Maths Curriculum Map

Teachers review the sequence of teaching throughout the year and use their discretion to adapt, revisit or reteach content when necessary to support the learning of our students.

Maths – KS3	Year 7	Year 8	Year 9
Integers and Decimals	Ordering numbers, Multiplying and Dividing by Powers of Ten, Positive, Negative and Decimal numbers in all four operations (add, subtract, multiply and divide), Money problems, Calculator use for Money Problems, rounding to the nearest 10, 100 and 100, know and use the order of operations including brackets and indices, be able to multiply and divide decimals.	Recognise and use multiples, factors and primes, prime factor decomposition and find the highest common factor (HCF) and lowest common multiple (LCM), use Venn diagrams to find HCF & LCM, find square roots and cube roots, rounding to decimal places and significant figures, estimate answers to calculations, order decimals and negative numbers, multiply and divide by powers of ten, multiply and divide decimals, know and use the order of operations including brackets and indices.	multiply and divide by powers of ten, highest common factor and lowest common multiple, rounding, upper and lower bounds. Add and subtract with positive and negative numbers.
Measure, Perimeter & Area	Converting Metric Units, Convert between Metric and Imperial Units, Measuring lengths, finding Area and Perimeter of rectangles, triangles, parallelograms and compound shapes.	Converting Metric Units, Convert between Metric and Imperial Units, Measuring lengths, finding Area and Perimeter of rectangles, triangles, parallelograms and compound shapes, finding the area of trapezia, area and circumference of circles and semi-circles.	Area of different shapes, conversion between units, properties of a circle, surface area and volume of 3D shapes, compound measures including speed and density.
Expressions & Formulae	Simplifying expressions by collecting like terms, substituting values into formulae, expanding brackets.	Simplifying expressions by collecting like terms, substituting values into formulae, expanding brackets, find common factors in algebraic terms, factorise expressions, derive formulae, change the subject of a formula, use real life formula.	Simplify terms, expand brackets, factorise expressions, derive a formula, substitute values into a formula, change the subject of a formula.
2D Shapes & Angle Properties	Naming types of angles, estimating and constructing angles, naming polygons, differentiating between regular and irregular polygons, classifying triangles and quadrilaterals and knowing their properties, knowing angle facts and being able to calculate missing angles using these, knowing facts about angles on parallel and intersecting lines.	Know facts about angles on parallel and intersecting lines, calculate interior and exterior angles of regular polygons, understand and recognise congruent and similar shapes and triangles. Calculate the linear scale factor of similar shapes, calculate the missing lengths of similar shapes.	Know types of angle and triangles, calculate missing angles, know facts about angles on parallel and intersecting lines, calculate interior and exterior angles in polygons. Know the rules of bearings and calculate a return bearing. Construct triangles using a protractor and compass.
Fractions, Decimals & Percentages	Converting mixed numbers and improper fractions, Fractions of amounts, add/subtract/ multiply/divide fractions. Converting a decimal into a fraction, writing percentages as fractions, finding percentages of amounts, calculating percentage increase and decrease.	Converting mixed numbers and improper fractions, Fractions of amounts, add/subtract/ multiply/divide fractions. Calculate percentages of amounts, percentage change, use percentage to solve problems, convert between fractions, decimals and percentages, express one number as a percentage of another.	Find equivalent fractions, four operations with fractions, calculate percentages including an increase and decrease, find a reverse percentage, calculate compound interest. Multiply and divide decimals.
Probability	Finding basic probabilities based on equally likely outcomes, understand that mutually exclusive events add up to 1, using data collected from experiments to estimate probability, compare experimental and theoretical probabilities, construct sample spaces, using Venn diagrams to sort data.	Finding basic probabilities based on equally likely outcomes, Show all the possible outcomes of two or more events in a list or table form, understand that mutually exclusive events add up to 1, using data collected from experiments to estimate probability, compare experimental and theoretical probabilities, use Venn diagrams to calculate probabilities, construct simple tree diagrams, use tree diagrams to calculate probabilities.	Calculate both theoretical and experimental probability. Create and use a sample space diagram to calculate probability.
Graphs	Plot horizontal and vertical lines, plot equations of straight lines using a table of values, understand that functions in the format of $y = mx + c$ represent a straight line, plot real life graphs, plot and interpret time series graphs.	Plot equations of straight lines using a table of values, understand that $y = mx + c$ represents a straight line, plot quadratic and cubic graphs using a table of values, find the midpoint of two coordinates, draw the graph on an equation, plot real life graphs, plot and interpret time series.	Plot coordinates in four quadrants, draw a straight line graph, investigate gradients of parallel and perpendicular lines, plot quadratic and cubic graphs, use distance-time graphs.
Transformations	Translating, reflecting and rotating 2D shapes, being able to recognise rotational symmetry and tessellate regular shapes, enlarging shapes using positive scale factors (including simple fractional scale factors).	Translating, reflecting and rotating 2D shapes, being able to recognise rotational symmetry and tessellate regular shapes, enlarging shapes using positive, negative and fractional scale factors, enlarge shapes using a centre enlargement.	Describe and carry out the four transformations reflections, rotations, enlargements and translations.
Equations	Use inverse operations to solve equations, solve one and two step equations, solving equations with unknowns on both sides, solve equations involving brackets, solve equations where the solution is a fraction or negative number, construct and solve equations.	Solve linear equations with unknowns on one or both sides, solve equations involving brackets, including when the solution is fractional or negative, solve equations involving fractions, construct real life equations.	Solve and form equations, construct equations to solve problems, solve simultaneous equations.
Factors and Multiples	Know square and cube numbers and find square roots and cube roots, recognise and use multiples, factors and prime numbers, prime factor decomposition, using prime factor decomposition to find the highest common factor and lowest common multiple.		
Sequences	Use rules to find missing terms in sequences, generate terms of a sequence given a term-to-term or position-to-term rule, find the nth term of a sequence.	Find the nth term, recognise and describe geometric sequences, quadratic sequences.	Generate terms of a sequence, find the term-to term rule and the next terms of a sequence find the nth term of a linear sequence, find the nth term of a quadratic sequence.
Proportion	Write proportion as a fraction or percentage, find the values of quantities when they change in direct proportion to each other, unitary method	Solve problems using direct proportion, compare proportions by converting to percentages, solve problems involving direct proportion using algebraic methods.	

	with direct proportion, increase or decrease quantities using direct proportion.		
Ratio	Simplify ratios and find equivalent ratios, divide a quantity in a given ratio, write ratios as fractions, know the difference between ratio and proportion.	Divide a quantity in a given ratio, solve problems using ratio and proportion, reverse ratio problems.	
Statistics	Find averages of a set data (mean, mode, median), find the range and use it to measure the spread of data, compare two data sets using an average and the range, collect discrete and continuous data in a grouped frequency tables, find the modal class from a grouped frequency table. Find averages and spread from frequency tables, construct and interpret frequency diagrams, comparative bar charts and pie charts, know the difference between primary and secondary data, create forms needed to record data for investigations.	Design a statistical survey and collect data, understand the effect sample size has on an investigation, find averages and spread of grouped and discrete data, draw stem and leaf diagrams and use them to find averages and range of data sets, compare distributions of data sets and make inferences, construct and interpret scatter graphs including lines of best fit.	Calculate averages including grouped data, calculate an estimated mean construct statistical diagrams.
3D Shapes, Surface Area & Volume	Know various 3D shapes and their names & properties, understand faces, edges and vertices, nets of 3D shapes, construct 3D shapes, find the surface area and volume of cuboids.	Recognise names and nets of 3D shapes, draw plans and elevations of 3D shapes. Find surface area of prisms including cylinders, find the volume of prisms including cylinders.	Find missing sides in similar shapes, understand and use area and volume scale factor.
Constructions	Construction triangles using ASA, SAS, SSS & RHS, construct other shapes using a ruler, compass and a protractor.	Construct triangles and other shapes using a ruler, compass and a protractor, construct bisectors and perpendicular lines, describe a locus of a moving point and draw it, use bearing to specify directions.	
Standard form and indices		Use index notation for integer powers, multiply and divide numbers in index form using index laws, use index notation including negative indices, substitute into expressions involving powers.	Convert between standard form and ordinary numbers, understand and use laws of indices.
Pythagoras' theorem and trigonometry			Calculate missing sides and solve problems in right angled triangles. Find missing sides and angles and solve problems using trigonometry.

Maths – KS4 & 5	Year 9 – Summer Term 2	Year 10	Year 11	Year 12	Year 13
Higher	**Rounding/Upper and lower bounds.** Round to a given number of decimal places and significant figures. Calculate the upper and lower bound of a measurement and carry out calculations using bounds. Calculate limits of accuracy. **Integers** Recognise different types of number. Write a number as a product of prime factors. Find the HCF and LCM of 2 numbers. **Algebraic Manipulation** Expand and simplify expressions with brackets. Substitute into formulae. Factorise expressions and factorise quadratic expressions. **Solve Equations** Solve linear equations including equations in which the unknown appears on both sides of the equation and including equations with fractions. **Co-ordinates** Find the midpoint of two points and find the length between 2 points. **Circles** Identify and apply circle properties. Find the area and circumference of a circle and find the length of arcs and the area of sectors	**Fractions** – Fraction calculations **2D and 3D shapes** – Plans and elevations. Area, surface area and volume **Straight Line Graphs** – Drawing linear graphs, equation of a line **Collecting Data** – Types of data, sampling **Statistical measures** – Averages and Averages in tables **Percentages** – Percentage calculations and interest **Decimals** – Decimal calculations, convert recurring decimals to fractions **Scatter Graphs** – Draw and interpret scatter graphs **Measures** – Convert area and volume units. Compound measures **Inequalities** – Solve inequalities. Represent inequalities on a number line and graphical inequalities **Simultaneous Equations** – Solve linear simultaneous equations by elimination, substitution and graphically **Transformations** – Rotate, reflect, enlarge and translate shapes. Describe transformations **Handling Data** – Stem and leaf, cumulative frequency, box plot, time series and histograms diagrams **Ratio and Proportion** – Ratio problems. Unitary proportion. Direct and inverse proportion. Proportion graphs **Angles and Polygons** – Angles in parallel lines, Angles in polygons. Bearings **Similar shapes** – Congruent and similar shapes. Linear, area and volume scale factors. **Pythagoras and Trigonometry** – Pythagoras and Trigonometry in 2D and 3D. Exact trigonometric values	**Vectors** – Calculations with vectors. Vector geometry in 2D Vector proof in 2D. **Surds** – Simplify, expand and rationalise surds **Probability** – Two way tables, probability tree diagrams **Venn Diagrams** – Set notation. Complete and interpret Venn diagrams **Sequences** – Arithmetic and geometric sequences. Nth term of linear and quadratic sequences **Ratio and Proportion** – Ratio and proportion problems. Unitary proportion. Direct and inverse proportion. **Functions** – Function notation. Composite and inverse function calculations **Proof** – Prove results using Algebra **Iterations** – Rearrange formula. Find values and solve equations using iterations **Review mock exam 1 and revise for mock exam 2.** **Review mock exam 2. Revise and prepare for GCSE exams**	**Proof** Understand and use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion; use methods of proof, including: Proof by deduction Proof by exhaustion Disproof by counter example. **Algebra and functions** Understand and use the laws of indices for all rational exponents. Use and manipulate surds, including rationalising the denominator. Work with quadratic functions and their graphs. The discriminant of a quadratic function, including the conditions for real and repeated roots. Completing the square. Solution of quadratic equations, including solving quadratic equations in a function of the unknown. Solve simultaneous equations in two variables by elimination and by substitution, including one linear and one quadratic equation. Solve linear and quadratic inequalities in a single variable and interpret such inequalities graphically, including inequalities with brackets and fractions. Manipulate polynomials algebraically, including expanding brackets and collecting like terms, factorisation and simple algebraic division; use of the factor theorem. Understand the effect of simple transformations on the graph of $y = f(x)$, including sketching associated graphs: $y = af(x), y = f(x) + a,$ $y = f(x + a), y = f(ax)$ **Coordinate geometry in the (x,y) plane** Understand and use the equation of a straight line, including the forms $y − y_1 = m(x − x_1)$ and $ax + by + c = 0$; Understand and use the coordinate geometry of the circle including using the equation of a circle in the form $(x − a)^2 + (y − b)^2 =$ **Sequences and series** Understand and use the binomial expansion of $(a+ bx)^n$ for positive integer n; the	**Proof** Similar to year 12 proofs with the addition of Proof by contradiction (including proof of the irrationality of 2 and the infinity of primes, and application to unfamiliar proofs). **Algebra and functions** Include all the topics in Year 12 plus The modulus of a linear function. Understand and use composite functions; inverse functions and their graphs. Decompose rational functions into partial fractions (denominators not more complicated than squared linear terms and with no more than 3 terms, numerators constant or linear). Use of functions in modelling, including consideration of limitations and refinements of the models. **Coordinate geometry in the (x,y) plane** All the contents in year 12 plus Understand and use the parametric equations of curves and conversion between Cartesian and parametric forms. Use parametric equations in modelling in a variety of contexts. **Sequences and series** Extend to any rational n, including its use for approximation; be aware that the expansion is valid for bx a < 1 (proof not required) Work with sequences including those given by a formula for the nth term and those generated by a simple relation of the form $x_n + 1 = f(x_n)$; increasing sequences; decreasing sequences; periodic sequences. Understand and use sigma notation for sums of series. Understand and work with arithmetic sequences and series, including the formulae for nth term and the sum to n terms Understand and work with geometric sequences and series, including the formulae for the nth term and the sum of a finite geometric series; the sum to infinity of a convergent geometric series, including the use of $|r| < 1$; modulus notation

		Indices – Index laws including fractional and negative **Standard Form** – Convert to and from standard form. Calculations with standard form **Experimental probability** – Estimate probabilities from data. Frequency trees **Further graphs** – Draw, sketch and interpret quadratic, cubic, circle, reciprocal, exponential and trigonometric graphs **Compound measures** – Speed, distance and time. Density, mass and volume, Pressure, Force and Area. **Further trigonometry and functions** – Sine and cosine rule. Sketching trigonometric graphs **Manipulating expressions**- Rearrange and create formula. Expand and Factorise. Algebraic fractions. Completing the square **Quadratic equations** – Solve by factorising, completing the square and quadratic formula. **Equation of a circle** – Sketch equation of a circle. Solve simultaneous equations with linear and circle equations. Find equation of a tangent to a circle **Loci and Constructions** – Use ruler, compass and protractor to construct and solve problems with loci **Functions and graph transformations** – Apply graph transformations to different types of graphs **Circle theorems** – Understand and use angle properties of a circle. Circle theorem proof.		notations n! and r n C link to binomial probabilities. Use of Pascal's triangle. Relation between binomial coefficients **Trigonometry** Understand and use the definitions of sine, cosine and tangent for all arguments; the sine and cosine rules; the area of a triangle in the form ½ ab sin C. Understand and use the sine, cosine and tangent functions; their graphs, symmetries and periodicity. Understand and use $\tan \theta = \frac{\sin \theta}{\cos \theta}$ Understand and use $\sin^2 \theta + \cos^2 \theta = 1$ Solve simple trigonometric equations in a given interval, including quadratic equations in sin, cos and tan and equations involving multiples of the unknown angle. **Exponentials and logarithms** Know and use the function a^x and its graph, where a is positive. Know and use the function e^x and its graph Know that the gradient of e^{kx} is equal to ke^{kx} and hence understand why the exponential model is suitable in many applications. Know and use the definition of $\log_a x$ as the inverse of a^x, where a is positive and $x \geq 0$ Know and use the function ln x and its graph. Know and use ln x as the inverse function of e^x Understand and use the laws of logarithms: $\log_a x + \log_a y = \log_a(xy)$ $\log_a x - \log_a y = \log_a \frac{x}{y}$ $k\log_a x = \log_a x^k$ Solve equations of the form $a^x = b$ Use logarithmic graphs to estimate parameters in relationships of the form $y = ax^n$ and $y = kb^x$, given data for x and y Understand and use exponential growth and decay; use in modelling (examples may include the use of e in continuous compound interest, radioactive decay, drug concentration decay, exponential growth as a model for population growth); consideration of limitations and refinements of exponential models. **Differentiation** Understand and use the derivative of f(x) as the gradient of the tangent to the graph of y = f(x) at a general point (x, y); the gradient of the tangent as a limit; interpretation as a rate of change sketching the gradient function for a given curve second derivatives	**Trigonometry** Work with radian measure, including use for arc length and area of sector. Understand and use the standard small angle approximations of sine, cosine and tangent $\sin \theta \approx \theta$ $\cos \theta \approx 1 - \theta^2/2$ $\tan \theta \approx \theta$ Where θ is in radians. Know and use exact values of sin and cos for $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}, \pi$ and multiples thereof, and exact values of tan for $0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \pi$ and multiples thereof. Understand and use the definitions of secant, cosecant and cotangent and of arcsin, arccos and arctan; their relationships to sine, cosine and tangent; understanding of their graphs; their ranges and domains. Understand and use $\sec^2 \theta = 1 + \tan^2 \theta$ and $\csc^2 \theta = 1 + \cot^2 \theta$ Understand and use double angle formulae; use of formulae for sin (A ± B), cos (A ± B), and tan (A ± B), understand geometrical proofs of these formulae. Understand and use expressions for a cosθ + bsinθ in the equivalent forms of r cos (θ α± α) or rsin (θ α± α) Construct proofs involving trigonometric functions and identities. **Exponentials and logarithms** Similar to year 12 **Vectors** Similar topics in year 12 vectors and extended three dimensions **Differentiation** In addition to year 12 differentiation from first principles for small positive integer powers of x and for sin x and cos x Understand and use the second derivative as the rate of change of gradient; connection to convex and concave sections of curves and points of inflection Differentiate e^{kx} and a^{kx}, sin kx, cos kx, tan kx and related sums, differences and constant multiples. Understand and use the derivative of ln x Differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions. Differentiate simple functions and relations defined implicitly or parametrically, for first derivative only.
Foundation	**Integers** Calculate with positive and negative integers. Recognise types of number. Write a number as a product of prime factors. Find the HCF and LCM of a number. **Powers and Roots** Calculate squares and square roots, cube and cube roots. Use index laws for multiplication and division, including zero and negative powers. **Angles**	**Formulae** – Substitution, create expressions and equations, rearrange formula **Coordinates** – Plotting coordinates, midpoint, drawing linear graph **Fractions** – Equivalent fractions, fraction calculations **Index Notation** – Simplify using index laws **Constructions** – Constructions with ruler, protractor and compass	**Order of Operations** – Order of operations, use of calculator **Measures** – Metric units. Speed, Distance and Time. Density, mass and Volume. Pressure, Force and Area. **Loci** – Draw locus of different scenarios **Real life graphs** – Interpret linear graphs. Draw and recognise other algebraic graphs **Similar shapes** – Congruence and similarity. Linear, area and volume scale factors		

Recognise types of angle. Measure and draw angles. Calculate angles using angle facts and angles with parallel lines. **Co-ordinates** Plot and identify coordinates in the four quadrants. Draw straight line graphs of linear equations. Find the midpoint of a line segment. **Algebraic Manipulation** Expand and simplify expressions with brackets. Substitute into formulae. Factorise expressions and factorise quadratic expressions. **Statistical Measures** Find mean, median, mode and range for a set of data. Calculate averages from group data. Calculate an estimated mean from group data.	**Area and Perimeter** – Area and Perimeter of 2D shapes, Surface Area of 3D shapes **3D Shapes** – Recognise, draw and sketch 3D shapes including nets. Plans and elevations. Volume **Graphical Representations** – Pictograms, bar charts, stem and leaf diagram, time series graphs, pie charts **Scatter Graphs** – Draw and interpret scatter graphs **Sequences** – Finding missing terms of a sequence, pattern sequences, nth term of a sequence **Percentages** – Equivalent fractions, decimals and percentages. Percentage calculations. Interest **Equations** – Solve linear and simultaneous equations **Transformations** – Reflect, rotate, translate and enlarge shapes. Describe transformations **Decimals** – Decimal calculations. Convert decimals, fractions and percentages. Rounding to decimal places and significant figures **Graphs** – Draw linear graphs, equation of a line **Probability** –Probability of single events, 2 independent events, mutually exclusive events. Experimental probability. Probability tree diagrams **Pythagoras** – Pythagoras in 2D **The Circle** – Name parts of a circle. Area and circumference. Volume/Surface Area of cylinder. **Polygons** – Properties and angles of polygons **Percentages and Variation** – Proportion, reverse percentages. Exponential growth and decay	**Review mock exam 1 and revise for mock exam 2.** **Review mock exam 2. Revise and prepare for GCSE exams**	differentiation from first principles for small positive integer powers of x Differentiate x n, for rational values of n, and related constant multiples, sums and differences. Apply differentiation to find gradients, tangents and normals, maxima and minima and stationary points. Identify where functions are increasing or decreasing. **Integration** Know and use the Fundamental Theorem of Calculus Integrate x n (excluding n = −1) and related sums, differences and constant multiples. Evaluate definite integrals; use a definite integral to find the area under a curve. **Vectors** Use vectors in two dimensions. Calculate the magnitude and direction of a vector and convert between component form and magnitude/direction form. Add vectors diagrammatically and perform the algebraic operations of vector addition and multiplication by scalars, and understand their geometrical interpretations. Understand and use position vectors; calculate the distance between two points represented by position vectors. Use vectors to solve problems in pure mathematics and in context, (including forces)	Construct simple differential equations in pure mathematics and in context, (contexts may include kinematics, population growth and modelling the relationship between price and demand). **Integration** Integrate e^{kx}, 1/x, sin kx, cos kx and related sums, differences and constant multiples. Find the area between two curves Understand and use integration as the limit of a sum. Carry out simple cases of integration by substitution and integration by parts; understand these methods as the inverse processes of the chain and product rules respectively (Integration by substitution includes finding a suitable substitution and is limited to cases where one substitution will lead to a function which can be integrated; integration by parts includes more than one application of the method but excludes reduction formulae.) Integrate using partial fractions that are linear in the denominator. Evaluate the analytical solution of simple first order differential equations with separable variables, including finding particular solutions (Separation of variables may require factorisation involving a common factor.) Interpret the solution of a differential equation in the context of solving a problem, including identifying limitations of the solution; includes links to kinematics. **Numerical methods** Locate roots of f(x) = 0 by considering changes of sign of f(x) in an interval of x on which f(x) is sufficiently well behaved. Understand how change of sign methods can fail. Solve equations approximately using simple iterative methods; be able to draw associated cobweb and staircase diagrams. Solve equations using the Newton-Raphson method and other recurrence relations of the form xn+1= g(xn) Understand how such methods can fail. Understand and use numerical integration of functions, including the use of the trapezium rule and estimating the approximate area under a curve and limits that it must lie between. Use numerical methods to solve problems in context.