YEAR 9 SCHEME OF WORK - SECURE

Autumn Term 1	Indices and standard form	Spring Term 1	Constructions	Summer Term 1	Sequences and graphs
	Expressions and formulae		Equations, inequalities and proportionality		Probability
Half Term: Assessment		Half Term: Assessment		Half Term: Assessment	
Autumn Term 2	Dealing with data	Spring Term 2	Circles, Pythagoras and prisms	Summer Term 2	Comparing shapes
	Multiplicative reasoning				End of Term Assessment
End of Term: Assessment		End of Term: Assessment		End of Year: Assessment	

Year 9 Core Term: Autumn 1	Unit Title: Indices and standard form	Duration: 10 hrs.
Objectives: • distinguish between exact representations of roots and their decimal approximations • interpret numbers in standard form A × 10n 1 ≤ A < 10, where n is a positive or negative integer or zero • compare numbers in standard form A × 10n 1 ≤ A < 10, where n is a positive or negative integer or zero	**Notes:** • Establish index laws for positive powers where the answer is a positive power • Understand which part of an e pression is raised to a power • Be able to simplify expressions containing powers • Solve word problems using square roots and cube roots • Know the prefixes associated with 10^{12}, 10^{9}, 10^{6}, 10^{3}, 10^{-2}, 10^{-3}, 10^{-6}, 10^{-9}, 10^{-12} • Know that any number to the power of zero is 1 • Make and justify estimates and approximations of calculations involving more than two operations and BIDMAS • Understand the order in which to calculate expressions that contain powers and brackets • Apply the index laws for multiplication and division of integer powers • Write and order numbers in standard index form	

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Year 9 Core Term: Autumn 1	Unit Title: Expressions and formulae	Duration: 11 hrs.
Objectives: • use and interpret algebraic notation: a2b in place of a × a × b • use and interpret algebraic notation: b/a in place of a ÷ b • simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials • understand and use standard mathematical formulae • rearrange formulae to change the subject	**Notes:** • Substitute integers into simple expressions involving small powers • Derive complex algebraic expressions and formulae • Simplify expressions involving brackets and powers • Apply the index laws including negative power answers • Use the distributive law to take out single term algebraic factors • Substitute integers into formulae to give equations and solve • Multiply out brackets and collect like terms • Change the subject of a formula • Carry out algebraic fraction calculations	

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Year 9 Core Term: Autumn 2	Unit Title: Dealing with data	Duration: 11 hrs.
Objectives: • describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving discrete data • describe, interpret and compare observed distributions of a single variable through: appropriate graphical representation involving continuous and grouped data • describe, interpret and compare observed distributions of a single variable through: appropriate measures of central tendency (mean, mode, median) • describe, interpret and compare observed distributions of a single variable through: appropriate measures of spread (range, consideration of outliers) • construct and interpret frequency tables • Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs	**Notes:** • Select the range of possible methods that could be used to collect primary data • Determine suitable sample size and degree of accuracy needed • Design and use a data collection sheet for continuous grouped data • Discuss factors that may affect the collection of data • Design tables recording discrete and continuous data • Identify key features of data sets described in either line graphs or scatter graphs – including exceptions and correlation • From a small choice of options identify ways to reduce bias in a sample • Find the modal class of a large set of data • Use a line of best fit, drawn by eye, to estimate the missing value in a two variable data set • Construct and use frequency polygons to compare sets of data • Calculate estimate of mean from large sets of grouped data	

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Year 9 Core Term: Autumn 2	Unit Title: Multiplicative reasoning	Duration: 11 hrs.
Objectives: • use compound units such as speed, unit pricing and density to solve problems • work with percentages greater than 100% • construct similar shapes by enlargement without coordinate grids • construct similar shapes by enlargement coordinate grids • interpret mathematical relationships both algebraically and geometrically	**Notes:** • Enlarge 2D shapes, given a centre of enlargement and a positive whole number scale factor • Find the centre of enlargement by drawing lines on a grid • Round numbers to a given number of significant figures • Solve 'original value' problems using inverse operation • Enlarge 2D shapes, given a fractional scale factor • Solve problems using compound measures • Solve problems using constant rates and related formulae • Calculate percentage change, using the formula actual change / original amount × 100 – where formula is recalled	

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Year 9 Core Term: Spring 1	Unit Title: Constructions	Duration: 10 hrs.
Objectives: • use scale diagrams • use maps • derive and use the standard ruler and compass constructions: perpendicular bisector of a line segment • derive and use the standard ruler and compass constructions: constructing a perpendicular to a given line from/at a given point • derive and use the standard ruler and compass constructions: bisecting a given angle • recognise and 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: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric • use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders and pyramids to solve problems in 3-D • use the properties of surfaces of cones and spheres to solve problems in 3-D	**Notes:** • Identify alternate and corresponding angles on the same diagram • Analyse 3D shapes through cross-sections, plans and elevations • Use and interpret maps and scale drawings • Use straight edge and compass to construct the mid-point and perpendicular bisector of a line segment • Use straight edge and compass to construct the bisector of an angle • Use straight edge and compass to construct a triangle, given three sides (SSS) • Use straight edge and compass to construct the perpendicular from a point to a line segment • Use straight edge and compass to construct the perpendicular from a point on a line segment • Use straight edge and compass to construct a triangle, given right angle, hypotenuse and side (RHS) • Construct nets of triangular prism, pyramid and wedge shape using SSS or RHS for the triangular sections • Draw and interpret loci	

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Year 9 Core Term: Spring 1	Unit Title: Equations, inequalities and proportionality	Duration: 10 hrs.
Objectives: • use and interpret algebraic notation: coefficients written as fractions rather than as decimals • use and interpret algebraic notation: brackets • substitute numerical values into formulae and expressions, including scientific formulae • understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors • simplify and manipulate algebraic expressions to maintain equivalence: collecting like terms • simplify and manipulate algebraic expressions to maintain equivalence: multiplying a single term over a bracket • simplify and manipulate algebraic expressions to maintain equivalence: taking out common factors • simplify and manipulate algebraic expressions to maintain equivalence: expanding products of two or more binomials	**Notes:** • Understand the difference between expression, equation, function and formula • Construct and solve equations of the form $(ax +/- b)/c = (dx +/- e)/f$ {one of c or f should be 1} • Find a positive square root as a solution of an equation involving x^2 • Know and understand the meaning of an identity and use the identity sign • Construct and solve equations of the form $a(bx +/- c) = d(ex +/- f)$ where negative signs are anywhere in the equation. {a or d are bigger than 1} e.g. $3(-2x - 1) = -4x + 1$ • Multiply both sides of an inequality by a negative number • Solve simple linear inequalities in one variable and represent the solution on a number line e.g. $-6 < 2n = 4$ or $-9 < 2n + 3 = 7$ • Understand the steps required to solve a pair of simultaneous equations of the form $ax + y = b, y = ax$ • Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 = 29$ • Construct and solve equations that involve multiplying out brackets by a negative number and collecting like terms • Find an unknown where it is not the subject of the formula and where an equation must be solved • Solve more complex linear inequalities in one variable and represent the solution on a number line e.g. $3n + 2 < 11$ and $2n - 1 > 1$ • Understand the steps required to solve a pair of simultaneous, when they are solved by addition. Equations are of the form $ax + y = b, x - y = c$ • Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 + x = 50$	

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Year 9 Core Term: Spring 2	Unit Title: Circles, Pythagoras and prisms	Duration: 10 hrs.
Objectives: • calculate possible errors resulting from estimating, expressed using inequality notation $a < x \leq b$ • calculate and solve problems involving perimeters of circles • calculate and solve problems involving areas of circles • use Pythagoras' Theorem to solve problems involving right-angled triangles	**Notes:** • Know the names of parts of a circle • Use the formula for the circumference of a circle • Round to an appropriate number of decimal places after calculations • Use the formulae for the circumference, given the circumference, to calculate the radius or diameter • Use the formula for area of a circle, given the radius or diameter • Use the formulae for area of a circle, given area, to calculate the radius or diameter • Know the formula for Pythagoras' theorem and how to substitute in values from a diagram • Use and apply Pythagoras' theorem to solve problems • Calculate the surface area and volume of right prisms (including cylinder) • Calculate simple error intervals, such as +/– 10% • Identify and calculate upper and lower bounds • Use inequality notation $a < x \leq b$	

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Year 9 Core Term: Summer 1	Unit Title: Sequences and graphs	Duration: 12 hrs.
Objectives: • model situations or procedures by using graphs • recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • reduce a given linear equation in two variables to the standard form y = mx + c • calculate and interpret gradients and intercepts of graphs of such linear equations numerically • calculate and interpret gradients and intercepts of graphs of such linear equations graphically • calculate and interpret gradients and intercepts of graphs of such linear equations algebraically • use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations • use quadratic graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations • find approximate solutions to contextual problems from given graphs of a variety of functions: including piece-wise linear graphs • find approximate solutions to contextual problems from given graphs of a variety of functions: exponential graphs • find approximate solutions to contextual problems from given graphs of a variety of functions: reciprocal graphs • solve problems involving inverse proportion	**Notes:** • Begin to use formal algebra to describe the nth term in an arithmetic sequence • Generate terms of a linear sequence using position-to-term rule • Generate the next term in a quadratic sequence • Recognise geometric sequences and appreciate other sequences that arise • Classify sequences as linear, geometric and quadratic • Calculate and interpret gradient using $y = mx + c$ • Find and interpret the y-intercept from $y = mx + c$ • Plot graphs of quadratic functions by hand and using ICT • Recognise that any line parallel to a given line will have the same gradient • reduce a given linear equation in two variables to the standard form $y = mx + c$ • Identify the solution of simultaneous equations on a graph • Use graphs to solve distance-time problems • Construct a table of values, including negative values of x for a function such as $y = ax^3$	

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Year 9 Core Term: Summer 1	Unit Title: Probability	Duration: 10 hrs.
Objectives: • enumerate sets and unions / intersections of sets systematically, using tables and grids • enumerate sets and unions / intersections of sets systematically, using Venn diagrams • generate theoretical sample spaces for single and combined events with equally likely and mutually exclusive outcomes • use sample spaces for single and combined events to calculate theoretical probabilities. • Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts	**Notes:** • Calculate probabilities from two-way tables with more than two columns / rows each way • Use the language of probability to compare the choice of x/a with x/b • Use the language of probability to compare the choice of x/a with y/b • Calculate the probability of a combination of events or single missing events of a set of mutually exclusive events using sum of outcomes is one • Calculate estimates of probability from experiments or survey results • Use experimental probabilities to predict outcomes • Identify all mutually exclusive outcomes for two successive events • Compare experimental and theoretical probabilities • Enumerate sets and combinations of sets systematically, using tabular, grid and Venn diagrams • Identify conditions for a fair game • Use P(A and B) = P(A) × P(B) for two independent events • Complete and use tree diagrams to calculate probabilities	

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Year 9 Core Term: Summer 2	Unit Title: Comparing shapes	Duration: 9 hrs.
Objectives: • know and use the criteria for congruence of triangles • derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies • identify and construct congruent triangles • use trigonometric ratios in similar triangles to solve problems involving right-angled triangles	**Notes:** • Use congruent shapes to help you solve problems about triangles and quadrilaterals, and explain all your reasoning • Know whether two 2D shapes are similar, congruent or neither similar nor congruent • Know that enlargements of 2D shapes produce similar shapes • Use what you know about the sides and angles of two triangles to decide whether they are similar, congruent or neither similar nor congruent • Know and use the criteria for congruence (SSS, SAS, ASA or RHS) • Know that if two 2D shapes are similar, corresponding angles are equal and corresponding sides are in the same ratio • Find points that divide a line in a given ratio, using the properties of similar triangles • Know that the scale factor of an enlargement is the ratio of the lengths of any two corresponding line segments • Use similarity to solve angle and side problems • Use the sine, cosine and tangent ratios to find the lengths of unknown sides in a right-angled triangle, using straight-forward algebraic manipulation, e.g. calculate the adjacent (using cosine), or the opposite (using sine or tangent ratios) • Use the sine, cosine and tangent ratios to find the lengths of unknown sides in a right-angled triangle, using more complex algebraic manipulation, e.g. the hypotenuse (using cosine or sine), or adjacent (using the tangent ratio)	

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