Maths Curriculum Overview Years 7-9

	Year 7	Year 8	Year 9
Autumn 1	**Arithmetic & Properties of Number** ● Show competency with addition and subtraction of values using written column methods ● Multiply and divide integers and decimals by powers of 10. ● Understand place value for integers and decimals. ● Perform increasingly complex calculations involving all four operations with whole numbers and decimals & understand opposites ● Understand the meaning of a power and begin to use powers in calculations ● Round numbers to the nearest power of 10 and given number of decimal places. ● Calculate using the order of operations for integers, decimals ● Use connecting operations with real life problems. **Factors, Multiples and Common Sequences:** ● Understand factor and multiple and the correct terminology when describing both. ● Understand and recognise when a value is a multiple of 2, 3, 5 or 10 using known facts. ● Describe and understand a prime number and its properties. ● Generate describe and continue special sequences such as odd, even, triangular, square numbers. ● Understand and generate square numbers	**Sequences:** ● Work out the terms of an arithmetic sequence using the term to term rule. ● Work out a given term in a simple arithmetic sequence. ● Generate sequences and predict how they will continue. ● Generate describe and continue special sequences. ● Recognise geometric sequences and work out the term-to-term rule. ● Generate terms of a sequence using the position-to-term rule. ● Work out and use expressions for the nth term in an arithmetic sequence ● Describe sequences arising in real life. ● Continue a quadratic sequence. ● Generate terms of a quadratic sequence. ● Make links to plotting graphs. **Forming and Solving Equations** ● Understand equality in algebraic relationships Be able to solve simple linear equations ● Experience manipulating pictorial and abstract algebraic representations ● Understand algebraic relationships embedded within various contexts ● Be able to form and solve linear equations with unknowns on both sides ● Experience representing and manipulating	**Fractions, decimals & percentages** ● Understand the connections between methods of calculation for fractions, decimals and percentage ● Be able to apply the four operations to fractions, decimals and percentage ● Experience manipulating and comparing methods of calculation involving fractions, decimals and percentage **Probability** ● Understand probability is a numerical measure of chance from 0 to 1 inclusive ● Be able to calculate the probability of single independent events ● Experience comparing probabilities using a variety of representations ● Understand a variety of representations of combined events ● Be able to calculate the probability of a pair of combined events ● Experience using a variety of techniques to solve problems

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	and properties of square numbers	algebraic relationships	
Autumn 2	**Prime Factor Decomposition** • Understand integers greater than 1 are either prime or can be made by multiplying primes in exactly one way • Be able to find the product of prime factors of a three digit composite number • Experience using prime factorisation to find the square root of a square number • Understand integers greater than 1 are either prime or can be made by multiplying primes in exactly one way • Be able to find the product of prime factors of a three digit composite number • Experience using prime factorisations to find the square root of a square number **Order Of Operation:** • Understand equal and unequal order of priority between addition, subtraction, multiplication and division • Be able to interpret and write calculations involving the four operations, indices and brackets • Experience connecting calculations to a variety representations **Positive and Negative Numbers** • Understand what positive and negative numbers are and how they exist in real life • Be able to solve simple addition problems involving negative numbers • Experience representing positive and	**Forming and Solving Inequalities:** • Understand different representations of inequalities • Be able to test and solve linear inequalities • Experience manipulating and explaining different inequality representations • Understand inequalities as representations of numerical relationships from a range of contexts • Be able describe solve inequalities including with unknowns on both sides • Experience manipulating inequalities and exploring the conditions for preservation of the relationship . **Linear Graphs :** • Students start the unit on linear graphs by visiting and revisiting familiar contexts on the Cartesian plane, such as using coordinates, horizontal and vertical lines and inequalities • Understand a linear relationship can be recognised from a constant rate of change in the coordinates • Be able to identify the gradient of a line from its graph and from a set of coordinates • Experience connecting a linear equation to its graphical representation • Understand a linear relationship can be described using algebra in the form $y=mx+c$ • Be able to identify the equation of a line and draw a line from its equation • Experience moving between three	**Further Probability:** • Understand set notation for intersections, unions, complements and the universal set • Be able to identify and interpret sets described by notation and within Venn diagrams • Experience interpreting a range of sets in qualitative and numerical contexts • Understand probability from set notation and Venn diagrams • Be able to form and interpret Venn diagrams in the context of probability • Experience representing probabilities and expected outcomes in different ways **Solving Simultaneous** • Be able to solve and manipulate linear equations with one or more variables • Understand how equivalence can be maintained while scaling and rearranging equations • Understand how variables and unknowns interact within a system of equations • Understand that addition and subtraction of simultaneous equations can result in the elimination of a variable • Experience pattern spotting and conjecturing to establish formal methods for eliminating variables • Be able to use equivalent equations –	

negative numbers on number lines	representations of a linear relationship: coordinates, graphs and equations	through scaling and rearranging – to solve simultaneous equations
	Accuracy & Estimation: ● Understand rounding is a method of approximation ● Be able round to decimal places and 'to the nearest' ● Experience using rounded numbers to estimate	**Solving Simultaneous Equations Graphically:** ● Understand coordinates as solutions to linear equations, including intersections as simultaneous solutions ● Be able to solve simultaneous linear equations graphically ● Experience visualising trends in and intersections of linear equations ● Understand parallel lines have no solution as they do not intersect ● Be able to identify whether a pair of simultaneous equations have a solution algebraically and graphically ● Experience connecting graphical and algebraic representations of linear relationships
Spring 1	**Expressions, Equations and Inequalities** ● Understand that algebra is used to express mathematical structures, and that algebraic terms represent numbers that are unknown or variable ● Be able to substitute (into), simplify, expand and factorise algebraic expressions ● Understand what is meant by an equation and an inequality ● Be able to manipulate equations and	**Ratio** ● Understand the relationship between ratio and other proportional descriptors ● Be able to use models and equivalence to solve ratio problems ● Experience models and contexts relating to ratio **Real Life Graphs**	**Angles** ● Understand angle theorems are used to calculate angles without the need from measures ● Able to calculate unknown angles using multiple angle theorems ● Justifying deductions using chain reasoning ● Able to estimate the size of an angle ● Draw an angle accurately using a protractor ● Understand parallel line rules

inequalities to form new equations and inequalities.
- Be able to form expressions and inequalities in a new context
- Be able to simplify and manipulate algebra in a new context
- Experience generalising patterns and how algebra can be used to
- represent them.

Coordinates
- Understand coordinates are used to describe a position on a coordinate grid
- Be able to read and plot coordinates on axes with different scales
- Experience coordinates in horizontal and vertical lines
- Understand gradient is the slope or 'steepness' of a line graph
- Be able to plot line graphs from a given relationships between the coordinates
- Experience finding parallel and perpendicular lines by considering right angled triangles

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- Understand graphical representation of (changing) rate
- Be able to interpret and express graphical linear and piecewise relationships
- Experience describing, comparing and visualising changing rate

Direct and Inverse Proportion
- Understand multiplicative relationships
- Be able to use scale factor and constant of proportionality independently to find missing values in directly proportional relationships
- Experience different representations of the constant of proportionality, including gradient
- Be able to identify the scale factor and constant of proportionality for any two directly proportional measures (including non-integer values)
- Understand key features of inversely proportional relationships
- Be able to find missing values from directly and inversely proportional relationships, and state the constant of proportionality in each case
- Be able to use algebraic notation to describe directly and inversely proportional relationships

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- Understand angles at a point, vertically opposite angles
- Properties of special triangles
- Understand interior and exterior calculations for regular polygons using the formula 180x number of sides for the exterior.

Constructions, congruence & Loci
- Understand circles can be used to draw the locus of a point that are given distances from a point.
- Construct given shapes
- Construct equilateral triangles and 60 degrees
- Perpendicular and angle bisectors within a geometric problem.
- Understand congruence and the conditions for congruence between given triangles
- Know SAS, ASA

Pythagoras
- Understand that radical notation can be used to describe slanted noninteger lengths and how this relates to squares and right-angled triangles
- Be able to find any missing length of a right-angled triangle by knowing that the square of the hypotenuse is equal to the sum of the squares of the other two sides
- Be able to identify opportunities to use Pythagoras's theorem in non obvious contexts
- Understand that perpendicular lines are often an opportunity to use Pythagoras' theorem

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Spring 2	## Angles - Understand that an angle is a measure of turn - Be able to find missing angles at a point and on a line	## Univariate Data - Understand different types of data - Be able to interpret and represent data in different ways - Experience collecting and analysing data in	## Ratio: - Understand ratios describe proportional relationships - Be able to describe proportional relationships using ratios and fractions

- Experience constructing chains of reasoning, giving justifications for each step
- Understand that two parallel straight lines will never meet
- Understand that two lines that are not parallel will meet exactly once
- Be able to identify angles that are equal and pairs of angles that sum to 180 degrees using angle rules in parallel lines

Classifying 2D Shapes

- Understand shapes have properties such as number of sides, number of equal sides, number of equal angles, and number of lines of symmetry
- Be able to identify lines of symmetry
- Experience categorising shapes according to a range of properties
- Understand rotational symmetry means a shape can be turned to fit over itself exactly
- Be able to name quadrilaterals accurately
- Experience classifying quadrilaterals according to equal sides, equal angles, parallel sides and length of diagonals

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- multiple representations
- Understand the mean is a way of sharing out equally
- Be able to use the mean to solve problems
- Experience using different representations of data in mean problems
- Understand mean, median, mode and range
- Be able to find averages from different representations of data
- Experience interpreting averages

Bivariate Data

- Understand that in bivariate data each data entry has 2 connected values
- Be able to represent bivariate data with a scatter diagram, and to read data from a scatter diagram
- Be able to identify trends in bivariate data and use mathematical language to describe trends.
- Understand how scatter graphs help make predictions about hypothetical data
- Be able to find averages from scatter graphs
- Experience mathematical reasoning to discuss correlations versus causation

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- Experience using scale factors, constants of proportionality and unit ratios to solve problems

Similarity & Enlargement:

- Understand ratios describe proportional relationships
- Be able to describe proportional relationships using ratios and fractions
- Experience using scale factors, constants of proportionality and unit ratios to solve problems
- Understand ratios describe proportional relationships
- Be able to describe proportional relationships using ratios and fractions
- Experience using scale factors, constants of proportionality and unit ratios to solve problems

Trigonometry

- Understand that every right-angled triangle is similar to a right angled triangle drawn within a unit circle.
- Be able to find the length of a side in right-angled triangles from a given angle and the length of the hypotenuse, including through using sine and cosine functions.
- Understand that the relationship between the opposite and adjacent is held constant by a set angle
- Be able to directly find the length of the opposite from the adjacent and given angle (and vice versa)
- Be able to find any angle in a right-angled triangle from two known side lengths.

Maths Curriculum Overview Years 7-9

Summer 1	**Area and Perimeter of 2D Shapes** ● Be able to work out perimeters and areas of different shapes ● Understand perimeter as a measure of length expressed in appropriate units ● Experience connecting perimeter calculations to shapes using axioms of number and algebra ● Be able to work out the area and perimeter of rectilinear shapes, parallelograms and triangles ● Understand the formulae for area of parallelograms and triangles involves the height perpendicular to a chosen base ● Experience reasoning how areas can be calculated including deriving area formula **Conceptualising Fractions** ● Be able to represent fractions pictorially and abstractly ● Understand the roles of numerator and denominator in describing numerical value ● Experience a variety of representations revealing different conceptualisations of fractions ● Understand fractions with the same value can be written in different ways ● Be able to convert between fractions and decimals ● Experience comparing fractions using a variety of representations	**Angles in Polygons:** ● Understand polygon, interior and exterior angles. ● Constructing and deconstructing polygons into/from triangles ● Know sum of interior angles in a triangle ● Finding missing angles in polygons ● Regular polygons and the connection with sides and exterior angles ● Calculation of interior angles from exterior angles ● Use of algebra with missing angles **Percentages** ● Understand percentages are a useful tool for comparing amounts ● Be able to write a proportion as a percentage, convert between fractions, decimals and percentage and mentally calculate percentages of amounts ● Experience working with a changing 'whole' in the same set of data ● Be able to work out percentages of amounts and percentage increase and decrease ● Understand how to use decimal multipliers to increase and decrease by a percentage ● Experience developing and manipulating calculation strategies when working with percentage	**Working with Algebra:** ● Understand algebraic conventions ● Be able to manipulate algebraic expressions by expanding brackets and simplifying or factorising ● Experience multiple representations of algebraic structures ● Understand a variable can take any value whilst an unknown has a fixed value (or values) ● Be able to evaluate expressions, solve single variable equations, and represent equations with 2 variables graphically ● Experience the effect of changing the order of operations on the value of an expression **Quadratic equations:** ● Understand that quadratics are expressions and equations that include a squared variable (and no higher order power) ● Understand that the shape of a quadratic graph is different from a linear graph ● Be able to evaluate quadratic expressions for a given value, and use these values to plot graphs of quadratic equations ● Understand that quadratic graphs can be used to give us information about x and y values ● Understand that every x-value can be mapped to a single y-value but not the other way around ● Understand that quadratics can be written in a factorised form, expressed as two brackets ● Be able to expand double brackets with x

Manipulating Fractions

- Be able to multiply integers and fractions by fractions
- Understand fractions as operators where the product is found by multiplying denominators and numerators
- Experience representing fraction multiplication pictorially to underpin calculation methods
- Be able to divide by fractions efficiently
- Understand the connections between equivalent and inverse operations when × and ÷ by fractions
- Experience reasoning the connections between equivalent and inverse operations
- Be able to add and subtract fractions
- Understand how to use and represent common denominators and the lowest common denominator
- Experience comparing the efficiency of using different calculation approaches when adding fractions

- coefficients of 1 and positive constants
- Understand expanding brackets as a multiplication of two partitioned numbers and use models of multiplication to find quadratics and other polynomials in their standard form
- Be able to expand double brackets including those with negatives and non-1 x coefficients
- Experience different representations of quadratics and spot patterns in how the algebraic forms relate to graphical forms

Summer 2

Ratio:

- Understand ratio tells us about proportion, not amounts
- Be able to simplify and scale ratios
- Experience using tables and bar models to find amounts
- Be able to divide an amount into a ratio, identify the constant of proportionality and move between fractional and ratio written representations
- Understand the relationship between parts

Circles:

- Understanding Pi and the ratio of the diameter to circumference
- Know all names involved with the anatomy of a circle
- Calculation of circumference and area
- Calculation of parts of circles from given information
- Solving perimeter problems involving compound shapes and arc lengths

Volume & Surface Area:

- Understanding of dimension and solid shapes

Surds

- Understand surd notation
- Identify surds
- Know surds are irrational
- Know a surd multiplied by itself gives the value $\sqrt{a} \times \sqrt{a} = a$
- Simplify a surd into a rational and irrational part
- Estimate a surd on a number line
- Give answers in surd form
- Rationalise a single denominator

and the whole when working with fractions and ratios together
- Experience the impact of defining the whole differently when working with combined parts

having 3 dimensions
- Finding the surface area of a cube and cuboid
- Use of nets for calculation of surface area
- Know the terminology with 3d shapes including edge, face, vertex
- Calculate volume
- Know that surface area is its net and that volume is what would "fill the inside"
- Understanding a prism and classifying shapes into prism or not
- Calculation of both surface area and volume of prisms including cylinders

Indices:

- Understand the notation and what it represents
- Understand and use negative indices
- Understand and use fractional indices
- Understand the power of zero
- Combinations of negative a fractional indices
- Combining indices and the rules also the use of brackets
- The use of powers of 10

Standard Form:
- Know the rules for standard form
- Writing values in standard form, big and small
- Calculating with standard form values
- Calculating with SF on a calculator