Maths

Year 9

Autumn	Algebra 4	A4a. Straight line graphs	• Interpret straight line graphs • Find and use the equation of a straight line • Explore real-life inverse proportion graphs	**Key Vocabulary** Asymptote A straight line that a graph will never meet. Gradient The steepness of a line. Intercept The point where two lines cross. Linear Has a constant additive difference. Parallel Two straight lines that never intersect that are always the same distance apart (the same gradient). Perpendicular Two straight lines that intersect at a right angle (at 90º). Plot To use exact coordinates to produce a graph. Reciprocal A pair of numbers that multiply together to give 1 - a multiplicative inverse. Y-intercept The point at which the line crosses the y-axis. Co-ordinate A set of values that show an exact position on a graph - looks like (x,y).
		A4b. Mathematical relationships 2	• Revisit and extend to equations and inequalities with unknowns on both sides using all previous contexts: angles, probability, area, etc. • Change the subject of a formula • Reduce equations to the form y=mx+c	**Key Vocabulary** Subject The isolated variable. Inequality A mathematical relationship that compares two expressions showing if one is greater than, less than or equal to another. Inverse A mathematical opposite. Rearrange Change the way an equation is displayed using inverses. Solve Find a numerical value that satisfies a mathematical relationship (makes it true). Substitute Replace a variable with a numerical value. Variable A letter than represents an unknown number or a changeable quantity.
		A4c. Testing conjectures	• Test conjectures in a wide range of contexts • Sums and products of odd and even numbers • Is a given number in a sequence? • Is this a shape? • Are these lines parallel?	**Key Vocabulary** Binomial An expression of the sum or difference of two terms. Expand To multiply each term in the bracket by the coefficient. Factor An integer that divides into a number without leaving a remainder, or, integers that multiply to make a specific number. HCF Highest common factor - the biggest factor that two or more numbers/terms share. LCM Lowest common multiple - the smallest multiple that two or more numbers/terms share. Multiple The result of multiplying a number by a positive integer. Prime An integer with exactly 2 factors. Proof A logical, sequential mathematical argument used to show that a statement is true. Quadratic expression An expression with four terms (often simplified to three terms) in which the highest exponent is 2. Verify To make sure a solution is correct using substitution.

| Geometry 3 | G3a. 3D shapes | • Understand the language of faces, edges and vertices
• Know the names of common prisms and non-prisms
• Identify 2-D shapes within 3-D shapes using nets
• To view 3D shapes using a plan view and front and side elevations
• Work out the volume and surface area of cuboids and cylinders
• Work out the volume of any prism
• Work out missing lengths given area and/or volume | **Key Vocabulary**
Face — A flat surface on a solid object.
Prism — A 3D shape with a constant cross-section and straight edges.
Plan — A drawing of something from directly above (sometimes birds eye view).
Sketch — To use key pieces of information to produce a drawing.
Vertex — A point where two or more line segments meet (a corner).
2D — Two dimensions to the shape e.g. length and width.
3D — Three dimensions to the shape e.g. length, width and height.
Cross-section — A view inside a solid shape made by cutting through it
Edge — A line joining two vertices or faces.
Surface area — The sum of the areas of the faces of a 3D shape.
Unit — The standard way of expressing a measurement (e.g. cm, kg, ml).
Perspective — A way to give illustration of a 3D shape when drawn on a flat surface. |
| | G3b. Constructions & congruency | • Construct and use scale drawings
• Construct perpendicular and bisectors
• Understand congruency | **Key Vocabulary**
Arc — Part of a curve.
Bisector — A line that divides something into two equal parts.
Congruent — The same shape and size
Locus — A set of points with a common property.
Perpendicular — Two straight lines that intersect at a right angle (at 90º).
Perpendicular bisector — A line that intersects another line at 90˚, dividing it into two equal parts.
Equidistant — The same distance.
Protractor — A piece of equipment used to measure and draw angles. |

Spring		**N8a. Solving number problems**	• Extend knowledge of HCF and LCM • Explore surds and fractional indices	**Key Vocabulary** Factor An integer that divides into a number without leaving a remainder, or, integers that multiply to make a specific number. Irrational A number that cannot be made by dividing two integers Multiple The result of multiplying a number by a positive integer. Inverse A mathematical opposite. Product The result of a multiplication. Quotient The result of a division Rational A number that can be made by dividing two integers. Index form Writing numbers as powers. Surd An irrational root. Integer A whole number that is positive, negative or zero.
		N8b. Using percentages	• Revisit percentage increase and decrease • Use percentages over 100% • Find percentage changes • Solve "reverse percentage" problems • Use multipliers in a variety of contexts	**Key Vocabulary** Growth The process of increasing/growing. Integer A whole number that is positive, negative or zero. Invest Use money with the goal of it increasing in value over time (usually in a bank). Percent Parts per 100 – written using the % symbol. Profit Money made after expenditure and taxes. Reduce To make smaller in value. Depreciate To decrease in value. Tax A compulsory contribution to the government Time and a half A rate of pay 50% higher than the usual rate. VAT Value added tax - tax added onto products (usually 20%). Equivalent Of equal value for all values of a variable. Multiplier A value to multiply by (multiplier more than 1 = increasing effect, less than 1 = decreasing effect). Decimal A base ten number with a decimal point used to separate ones, tenths, hundredths etc. Fraction A type of number that represents how many parts of a whole we have. A fraction represents a division.
		N8c. Maths and money	• Explore financial mathematics (incl. bills and bank statements, interest, unit pricing (best buys)	**Key Vocabulary** Multiplier A value to multiply by (multiplier more than 1 = increasing effect, less than 1 = decreasing effect). Balance The amount of money in a bank account Credit Money that goes into a bank account Debit Money that leaves a bank account. Currency A system of money used in a particular country. Deposit An initial payment (often a way of securing an item you will later pay for). Expense A cost or outgoing. Per Annum Each year. Tax A compulsory contribution to the government Interest The cost of borrowed money or money paid for saving. Unitary A single item (one of).

Geometry 4	**G4a. Angles 2**	• Revisit angle rules, including within special quadrilaterals • Find angles using algebraic methods • Use chains of reasoning to evaluate angles	**Key Vocabulary** Conjecture — A mathematical statement that has not been rigorously proven. Counterexample — An example that disproves a statement Equation — A mathematical relationship stating two expressions are equal. Parallel — Two straight lines that never intersect that are always the same distance apart (the same gradient). Parallelogram — A quadrilateral with two pairs of parallel sides of the same length. Perpendicular — Two straight lines that intersect at a right angle (at 90º). Polygon — A 2D closed shape made with straight lines. Sketch — To use key pieces of information to produce a drawing. Sum — The result of an addition (the total). Transversal — A straight line that intersects two or more other (normally parallel) lines Trapezium — A quadrilateral with one pair of parallel sides
	G4b. Rotation & translation	• Identify the order of rotational symmetry of a shape • Find the result of rotating a shape • Translate points and shapes by a given vector • Compare rotation and reflection	**Key Vocabulary** Invariant — A point that does not move after a transformation. Regular — A shape that has angles of equal size and sides of equal lengths. Vertex — A point where two or more line segments meet (a corner). Horizontal — A straight line from left to right (parallel to the x axis). Rotate — Transform with a circular movement. Symmetry — One shape is identical to another shape when it is moved, rotated or flipped. Vertical — A straight line from top to bottom (parallel to the y axis).
	G4c. Pythagoras' Theorem	• Identify the hypotenuse of a right-angled triangle • Calculate missing sides in right-angled triangles • Distance between two points • Midpoint of a line segment • Determine whether a triangle is right-angled	**Key Vocabulary** Adjacent — The side next to the angle of interest. Hypotenuse — The longest side on a right-angled triangle. It is always opposite the right angle. Sketch — To use key pieces of information to produce a drawing. Square number — The output of a number multiplied by itself. Square root — A number that when multiplied by itself gives the value (symbol $\sqrt{\ }$).

Summer	Ratio & Proportion 2	R2a. Enlargement & similarity	• Enlarged shapes by a positive scale factor, including from a given point (extend to negative scale factor to interleave directed number) • Calculate the lengths of missing sides in similar shapes	**Key Vocabulary** Corresponding Objects (or sides) that appear in the same place in two similar situations. Enlarge To change the size of a shape (enlargement is not always making a shape bigger. Scale Factor A multiplier describing a change in size (SF more than 1 = increased size, SF less than 1 = decreased size). Similar Shapes Shapes of different sizes that have corresponding sides in equal proportion and identical corresponding angles. Image The picture or visual representation.
		R3b. Solving ratio problems	• Direct proportion problems and graphs • Conversion graphs • Solve ratio problems given the whole or part • Simple inverse proportion • Unit pricing problems ('best buys')	**Key Vocabulary** Direct proportion As one variable is multiplied by a scale factor the other variable is multiplied by the same scale factor. Inverse proportion As one variable is multiplied by a scale factor the other is divided by the same scale factor. Ratio A multiplicative relationship describing how two numbers or variables compare. Proportion A numerical relationship that compares the size of a part to the size of a whole.
		R2c. Rates	• Work with speed, distance and time • Solve problems involving density • Work with compound units	**Key Vocabulary** Origin (0,0) on a graph - the point where the two axes intersect. Substitute Replace a variable with a numerical value. Volume The amount of space inside a 3D shape (the capacity of a container). Proportion A numerical relationship that compares the size of a part to the size of a whole
	Probability & Statistics 4	P4. Probability 3	• Relative frequency • Expected number of outcomes • Independent events	**Key Vocabulary** Bias A built-in error that makes all values wrong (unequal) by a certain amount, e.g. a weighted dice. Event The outcome of a probability – a set of possible outcomes. Independent event An event that is not effected by any other events. Relative Frequency How often something happens divided by the total number of outcomes. Chance The likelihood of a particular outcome. Probability The likelihood of an event happening.
	Algebra 5	A5. Algebraic representations	• Drawing and reading from quadratics • Interpreting other graphs e.g. reciprocal, piece-wise • Representing inequalities • Solve simultaneous equations graphically	**Key Vocabulary** Cubic A curved graph with the highest power being 3 (cubed). Inequality A mathematical relationship that compares two expressions showing if one is greater than, less than or equal to another. Origin (0,0) on a graph - the point where the two axes intersect. Parabola A 'u' shaped curve that has mirror symmetry. Quadratic Graph A U-shaped graph with a quadratic equation. Reciprocal A pair of numbers that multiply together to give 1 - a multiplicative inverse. Sketch To use key pieces of information to produce a drawing.
	Number 9	N9. Standard index form 2	• Calculate with numbers given in standard form, with and without a calculator	**Key Vocabulary** Base The number being repeatedly multiplied. Exponent The number of repeats in the multiplication (synonym of index/indices). Index The number of repeats in the multiplication (synonym of exponent). Leading digit The left-most non-zero digit in a number. Power A base with an exponent/index. Sometimes used as a synonym for exponent/index. Standard (Index) Form A system of writing very big or very small numbers.