YEAR 9 SCHEME OF WORK - DEVELOPING

Autumn Term 1	Number calculations	Spring Term 1	Geometry in 2D and 3D	Summer Term 1	Algebraic and geometric formulae
	Sequences and equations		Algebraic and real-life graphs		Probability
Half Term: Assessment		Half Term: Assessment		Half Term: Assessment	
Autumn Term 2	Statistics	Spring Term 2	Multiplicative reasoning	Summer Term 2	Polygons and transformations
	Fractions, decimals and percentages				End of Term Assessment
End of Term: Assessment		End of Term: Assessment		End of Year: Assessment	

Year 9 Support Term: Autumn 1	Unit Title: Number calculations	Duration: 10 hrs.
Objectives: • use the four operations, including formal written methods, with positive and negative improper fractions and mixed numbers • use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals • use integer powers and associated real roots (square, cube and higher) • recognise powers of 2, 3, 4, 5	**Notes:** • Be able to add and subtract more than two integers with varying numbers of significant figures • Be able to add and subtract more than two decimals with up to two decimal places • Convert numbers such as 2 360 000 to 2.36 million • Use mental strategies for multiplication - doubling and halving strategies • Multiply 4-digit integers and decimals by a single digit integer • Multiply 3- or 4-digit integers by a 2-digit integer • Divide 3-digit integers by a single digit integer with remainder • Divide 3-digit by 2-digit integers – no remainder • Divide decimals with one or two places by single-digit integers • Divide £.p by a 2-digit number to give £.p • Divide an integer or decimal with 1 or 2 dp by a decimal number with 1 d.p. • Multiply negative integers by a negative number • Divide negative integers by a positive or negative numbers • Understand the infinite nature of the set of real numbers (whole numbers and decimals here) • Know all the squares of numbers less than 16 and give the positive and negative square root of a square number • Work out cubes and cube roots mentally or with a calculator • Use index notation for small integer powers, eg up to 5 • Establish index laws for positive powers where the answer is a positive power • Find the prime factor decomposition of a number >100 • Find the HCF or LCM of 2 numbers less than 100 using prime factor decomposition • Combine laws of arithmetic for brackets with mental calculations of squares, cubes and square roots • Be able to work with decimals and a calculator with expressions that contain brackets, squares and square roots as well as the four operations • Be able to estimate answers to calculations involving 2 or more operations	

Back to top

Year 9 Support Term: Autumn 1	Unit Title: Sequences and equations	Duration: 11 hrs.
Objectives: • use and interpret algebraic notation: ab in place of a × b • use and interpret algebraic notation: 3y in place of y + y + y and 3 × y • use and interpret algebraic notation: a^2 in place of a × a • generate terms of a sequence from a term-to-term rule • generate terms of a sequence from a position-to-term • recognise arithmetic sequences • find the nth term	**Notes:** • Construct expressions from worded description, using all 4 basic operations, e.g. $30/x$, $x - y$, $m/2$, $3m + 4$, $a + a + 3$, a^2 • Know that multiplication and division are carried out before addition and subtraction, e.g. $ab + cd$, $a \times b$ and $c \times d$ must be calculated before adding • Simplify simple expressions in more than one variable, including positives and negatives, by collecting like terms • Generate terms of a linear sequence using position-to term-with positive integers. • Generate terms from a complex practical context (e.g. maximum crossings for a given number of lines) • Generate terms of a linear sequence using position-to-term with negative integers. • Begin to use linear expressions to describe the nth term in a two-step arithmetic sequence. (e.g. nth term is $3n + 1$ or $n/2 - 5$) • Find outputs of more complex functions expressed in words (e.g. add 6 then multiply by 3) • Solve simple two-step linear equations with integer coefficients, of the form $ax + b = c$, e.g. $3x + 7 = 25$	

Back to top

Year 9 Support Term: Autumn 2	Unit Title: Statistics	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 • construct and interpret bar charts • construct and interpret pie charts • construct and interpret vertical line (or bar) charts for ungrouped data • construct and interpret vertical line (or bar) charts for grouped numerical data • Describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts • Illustrate simple mathematical relationships between two variables (bivariate data) using scatter graphs	**Notes:** • Select and identify the data related to a problem • Select the range of possible methods that could be used to collect this data as primary or secondary data • Discuss the range of possible methods that could be used to investigate a problem, e.g. questionnaire, survey, modelling, data logging, etc. • Select appropriate level of accuracy of data from limited choices • From a range of sample sizes identify the most sensible answer • Discuss factors that may possibly affect the collection of data, e.g. time, place, type of people asked, phrasing of questions • Find the mode and range from a frequency table • Calculate the mean from a simple frequency table • Draw conclusions from simple statistics for a single distribution • Compare two simple distributions using the range and the median • Compare two simple distributions using the range and the mean or range and mode • Compare two distributions given summary statistics • Recognise when it is appropriate to use mean, median, or mode in more complex cases • Use two-way tables • Construct a simple (no boundary data) frequency table with given equal class intervals for continuous data • Identify discrete and continuous data • Design tables recording discrete and continuous data • Find the modal class of a set of continuous data • Construct on paper and using ICT simple pie charts using categorical data, e.g. two or three categories • Draw pie charts from data presented in a table. • Interpret and plot scatter graphs and recognise anomalies • Interpret and / or compare bar graphs (with crumple zones, different scales) and frequency diagrams where data is incomplete / scales are incorrect. • Interpret and / or compare bar graphs and frequency diagrams which are misleading (with false origins, different scales etc.)	

	• Choose and justify appropriate diagrams, graphs and charts, using ICT as appropriate, to illustrate a short report of a statistical enquiry • Identify further lines of enquiry from information provided for an initial enquiry

Back to top

Year 9 Support **Term: Autumn 2**	**Unit Title: Fractions, decimals and percentages**	**Duration: 12 hrs.**
Objectives: • work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 7/2 or 0.375 and 3/8) • interpret percentages multiplicatively • express one quantity as a percentage of another • compare two quantities using percentages • work with percentages greater than 100% • solve problems involving percentage change: percentage increase • solve problems involving percentage change: decrease • solve problems involving percentage change: original value problems • solve problems involving percentage change: simple interest in financial mathematics	**Notes:** • Be able to add and subtract more than two decimals with up to two decimal places, but with varying numbers of decimal places and using a mixture of operations within the calculation • Recall known facts including fraction to decimal conversions • Convert terminating decimals to fractions • Learn fractional equivalents to key recurring decimals, e.g. 0.333333..., 0.66666666..., 0.11111… • Interpret rounded off recurring decimals displayed on a calculator as fractions – 2/3, 1/6, 1 2/3, 1 1/6 • Know the denominators of simple fractions that produce recurring decimals, and those that do not • Use division to convert a fraction to a decimal • Add and subtract simple fractions with denominators of any size • Check addition or subtraction of fractions with an inverse calculation • Add and subtract mixed number fractions without common denominators • Add and subtract up to 3 fractions mixing both addition and subtraction in the calculation • Interpret division as a multiplicative inverse; know that 1 divided by 1/4 is the same as 1 × 4	

	• Understand the effect of multiplying a positive number by a fraction less than 1 • Multiply a fraction by a fraction • Divide an integer by a fraction • Recall equivalent fractions, decimals and percentage • Use the equivalence of fractions, decimals and percentages to compare proportions (i.e. compare a fraction and a percentage) • Find the outcome of given percentage increase or decrease	

Back to top

Year 9 Support **Term: Spring 1**	**Unit Title: Geometry in 2D and 3D**	**Duration: 10 hrs.**
Objectives: • derive and apply formulae to calculate and solve problems involving volume of cuboids (including cubes) • 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 • understand and use the relationship between parallel lines and alternate and corresponding angles • use the sum of angles in a triangle to deduce the angle sum in any polygon • derive properties of regular polygons • use Pythagoras' Theorem to solve problems involving right-angled triangles	**Notes:** • Identify alternate angles • Identify corresponding angles • Explain how to find the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons • Use scales in maps and plans • Make simple drawings, demonstrating accurate measurement of length and angle (draw accurately from a plan). • Use straight edge and compasses to construct the midpoint and perpendicular bisector of a line segment • Use straight edge and compasses to construct the bisector of an angle • Recognise and use the perpendicular distance from a point to a line as the shortest distance to the line • Visualise and use a wide range of 2D representations of 3D objects • Analyse 3D shapes through informal 2D representations • Begin to use plans and elevations. • Find volumes of shapes made from cuboids • Be able to correctly identify the hypotenuse • Carry out an investigation leading to understanding of Pythagoras' theorem	

Back to top

Year 9 Support Term: Spring 1	Unit Title: Algebraic and real-life graphs	Duration: 10 hrs.
Objectives: • model situations or procedures by using graphs • work with coordinates in all four quadrants • recognise, sketch and produce graphs of linear functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • interpret mathematical relationships both algebraically and graphically • 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	**Notes:** • Draw conclusions based on the shape of line graphs • Interpret information from a real-life graph • Plot a graph of a simple linear function in the first quadrant • Recognise straight-line graphs parallel to *x*- or *y*-axes • Express simple functions in symbols, e.g. $y = x + 3$ to draw graph • Generate four quadrant coordinate pairs of simple linear functions • Plot a simple straight-line graph (distance–time graphs) • Discuss and interpret line graphs and graphs of functions from a range of sources • Know how to find the midpoint of a line segment • Find the midpoint of a horizontal (or vertical) line AB, using the coordinates of these points • Interpret intercept of real-life graphs • Plot the graphs of simple linear functions in the form $y = mx + c$ in four quadrants	

Back to top

Year 9 Support Term: Spring 2	Unit Title: Multiplicative reasoning	Duration: 9 hrs.
Objectives: • use standard units of mass, length, time, money and other measures, including with decimal quantities • change freely between related standard units [for example time, length, area, volume/capacity, mass] • divide a given quantity into two parts in a given part:whole ratio • relate the language of ratios and the associated calculations to the arithmetic of fractions • solve problems involving direct proportion • solve proportion problems including graphical and algebraic representations • use compound units such as speed, unit pricing and density to solve problems	**Notes:** • Divide a quantity into two parts in a given ratio, where ratio given in ratio notation • Divide a quantity into two parts in a given ratio (whole numbers), where the answer is a decimal • Divide a quantity into more than 2 parts in a given ratio • Reduce a ratio to its simplest form, where a ratio is expressed in different units • Understand the relationship between ratio and proportion • Use multiplicative reasoning to solve a problem • Use the unitary method to solve simple word problems involving ratio and direct proportion • Solve best buy / unit price problems • Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction • Recognise when values are in direct proportion by reference to the graph form • Solve problems involving direct and inverse proportion, including graphical and algebraic representations • Use units of measurement to calculate and solve problems in everyday contexts involving length, area, volume, mass, time and angle • Convert between area measures (e.g. mm^2 to cm^2, cm^2 to m^2, and vice versa) • Know rough metric equivalents of imperial measures in daily use (feet, miles, pounds, pints, gallons)	

Back to top

Year 9 Support Term: Summer 1	Unit Title: Algebraic and geometric formulae	Duration: 13 hrs.
Objectives: • understand and use standard mathematical formulae • rearrange formulae to change the subject • model situations or procedures by translating them into algebraic expressions or formulae • use algebraic methods to solve linear equations • derive formulae to calculate and solve problems involving perimeter of triangles, parallelograms, trapezia • derive and apply formulae to calculate and solve problems involving area of triangles, parallelograms, trapezia • calculate and solve problems involving perimeters of circles • calculate and solve problems involving areas of circles • calculate and solve problems involving composite shapes	**Notes:** • Find the measurement of a side given the perimeter of squares and rectangles, where one or more lengths are decimals • Substitute integers into formulae expressed in letter symbols • Derive formulae expressed in letter symbols • Substitute integers into formulae (involving brackets and more than one operation) expressed in letter symbols • Use a formula to calculate the area of triangles • Calculate the perimeter and area of shapes made from rectangles • Understand the different role of letter symbols in formulae and functions • Substitute positive and negative integers into simple formulae • Calculate areas of compound shapes made from rectangles and triangles • Use a formula to calculate the area of parallelograms • Substitute integers into formulae to give equations and solve • Know the names of parts of a circle • Use a formula to calculate the circumference of a circle • Use a formula to calculate the area of a circle • Change the subject of a one-step formula	

Back to top

Year 9 Support Term: Summer 1	Unit Title: Probability	Duration: 9 hrs.
Objectives: • record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes • use appropriate language of probability • use the 0–1 probability scale • understand that probabilities of all possible outcomes sum to 1 • 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.	**Notes:** • Apply probabilities from experimental data to a different experiment in simple situations • Identify all mutually exclusive outcomes for two successive events – with three outcomes in each event. • Identify conditions for a fair game – from a small set of simple options • Use two-way tables for discrete data. Complete and collect probabilities • Use the language of probability to compare the choice of x/a with x/b • Apply probabilities from experimental data to a different experiment in applying to two step outcomes • Find the probability from two-way tables • Identify dependent and independent events • Work out the probability of two independent events • Draw and use tree diagrams to represent outcomes of two independent events and calculate probabilities	

Back to top

Year 9 Support Term: Summer 2	Unit Title: Polygons and transformations	Duration: 10 hrs.
Objectives: • use scale factors • identify and construct congruent triangles • construct similar shapes by enlargement without coordinate grids • construct similar shapes by enlargement coordinate grids • apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides	**Notes:** • Solve simple geometrical problems using properties of triangles • Understand and use the language associated with rotations • Translate a shape on a coordinate grid • Rotate a shape on a coordinate grid • Reflect a shape on a coordinate grid • Know that in congruent shapes, corresponding sides and angles are equal • Solve simple geometrical problems showing reasoning • Transform 2D shapes by simple combinations of rotations, reflections and rotations • Plot points on a grid an identify resulting geometric shapes across all four quadrants • Solve geometric problems using side and angle properties of equilateral and isosceles triangles • Solve geometric problems using side and angle properties of equilateral, isosceles and right-angled triangles • Classify quadrilaterals by their geometric properties • Use the language and notation associated with enlargement • Know that translations, rotations and reflections preserve length and angle • Enlarge 2D shapes, given a centre of enlargement and a positive whole-number scale factor	

Back to top