtained from KS3.</p> <p>In KS4 an additional element taught to the inequalities topic is making students aware of using the correct notation to show both inclusive and exclusive inequalities.</p> <p>In KS3 students are introduced to the basics of loci and construction. Previously they were taught how to use a ruler and compass to construct a: bisector of an angle, perpendicular bisector and perpendicular from a point to a line.</p> <p>In KS3 learners will be given opportunities to solve geometric problems based on real life scenarios such as location of a house a certain distance away from a given point or</p>	<p>RHS, ASA) to deduce familiar properties of triangles and quadrilaterals, e.g. an isosceles triangle has two equal angles.</p> <p>Using the above skills students now in KS4 enhance their congruency skills by proving two shapes are similar by showing corresponding angles are equal or scale factor of the sides are in the same ratio. They also use formal geometrical proof for similarity of 2 given triangles.</p> <p>Students also enhance skills on solving problems involving frustum of cones.</p> <p>In KS4 students are introduced to constructing cumulative frequency tables and graphs where they gain skills on how to find the median, quartiles and inter quartile range from the graphs and data sets. Here they explore how to</p>	<p>plane by using the previous skills obtained at KS3.</p> <p>Learners now establish trigonometry used in non-right angled triangles where they begin to find the area of a triangle applying the formula</p> $A = \frac{1}{2} ab \sin C.$
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<p>gradient of the equation by rearranging to make y the subject of the formula.</p> <p>In KS4 students will enjoy the experience of drawing new graphs such as quadratic, cubic, reciprocal and circle graphs. Here students will the skill of substitution to complete a table of values (with and without a calculator) to draw the above graphs.</p>	<p>Students explore a measure of the probability of an event occurring given that another event has occurred is also known as conditional probability. Here students explore real life</p> <p>Conditional probability looks at these two events in relationship with one another.</p>	<p>focus of the spring term 1 objectives. Here students recognise the 3 methods to solve a quadratic equation are: completing the square, using the quadratic formula and factorising.</p> <p>Students also apply skills used and gained from autumn term 1 on drawing the equation of a circle. Applying these skills students are expected to now solve simultaneous equations that involve quadratic equations (equation of a circle) and a linear equation both graphically and by the method of substitution.</p>	<p>they will be given opportunities to use loci when installing CCTV cameras in a building/GPS systems.</p> <p>In KS4 students enhance those skills by calculating bearing and solving bearing problems and are expected to read and construct scale drawing, drawing lines and shapes to scale. This skill is used a lot in cross curricular subjects like Geography and Duke of Edinburgh hikes when using scaling of maps.</p>	<p>compare the mean and range of 2 distributions or the median and interquartile range.</p> <p>Previously in KS3 students access skills on how to produce a histogram (Frequency density = $\text{Frequency} \div \text{Class width}$). In KS4 now student use these prior skills attained to interpret and estimate the mean and median from a histogram or finding the frequency of a given interval.</p> <p>In this term students explore, recognise, sketch and interpret graphs of trigonometric functions (in degrees)</p> <p>$y = \sin x$ $y = \cos x$ $y = \tan x$</p> <p>At the start of KS4 students learn to calculate exact trig values for $\sin \theta$, $\cos \theta$, $\tan \theta$, for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$. In Year 10 during the Summer term 1 students recall these prior skills but find them from graphs.</p>	
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				Using the above skills students are then exposed to graph transformations i.e $y=f(x)$, $y=-f(x)$, $y=f(x)+a$ and $y=f(x+a)$. This can be linked to skills in physics from sound waves.	
Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:	Reading / literacy:
Numeracy:	Numeracy:	Numeracy:	Numeracy:	Numeracy:	Numeracy:
Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):					