



Curriculum map – Mathematics (2023-2024)

YEAR 11 HIGHER TIER	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC(s)	<p>Unit 1 Pythagoras' Theorem and trigonometry in right-angled triangles</p> <p>Unit 2 Quadratic, cubic and other graphs</p> <p>Unit 3 Constructions, loci and bearings</p> <p>Unit 4 Solving quadratic and simultaneous equations</p> <p>Unit 5 Inequalities</p>	<p>Unit 6 Multiplicative reasoning</p> <p>Unit 7 Similarity and congruence in 2D and 3D</p> <p>Unit 8 Graphs of trigonometric functions</p> <p>Unit 9 Further trigonometry</p>	<p>Unit 10 Cumulative frequency, box plots and histograms</p> <p>Unit 11 Quadratics, expanding more than two brackets, sketching graphs and graphs of circles</p> <p>Unit 12 Circle theorems</p> <p>Unit 13 Circle geometry</p> <p>Unit 14 Changing the subject, algebraic fractions, rationalising surds and proof</p>	<p>Unit 15 Vectors and geometric proof</p> <p>Unit 16 Reciprocal and exponential graphs; Gradient under a curve</p> <p>Unit 17 Direct and inverse proportion</p>	Revision and consolidation	GCSE examinations

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What students will know	<p>Unit 1 Pythagoras' Theorem. The trigonometric ratios for a right-angled triangle (SOHCAHTOA). The exact values of $\sin \theta$ and $\cos \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°. The exact value of $\tan \theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°.</p> <p>Unit 2 The point(s) at which a quadratic or cubic graph crosses the x-axes are the real solutions of the equation. The graph of a circle is represented by the equation $x^2+y^2=r^2$, where r is the radius of the circle.</p> <p>Unit 3 Bearings are three figures and are always measured clockwise from North. The perpendicular distance from a point to a line is the shortest distance to the line.</p> <p>Unit 4 Quadratic equations can be solved algebraically by factorising, completing the square or using the quadratic formula. The quadratic formula. Solutions are more accurate given in surd form, than decimal form.</p> <p>Unit 5 When representing inequalities on a number line, a hollow circle does not include that value, a solid circle means the value is included.</p>	<p>Unit 6 Formulae for the three common compound measures (Speed, Density, Pressure). The multipliers for a given percentage increase/decrease. What it means for two variables to be in direct or inverse proportion to each other. Graphical representations of proportion.</p> <p>Unit 7 The definition of congruence and the four conditions of congruence. The definition of similarity. The effect of angles, perimeter, area and volume of shapes after an enlargement. How a frustum is created.</p> <p>Unit 8 The characteristic shape of a trigonometric graph.</p> <p>Unit 9 For any triangle, $\text{Area} = \frac{1}{2} ab \sin C$. The sine rule The cosine rule</p>	<p>Unit 10 Cumulative frequency is plotted at the upper boundary on a graph. Histograms use frequency density. How to calculate frequency density.</p> <p>Unit 11 Finding graphical solutions only gives approximate answers.</p> <p>Unit 12 The definition of a circle. The circle theorems.</p> <p>Unit 13 For the graph of a circle, the radius and tangent are perpendicular.</p> <p>Unit 14 Consecutive integers can be represented algebraically by $n, n+1$ etc. Even numbers can be represented by the expression $2n$. Odd numbers can be represented by the expression $2n+1$. The inverse function can be written as $f^{-1}(x)$.</p>	<p>Unit 15 $2\mathbf{a}$ is parallel to \mathbf{a} and twice its length. \mathbf{a} is parallel to $-\mathbf{a}$ in the opposite direction.</p> <p>Unit 16 The gradient of a tangent to a curve at a given point represents the rate of change.</p> <p>Unit 17 \propto is the symbol for 'is proportional to'. For $y=kx$, k represents the constant of proportionality.</p>		

What students will be able to do

<p>Unit 1</p> <p>Use Pythagoras' Theorem to justify if a triangle is right-angled or not.</p> <p>Use Pythagoras' Theorem to find the hypotenuse in a right-angled triangle.</p> <p>Use Pythagoras' Theorem to find a shorter side in a right-angled triangle.</p> <p>Calculate the length of a line segment, given coordinates of the end points.</p> <p>Use the trigonometric ratios to find a missing side in a right-angled triangle.</p> <p>Use the trigonometric ratios to find a missing angle in a right-angled triangle.</p> <p>Find angles of elevation and depression.</p> <p>Unit 2</p> <p>Plot and draw a quadratic graph, using a table of values.</p> <p>Find approximate solutions of a quadratic equation using a graph.</p> <p>Plot and draw a cubic graph, using a table of values.</p> <p>Plot and draw graphs of the reciprocal function, using a table of values.</p> <p>Draw circles, centre the origin, equation $x^2+y^2=r^2$.</p> <p>Unit 3</p> <p>Draw 3D shapes using isometric grids.</p> <p>Draw front and side elevations and plans of shapes made from simple solids.</p> <p>Draw a sketch of a 3D solid, given the front and side elevation and the plan view.</p> <p>Draw and measure bearings.</p> <p>Calculate bearings.</p> <p>Bisect a given angle.</p> <p>Construct angles of 90° and 45°.</p> <p>Construct a perpendicular bisector of a line segment.</p> <p>Construct a perpendicular to a given line from a point.</p>	<p>Unit 6</p> <p>Express a multiplicative relationship as a ratio or fraction.</p> <p>Solve problems using the unitary method e.g best buys/rates of pay</p> <p>Calculate multipliers for repeated proportional change e.g compound interest and depreciation.</p> <p>Use compound measures for speed, density and pressure.</p> <p>Use given kinematics formulae to calculate speed, acceleration etc.</p> <p>Set up, solve and use direct/inverse proportion equations.</p> <p>Unit 7</p> <p>Use the basic congruence criteria for triangles (SSS, SAS, ASA and RHS).</p> <p>Solve problems by at first proving congruence.</p> <p>Prove that two shapes are similar by considering angles and the enlargement of sides.</p> <p>Use formal geometric proof for similarity of two triangles.</p> <p>Find and solve problems considering linear, area and volume scale factors.</p> <p>Solve problems involving frustums of cones, including finding missing lengths in similar triangles.</p> <p>Unit 8</p> <p>Recognise, sketch and interpret graphs of the trigonometric functions (in</p>	<p>Unit 10</p> <p>Construct and interpret cumulative frequency tables.</p> <p>Construct and interpret cumulative frequency graphs.</p> <p>Use a cumulative frequency graph to estimate the frequency greater/less than a value.</p> <p>Use a cumulative frequency graph to estimate the median, LQ, UQ and IQR.</p> <p>Use a box plot to identify the median, LQ, UQ, IQR and range.</p> <p>Construct a box plot given the critical values.</p> <p>Construct a box plot from a given data set.</p> <p>Compare a measure of average and measure of spread for two distributions.</p> <p>Construct and interpret histograms from class intervals with unequal width.</p> <p>Use a histogram to complete a grouped frequency table.</p> <p>Use a histogram to estimate the mean and median.</p> <p>Unit 11</p> <p>Sketch the graph of a quadratic function, using the roots, y-intercept and turning point, identified by factorising or using the formula.</p> <p>Sketch the graph of a cubic function, given as three linear expressions.</p> <p>Expand the product of more than two linear expressions.</p> <p>Solve simultaneous equations graphically.</p> <p>Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values.</p> <p>Represent the solution set for inequalities using set notation.</p>	<p>Unit 15</p> <p>Use vector notation, including column notation.</p> <p>Represent vectors pictorially.</p> <p>Represent combinations of vectors pictorially.</p> <p>Represent scalar multiples of a vector pictorially.</p> <p>Calculate the sum of two vectors using column vectors.</p> <p>Calculate the difference of two vectors using column vectors.</p> <p>Calculate a scalar multiple of a vector using column vectors.</p> <p>Find the length of a vector using Pythagoras' Theorem.</p> <p>Calculate the resultant of two vectors.</p> <p>Solve geometric problems in 2D where vectors are divided in a given ratio.</p> <p>Produce geometric proofs with vectors.</p> <p>Unit 16</p> <p>Recognise, sketch and interpret graphs of the reciprocal function.</p> <p>State the value of x for which an equation is undefined.</p> <p>Recognise, sketch and interpret graphs of exponential functions.</p> <p>Set up, solve and interpret the answers in growth and decay problems.</p> <p>Interpret and analyse transformations of graphs of functions and write the functions algebraically.</p> <p>Estimate the area under a curve by dividing it into trapezia.</p> <p>Interpret the gradient of linear and non-linear graphs.</p> <p>Estimate the gradient of a curve at a given point by sketching a tangent and finding its gradient.</p>		
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	<p>Construct a perpendicular to a given line at a point.</p> <p>Find the locus of a region bounded by a circle and intersecting line.</p> <p>Find the locus of a given distance from a point.</p> <p>Find the locus of a given distance from a line.</p> <p>Find the locus of equal distances from two points.</p> <p>Find the locus of equal distances from two line segments.</p> <p>Find the locus of regions which may be defined by 'nearer to' or 'greater than'.</p> <p>Use constructions to solve loci problems.</p> <p style="text-align: center;">Unit 4</p> <p>Factorise quadratic expressions in the form ax^2+bx+c.</p> <p>Solve quadratic equations by factorisation.</p> <p>Solve quadratic equations by completing the square.</p> <p>Solve quadratic equations using the quadratic formula.</p> <p>Solve quadratic equations that need rearranging.</p> <p>Solve two linear simultaneous equations, with two unknowns, by elimination.</p> <p>Solve two linear simultaneous equations, with two unknowns, by substitution.</p> <p>Solve two simultaneous equations (one linear, one quadratic), with two unknowns, by substitution.</p> <p style="text-align: center;">Unit 5</p> <p>Represent an inequality on a number line.</p> <p>Write down integers that satisfy an inequality.</p> <p>Solve linear inequalities, in one variable.</p>	<p>degrees) $y = \sin x$, $y = \cos x$ and $y = \tan x$ for angles of any size.</p> <p>Apply to the graph of $y = f(x)$ the transformations $y = -f(x)$, $y = f(-x)$ for sine, cosine and tan functions $f(x)$.</p> <p>Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(x + a)$ for sine, cosine and tan functions $f(x)$.</p> <p style="text-align: center;">Unit 9</p> <p>Use $\text{Area} = \frac{1}{2}ab \sin C$ to calculate the area, sides or angles of any triangle.</p> <p>Use the sine rule to solve 2D problems.</p> <p>Use the cosine rule to solve 2D problems.</p> <p>Use the sine rule to solve 3D problems.</p> <p>Use the cosine rule to solve 3D problems.</p> <p>Use Pythagoras' Theorem and trigonometry in a right-angled triangle to solve 3D problems.</p> <p>Calculate the length of a diagonal of a cuboid.</p>	<p>Solve linear inequalities in two variables graphically.</p> <p>Use iteration with simple converging sequences.</p> <p style="text-align: center;">Unit 12</p> <p>Identify and draw parts of a circle, including sector, tangent, chord and segment.</p> <p>Use circle theorems to calculate missing angles.</p> <p style="text-align: center;">Unit 13</p> <p>Find the equation of a tangent to a circle at a given point.</p> <p style="text-align: center;">Unit 14</p> <p>Rationalise the denominator involving surds.</p> <p>Simplify algebraic fractions.</p> <p>Multiply and divide algebraic fractions.</p> <p>Solve quadratic equations arising from algebraic fraction equations.</p> <p>Change the subject of a formula.</p> <p>Solve 'show that' and proof problems using consecutive integers, squares, even numbers and odd numbers.</p> <p>Use function notation.</p> <p>Find $f(x)+g(x)$, $f(x)-g(x)$, $2f(x)$, $f(3x)$ etc algebraically.</p> <p>Find the inverse of a linear function.</p> <p>For two functions $f(x)$ and $g(x)$, find $gf(x)$.</p>	<p style="text-align: center;">Unit 17</p> <p>Recognise and interpret graphs showing direct and indirect proportion.</p> <p>Identify direct proportion from a table of values for x-squared and x-cubed relationships.</p> <p>Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity.</p> <p>Set up and use equations to solve problems involving direct proportion.</p> <p>Use $y=kx$ to solve direct proportion problems.</p> <p>Solve problems involving inverse proportion using graphs.</p> <p>Solve problems using inverse proportionality.</p> <p>Set up and solve equations to solve problems involving inverse proportion.</p>		
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Beyond the classroom (Wider reading / Trips)	Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks. Y10 End of Year Assessment Intervention.	Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks. Y10 End of Year Assessment Intervention.	Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks. Y11 Autumn MOCK exam Intervention.	Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks. Y11 Autumn MOCK exam Intervention Runshaw College Mathematics Challenge	Sparx Compulsory Homework Task. Sparx XP Boost Task. Sparx Target Task. Sparx Independent Learning Tasks. Y11 Spring MOCK exam Intervention	