



Topic	Learning Objectives	Key Vocabulary	Learning Sequence	Linked Learning	Home Learning
<p>Investigating properties of shapes</p>	<p>Know and use the exact values of trigonometric functions for 0°, 30°, 45°, 60° and 90°</p> <p>Know and use the trigonometric ratios to find angles and lengths in right-angled triangles</p>	<p>Opposite Adjacent Hypotenuse Function Ratio Sine Cosine Tangent Angle of elevation, angle of depression</p>	<p>Establish the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90°</p> <p>Establish the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ$ and 60°</p> <p>Learn the trigonometric ratios, $\sin\theta = o/h$, $\cos\theta = a/h$, $\tan\theta = o/a$</p> <p>Solve a trigonometric equation to find a missing side or angle in a right-angled triangle</p> <p>Use trigonometry to solve problems involving bearings and angles of elevation and depression</p>	<p>Solve linear equations, including those with the unknown in the denominator of a fraction</p> <p>Understand and use Pythagoras' theorem</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>
<p>Calculating</p>	<p>Be able to calculate with integer and fractional indices</p> <p>Be able to calculate exactly with surds Be able to apply and interpret limits of accuracy, including upper and lower bounds</p>	<p>Power, Root Index, Indices Surd Inequality Truncate, Round Significant figure</p>	<p>Know and use the fact that $a^{-n} = 1/a^n$</p> <p>Know and use the fact that $a^{1/n} = \sqrt[n]{a}$ Use $\sqrt{a \times b} = \sqrt{a} \times \sqrt{b}$</p> <p>Simplify surds Identify error bounds</p> <p>Calculate the upper and lower bounds in a given situation</p>	<p>Know the multiplication and division laws of indices</p> <p>Know square numbers</p> <p>Round to a given number of decimal places or significant figures</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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Solving equations	Be able to find approximate solutions to equations numerically using iteration Be able to solve two linear simultaneous equations in two variables algebraically	Interval Decimal search Iteration Substitution Elimination	Use decimal search to solve a complex equation Use an iterative formula to find approximate solutions to equations Solve two linear simultaneous equations in two variables by substitution Solve two linear simultaneous equations in two variables by elimination	Solve a linear equation Substitution into expressions	There will be a written piece of homework each week to reinforce key concepts.



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Mathematical movement Enlargement	Be able to describe and construct similar shapes by enlargement, including on coordinate axes	Scale Factor Enlarge Similar Congruent	Find the centre and fractional scale factor of an enlargement Use the centre and scale factor to carry out an enlargement with a fractional scale factor Solve problems involving similarity	Use the centre and scale factor to carry out an enlargement of a 2D shape with a positive integer scale factor	There will be a written piece of homework each week to reinforce key concepts.
Mathematical movement Changes and Invariance	Be able to describe the changes and invariance achieved by combinations of rotations, reflections and translations	Transformation Rotation Reflection Translation	Perform a sequence of transformations on a 2D shape Find and describe a single transformation given two congruent 2D shapes	Carry out reflection, rotations and translations of 2D shapes	There will be a written piece of homework each week to reinforce key concepts.
Algebraic proficiency Algebraic fractions in expressions	Be able to manipulate algebraic expressions involving algebraic fractions	Equation Expression Simplify	Add, subtract, multiply and divide algebraic fractions Simplify an algebraic fraction	Add, subtract, multiply and divide proper fractions	There will be a written piece of homework each week to reinforce key concepts.



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<p>Algebraic proficiency</p> <p>Factorise quadratic expressions</p>	<p>Be able to expand products of more than two binomials and factorise quadratic expressions of the form $x^2 + bx + c$</p>	<p>Expand Linear Quadratic Difference of two squares Binomial Factorise</p>	<p>Expand the product of three binomials</p> <p>Factorise an expression involving the difference of two squares</p> <p>Factorise a quadratic expression of the form $ax^2 + bx + c$ (a is prime or composite)</p>	<p>Multiply two linear expressions of the form $(x \pm a)(x \pm b)$</p> <p>Factorise a quadratic expression of the form $x^2 + bx + c$</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>
<p>Algebraic proficiency</p> <p>Changing subject of a formulae</p>	<p>Be able to change the subject of formulae</p>		<p>Change the subject when more than two steps are required</p> <p>Change the subject when the required subject appears twice</p>	<p>Change the subject of a formula when two steps are required</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>
<p>Proportional reasoning</p>	<p>Be able to recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>Be able to interpret equations that describe direct and inverse proportion</p>	<p>Direct proportion Inverse proportion Multiplier</p>	<p>Recognise and interpret graphs that illustrate direct and inverse proportion</p> <p>Interpret equations that describe direct and inverse proportion</p> <p>Solve problems which include finding the multiplier in a situation involving direct and inverse proportion</p>	<p>Know the difference between direct and inverse proportion</p> <p>Understand the connection between the multiplier, the expression and the graph</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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Pattern sniffing	Be able to deduce expressions to calculate the nth term of quadratic sequences Be able to recognise and use simple geometric progressions (r^n where n is an integer, and r is a rational number > 0)	Term nth term Generate Quadratic First (second) difference Geometric Progression	Find the nth term of a sequence of the form $ax^2 + b$ Find the nth term of a sequence of the form $ax^2 + bx + c$ Recognise and describe a simple geometric progression (of the form r^n) Find the next three terms, or a given term, in a geometric progression	Find the nth term for an increasing linear sequence Find the nth term for a decreasing linear sequence Identify quadratic sequences Establish the first and second differences of a quadratic sequence Find the next three terms in a quadratic sequence	There will be a written piece of homework each week to reinforce key concepts.
Solving equations and inequalities II	Be able solve linear inequalities in two variables Be able to represent the solution set to an inequality using set notation and on a graph	(Linear) inequality Variable Manipulate Solve Solution set Integer Set notation Region	State the inequality represented by a shaded region on a graph Construct and shade a graph to show a linear inequality of the form $y > ax + b$, $y < ax + b$, $y \geq ax + b$ or $y \leq ax + b$ Construct and shade a graph to show a linear inequality in two variables stated implicitly Construct and shade a graph to represent a set of linear inequalities in two variables Find the set of integer coordinates that are solutions to a set of inequalities in two variables Use set notation to represent the solution set to an inequality	Understand the meaning of the four inequality symbols Find the set of integers that are solutions to an inequality Use set notation to list a set of integers Use a formal method to solve an inequality in one variable Plot graphs of linear functions	There will be a written piece of homework each week to reinforce key concepts.



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Calculating space	<p>Be able to calculate surface area and volume of spheres, pyramids, cones and composite solids</p> <p>Be able to apply the concepts of congruence and similarity, including the relationships between length, areas and volumes in similar figures</p>	Composite) solid Sphere, Pyramid, Cone Perpendicular (height), (slant height) Surface area Volume Congruent, Congruence Similarity, Similar shapes, Similar figures Enlarge, Enlargement Scale factor	<p>Use Pythagoras' theorem to find lengths in a pyramid or cone</p> <p>Find the surface area and volume of spheres, cones and pyramids</p> <p>Identify how to find the volume or surface area of a composite solid</p> <p>Solve practical problems involving the surface area and volume of solids</p> <p>Understand the implications of enlargement on area and volume</p> <p>Move freely between scale factors for length, area and volume</p> <p>Solve practical problems involving length, area and volume in similar figures</p>	<p>Calculate exactly with multiples of π</p> <p>Know and use the formula for area and circumference of a circle</p> <p>Know how to use formulae to find the area of rectangles, parallelograms, triangles, trapezia, circles, sectors and</p> <p>Know how to find the area of compound shapes</p> <p>Calculate the surface area of a right prism and a cylinder</p> <p>Carry out an enlargement</p> <p>Find the scale factor of a given enlargement</p> <p>Use Pythagoras' theorem to find missing lengths in right-angled triangles</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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Conjecturing	Be able to apply and prove the standard circle theorems concerning: Angles Radii Tangents Chords and use them to prove related results	Radius, radii Tangent Chord Theorem Conjecture Derive Prove, proof Counterexample	Know and apply the eight circle theorems. Create a chain of logical steps to create a proof in a geometrical situation Use a combination of known and derived facts to solve a geometrical problem Identify when a circle theorem can be used to help solve a geometrical problem Justify solutions to geometrical problems	Know the vocabulary of circles Know angle facts including angles at a point, on a line and in a triangle Know angle facts involving parallel lines and vertically opposite angles Know the properties of special quadrilaterals	There will be a written piece of homework each week to reinforce key concepts.



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<p>Algebraic proficiency: visualising I</p>	<p>Be able to plot and interpret graphs (including exponential graphs) and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration</p> <p>Be able to calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts</p> <p>Be able to interpret the gradient at a point on a curve as the instantaneous rate of change</p> <p>Be able to identify and interpret roots, intercepts, turning points of quadratic functions graphically</p>	<p>Function Equation Linear, Non-linear Quadratic, Cubic Reciprocal Exponential Parabola Asymptote Gradient, y-intercept, x-intercept, Root Rate of change Sketch, plot Kinematic Speed Distance Time Acceleration, Deceleration</p>	<p>Recognise, plot and interpret exponential graphs</p> <p>Plot graphs of non-standard functions</p> <p>Use graphs of non-standard functions to solve simple kinematic problems</p> <p>Recognise that the gradient of a curve is not constant and know that the gradient of a curve is the gradient of the tangent at that point</p> <p>Calculate the gradient at a point on a curve and interpret as the instantaneous rate of change</p> <p>Interpret the gradient of a chord as an average rate of change</p> <p>Solve problems involving the gradients of graphs in context</p> <p>Calculate an estimate for the area under a graph, including the area under a speed-time graph as distance and solve problems involving the area under graphs in context</p> <p>Identify and interpret roots, intercepts and turning points of quadratic functions graphically</p>	<p>Plot graphs of linear, quadratic, cubic and reciprocal functions</p> <p>Interpret the gradient of a straight line graph as a rate of change</p> <p>Plot and interpret graphs of kinematic problems involving distance and speed</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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<p>Exploring fractions, decimals and percentages</p>	<p>Be able to change recurring decimals into their corresponding fractions and vice versa</p> <p>Be able to set up, solve and interpret the answers in growth and decay problems, including compound interest</p>	<p>Fraction</p> <p>Mixed number</p> <p>Top-heavy fraction</p> <p>Percentage change, percentage increase, percentage decrease</p> <p>Compound interest, Simple interest</p> <p>Terminating decimal, Recurring decimal</p> <p>(Exponential) growth, decay</p>	<p>Convert a fraction to a recurring decimal</p> <p>Convert a recurring decimal of the form $0.\dot{x}$, $0.x\dot{y}$, $0.x\dot{y}\dot{z}$ to a fraction</p> <p>Convert a recurring decimal of the form $0.0\dot{x}$, $0.0x\dot{y}$ to a fraction</p> <p>Recognise when a situation involves compound interest</p> <p>Calculate the result of a repeated percentage change, including compound interest</p> <p>Solve problems involving growth and decay</p>	<p>Identify if a fraction is terminating or recurring</p> <p>Move freely between terminating fractions, decimals and percentages</p> <p>Use a multiplier to calculate the result of percentage changes</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>
<p>Solving equations and inequalities III</p>	<p>Be able to solve quadratic equations algebraically by factorising</p> <p>Be able to solve quadratic equations (including those that require rearrangement) algebraically by factorising</p> <p>Be able find approximate solutions to quadratic equations using a graph</p> <p>Be able deduce roots of quadratic functions algebraically</p>	<p>(Quadratic) equation</p> <p>Factorise</p> <p>Rearrange</p> <p>Variable</p> <p>Unknown</p> <p>Manipulate</p> <p>Solve</p> <p>Deduce</p> <p>x-intercept</p> <p>Root</p>	<p>Solve a quadratic equation of the form $x^2 + bx + c$ by factorising</p> <p>Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = 0$</p> <p>Make connections between graphs and quadratic equations of the form $ax^2 + bx + c = dx + e$</p> <p>Find approximate solutions to quadratic equations using a graph</p> <p>Deduce roots of quadratic functions algebraically</p> <p>Solve problems that involve solving a quadratic equation in context</p>	<p>Manipulate linear equations</p> <p>Factorise a quadratic expression of the form $x^2 + bx + c$</p> <p>Factorise a quadratic expression of the form $ax^2 + bx + c$</p> <p>Make connections between a linear equation and a graph</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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<p>Understanding risk</p>	<p>Be able to apply systematic listing strategies including use of the product rule for counting</p> <p>Be able to calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams.</p>	<p>Outcome</p> <p>equally likely outcomes</p> <p>Event</p> <p>Independent event</p> <p>Dependent event</p> <p>Tree diagrams</p> <p>Theoretical probability,</p> <p>Experimental probability</p> <p>Bias,</p> <p>Unbiased</p> <p>Fair</p> <p>Set</p> <p>Conditional probability</p> <p>Venn diagram</p>	<p>Apply the product rule for counting</p> <p>Use a Venn diagram to sort information in a probability problem</p> <p>Use a two-way table to sort information in a probability problem</p> <p>Use a Venn diagram to calculate theoretical probabilities</p> <p>Use a two-way table to calculate theoretical probabilities</p> <p>Calculate conditional probabilities using different representations</p>	<p>Know when to add two or more probabilities</p> <p>Know when to multiply two or more probabilities</p> <p>Convert between fractions, decimals and percentages</p> <p>Use a tree diagram to calculate probabilities of dependent and independent combined events</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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<p>Analysing statistics</p>	<p>Be able to infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling</p> <p>Be able to construct and interpret diagrams for grouped discrete data and continuous data, i.e. cumulative frequency graphs, and know their appropriate use</p> <p>Be able to interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data, including box plots</p> <p>Be able to interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency including quartiles and inter-quartile range</p>	<p>Categorical data</p> <p>Discrete data</p> <p>Continuous data</p> <p>Grouped data</p> <p>Axis</p> <p>Axes</p> <p>Population</p> <p>Sample</p> <p>Cumulative frequency</p> <p>Box plot</p> <p>Box-and-whisker diagram</p> <p>Central tendency</p> <p>Mean</p> <p>Median</p> <p>Mode</p> <p>Spread</p> <p>Dispersion</p> <p>Consistency</p> <p>Range</p> <p>Interquartile range</p> <p>Skewness</p>	<p>Understand the limitations of sampling</p> <p>Use a sample to infer properties of a population</p> <p>Know the meaning of the lower quartile and upper quartile</p> <p>Find the quartiles for discrete data sets</p> <p>Calculate and interpret the interquartile range</p> <p>Construct and interpret a box plot for discrete data</p> <p>Use box plots to compare distributions</p> <p>Understand the meaning of cumulative frequency</p> <p>Complete a cumulative frequency table and construct a cumulative frequency curve</p> <p>Use a cumulative frequency curve to estimate the quartiles and properties of grouped continuous data sets</p>	<p>Know the meaning of discrete and continuous data</p> <p>Interpret and construct frequency tables</p> <p>Analyse data using measures of central tendency</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>



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<p>Algebraic proficiency: visualising II</p>	<p>Be able to use the form $y = mx + c$ to identify perpendicular lines</p> <p>Be able to recognise and use the equation of a circle with centre at the origin</p> <p>Be able to find the equation of a tangent to a circle at a given point</p>	<p>Function equation</p> <p>Linear</p> <p>Non-linear</p> <p>Parallel</p> <p>Perpendicular</p> <p>Gradient</p> <p>y-intercept,</p> <p>x-intercept</p> <p>Root</p> <p>Sketch plot</p> <p>Centre (of a circle)</p> <p>Radius</p> <p>Tangent</p>	<p>Know that perpendicular lines have gradients with a product of -1</p> <p>Identify perpendicular lines using algebraic methods</p> <p>Identify the equation of a circle from its graph</p> <p>Use the equation of a circle to draw its graph</p> <p>Find the equation of a tangent to circle at a given point</p> <p>Solve algebraic problems involving tangents to a circle</p>	<p>Use the form $y = mx + c$ to identify parallel lines</p> <p>Rearrange an equation into the form $y = mx + c$</p> <p>Find the equation of a line through one point with a given gradient</p> <p>Find the equation of a line through two given points</p> <p>Know and apply Pythagoras' Theorem</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>
<p>Mathematical movement II</p>	<p>Be able to apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors</p>	<p>Vector</p> <p>Scalar</p> <p>Constant</p> <p>Magnitude</p>	<p>Know and use different notations for vectors, including diagrammatic representation</p> <p>Add and subtract vectors</p> <p>Multiply a vector by a scalar</p> <p>Solve simple geometrical problems involving vectors</p>	<p>Understand column vector notation</p>	<p>There will be a written piece of homework each week to reinforce key concepts.</p>