Mathematics Year 9 Foundation

Term	1		2			3		4		5		6	
Topic	**Number 1**	**Number 2**	**Geometry**	**Statistics**	**Algebra**	**Ratio and Proportion**	**Algebra**	**Geometry**	**Ratio and Proportion**	**Algebra**	**Geometry**	**Algebra**	**Statistics**
Detail	Investigate and use prime factorisation to find the HCF and LCM of 2 or more numbers. Estimate calculations by rounding to a specific degree of accuracy. Explore the links between ordinary numbers and standard form.	Consolidate use of all four operations including with decimals, negative numbers, powers and roots.	Explore enlargement, representation of 3D shapes, bearings and scale diagrams. **Students will need pencil, ruler, rubber, protractor, coloured pencils or pens**	Understand the meaning of probability, explore experiments and outcomes, develop an understanding of probability	Develop the use of algebra to incorporate multiplying terms, factorising an expression, simplifying expressions, using the laws of indices and algebraic substitution	Explore connections between fractions, decimals, percentage, ratio, proportion and how they can be applied to compound units.	Investigate sequences and incorporate a link to algebraic notation for sequences.	Explore angles in parallel lines and regular polygons.	Develop use of percentages in a variety of situations including finance.	Solve linear equations up to unknown on both sides including those with brackets and set in a context.	Investigate and apply the circumference and area of a circle, extending this to finding the volume of a prism including cylinders.	Explore graphs. Looking at gradients, y-intercepts, linear, quadratic and real life graphs.	Develop knowledge of averages, representing data and comparing data sets.
Grade 8-9													
Grade 6-7			Enlarge 2D shapes by a negative scale factor. Describe an enlargement by a negative scale factor.										
Grade 5	Write upper and lower bounds as an error interval.												
Grade 4	Identify upper and lower bounds.		Enlarge 2D shapes by a positive and fractional scale factor. Describe enlargements with a positive and fractional scale factor.		Know and use the laws of indices - understand about the power zero and that negative powers can arise. Substitute into common scientific formulae. Change the subject of a simple formula	Write a decimal or a fraction as a percentage. Identify proportion and fractions fluently in situations involving ratio or proportion. Know the connection between speed, distance and time.	Use the nth term of a sequence to make conclusions about a sequence	Establish the size of an interior angle in a regular polygon. Solve angle chase problems with parallel lines	Solve problems that require exact calculation by using fractions. Solve financial problems including compound interest and depreciation.	Solve linear equations (can include brackets) with the unknown on both sides when the solution can be a negative, integer or fraction. Create and solve equations using perimeter, area and properties of shapes and angles. Recognise that the point of intersection of two graphs corresponds to the solution of a connected equation.	Calculate the radius or diameter of a circle when the circumference is known. Calculate the perimeter of composite shapes that include sections of circles. Calculate the radius and diameter of a circle when the area is known. Calculate the area of composite shapes that include sections of a circle.	Plot and interpret graphs of piece-wise linear functions in real life contexts. Plot and interpret distance-time graphs or speed-time graphs. Find approximate solutions to kinematic problems involving speed and distance.	Use theoretical and experimental probability to calculate expected outcomes. Draw and interpret histograms, with equal class intervals, for grouped data. (Frequency diagrams) Plot and interpret scatter diagrams of bivariate data.
Grade 2-3	Finding factors and multiples of any number. Decompose any number and express it as product of its prime factors. Find HCF and LCM of at least 2 numbers. Round numbers to specific significant figures or decimal places. Convert ordinary numbers into standard form and vice versa.	Perform all four operations with decimals. Perform all four operations with negative numbers. Use BIDMAS with more than one operation in a calculation. Calculate using long multiplication and long division. Know your square numbers up to 15 x 15, cube numbers up to 125. Find the square roots of the square numbers up to 225. Find the cube root of numbers up to 125.	Draw,measure and interpret bearings and scale diagrams. Represent 3D shapes as plans and elevations.	Know and use the vocabulary of probability. Understand the use of the 0-1 scale to measure probability. List all the outcomes for an experiment whilst identifying the probabilities of the outcomes. Work out theoretical vs experimental probability for events. Know the probabilities for all outcomes is 1.	Simplify algebraic notation by multiplying. Simplify an expression involving terms with combinations of variables e.g 3a^2b + 4ab^2 + 2a^2 - a^2b Substitute positive and negative numbers into formulae. Factorise a simple expression by taking out common factors.	Convert a fraction to a decimal and identify if a fraction is terminating or recurring. Write a decimal as a fraction. Convert a fraction to a decimal by scaling. Use a calculator to change any fraction to any decimal. Identify a ratio in a real life context, write a ratio to describe a situation. Understand the meaning of compound units.	Generate a sequence from a term-to-term rule. Understand the meaning of a position to term rule. Use a position to term rule to generate a sequence. Find the position to term rule for a given sequence using algebra.	Identify alternate and corresponding angles. Know the total of the exterior angles in any polygon and use this to find the exterior angle in a regular polygon.	Find the percentage of an amount. Identify the multiplier for a percentage increase or decrease including when the percentage is greater than 100%. Use calculators to increase an amount by a percentage greater than 100% Solve to find the original value when working with percentages. Solve financial problems including simple interest.	Solve linear equations with the unknown on one side, when the solution can be a negative, integer or fraction. Use substitution to check solutions to linear equations.	Know the vocabulary of circles. Find a connection between the circumference and diameter of a circle. Calculate the circumference of a circle when either the radius or diameter is known. Know and use the formula for the area of a circle. Know and use the formula for finding the volume of a prism. Find the volume of a cylinder.	Plot graphs of functions of the form y = mx + c. Understand the concept of and find the gradient of a straight line. Find the y-intercept of a straight line. Use the gradient and y-intercept to sketch a linear graph. Distinguish between a linear and quadratic graph. Plot graphs of quadratic functions in the form of y = x^2± c. Sketch a simple quadratic graph.	Use Venn diagrams to list the elements of a set and their probabilities. List outcomes of an even systematically by using sample space diagrams and find probabilities, Use frequency trees to record outcomes of probability experiments and make conclusions. Explore different type of data. Collect dataand construct a grouped frequency table Find the mode, median and range from a frequency table of discrete data. Find the mean of a set of data and use the mean to find a missing number in a set of data. Draw and use lines of best fit on a scatter diagram Find the modal class, class containing the median and an estimate for the range and mean of a set of grouped data. Know the different types of correlation in a scatter
Keywords	prime, prime factor, prime factorisation, product, Venn diagram, highest common factor, lowest common multiple, standard form, significant figure	Negative number, directed number, operation, inverse, long multiplication, short division, power, index (indices), roots	Similar, similarity, enlarge, enlargement, scaling, scale factor, centre of enlargement, object, image, scale drawing, bearing, plan, elevation	Probability, theoretical probability, even, outcome, impossible, unlikely, even chance, likely, certain, equally likely, mutually exclusive, exhaustive, possibility space, experiment	Product, variable, term, coefficient, common factor, factorise, power, indices, formula, formulae, subject, change the subject	Fraction, mixed number, top-heavy fraction, percentage, decimal, proportion, terminating, recurring, simplify, cancel, speed, distance, time, compound units, multiplier, unitary method, units	Sequence, linear, term, difference, term-to-term rule, position-to-term rule, ascending, descending	Degrees, right angle, acute, obtuse, reflex, vertically opposite, geometry, beometric, parallel, alternate angles, corresponding angles, interior angle, exterior angle, regular polygon	Simplify, cancel, lowest terms, percent, percentage, percentage change, original amount, multiplier, simple interest, exact	Algebra, algebraic, algebraically, unknown, equation, operation, solve, solution, brackets, symbol, substitute, graph, point of intersection	Circle, centre, radius, diameter, chord, circumference, Pi, prism, cross-section, cylinder, polygon, polygonal, solid	Plot, equation, function, formula, linear, coordinate plane, gradient, y-intercept, substitute, quadratic, piece-wise linear, model, kinematic, speed, distance, time	Outcome, event, exeriment, combined experiment, frequency tree, enumerate, set, Venn diagram, probability, sample space, equally likely outcomes, theoretical probability, random, bias, fairness, relative frequency
Resource Links	Use the number 5040 when writing prime factorisations KM: Ben Nevis KM: Astronomical numbers KM: Interesting standard form KM: Powers of ten KM: Maths to Infinity: Standard form Powers of ten film (external site) The scale of the universe animation	KM: Summing up KM: Developing negatives KM: Sorting calculations KM: Maths to Infinity: Directed numbers Standards Unit: N9 Evaluating directed number statements NRICH: Working with directed numbers	KM: Outdoor Leisure 13 KM: Airports and hilltops KM: Plans and elevations KM: Transformation template KM: Enlargement I KM: Enlargement II KM: Investigating transformations with Autograph (enlargement and Main Event II). Dynamic example. KM: Solid problems (plans and elevations) KM: Stick on the Maths: plans and elevations WisWeb applet: Building houses NRICH: Who's the fairest of them all?	KM: Probability scale and slideshow version KM: Probability loop cards NRICH: Dice and spinners interactive	KM: Missing powers KM: Laws of indices. Some useful questions. KM: Maths to Infinity: Indices KM: Scientific substitution (Note that page 2 is hard) NRICH: Temperature	KM: FDP conversion. Templates for taking notes. KM: Fraction sort. Tasks one and two only. KM: Maths to Infinity: Fractions, decimals, percentages, ratio, proportion NRICH: Matching fractions, decimals and percentages KM: Proportion for real KM: Investigating proportionality NRICH: In proportion NRICH: Ratio or proportion? NRICH: Roasting old chestnuts 3 Standards Unit: N6 Developing proportional reasoning	KM: Spreadsheet sequences KM: Generating sequences KM: Brackets and sequences KM: Maths to Infinity: Sequences KM: Stick on the Maths: Linear sequences NRICH: Charlie's delightful machine NRICH: A little light thinking NRICH: Go forth and generalise	KM: Alternate and corresponding angles KM: Perplexing parallels KM: Investigating polygons KM: Maths to Infinity: Lines and angles KM: Stick on the Maths: Alternate and corresponding angles KM: Stick on the Maths: Geometrical problems NRICH: Ratty	KM: Stick on the Maths: Proportional reasoning KM: Stick on the Maths: Multiplicative methods KM: Percentage identifying NRICH: One or both NRICH: Antiques roadshow	KM: Solving equations KM: Stick on the Maths: Constructing and solving equations NRICH: Think of Two Numbers	KM: Circle connections, Circle connections v2 KM: Circle circumferences, Circle problems KM: Circumference searching KM: Maths to Infinity: Area and Volume KM: Stick on the Maths: Circumference and area of a circle KM: Stick on the Maths: Right prisms NRICH: Blue and White NRICH: Efficient Cutting NRICH: Cola Can	KM: Plotting graphs KM: Matching graphs KM: Autograph 1 KM: Autograph 2 KM: The hare and the tortoise	KM: Sample spaces KM: Race game KM: Stick on the Maths L4HD3 NRICH: Prize Giving (frequency trees) KM: Make a 'human' scatter graph by asking pupils to stand at different points on a giant set of axes. KM: Gathering data KM: Spreadsheet statistics KM: Stick on the Maths HD2: Selecting and constructing graphs and charts KM: Stick on the Maths HD3: Working with grouped data KM: Swillions KM: Lottery project NRICH: Half a Minute
Career Opportunities	Why Maths is Important Jobs that involve Maths	Roller coaster engineering	Robotics	Astronaut	Artist who uses Maths	Nursing Fashion Designer	Forensic Science	Maths and Movies App Creator	Ecological Modelling	Store Manager Mechanical Engineering	Surveyor	Structural design Sustainability within Construction Design	Geographic Information Systems