

Mathematics Y8

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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. Explain the links between ordinary numbers and standard form.	Consolidate use of all four operations including with fractions, decimals, negative numbers, powers and roots.	Explore enlargement, congruence and similarity, bearings and scale diagrams. Students will need pencil, ruler, rubber, protractor, coloured pencils or pens.	Understand the meaning of probability, explore experiments and outcomes. Understand probability.	Develop the use of algebra to incorporate a link to algebraic notation for sequences.	Explore connections between operations, decimals, percentages, ratio, proportion and 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 to solve problems including including finance.	Solve linear equations on to problems on both sides including those with brackets and set in a context.	Investigate and apply the knowledge of area and circumference of a circle including cylinders.	Investigate and apply the knowledge of area and circumference of a circle and volume of a prism including cylinders.	Develop knowledge of averages, representing and comparing data sets.
Mastered	Interpret, analyse and generate strategies to solve problems concerning prime factorisation, extension and standard form.	Interpret, analyse and generate strategies to solve problems with all four operations, negative numbers, powers, roots and bearings.	Interpret, analyse and generate strategies to solve problems concerning enlargement, representation of 2D shapes, scale diagrams and bearings.	Interpret, analyse and generate strategies to solve problems concerning probability.	Interpret, analyse and generate strategies to solve problems using multiplying algebraic notation, factoring an expression, substitution and changing the subject of a formula.	Interpret, analyse and generate strategies to use and solve problems with fractions, decimal and percentage equivalents, proportion and compound units.	Interpret, analyse and generate strategies to use and solve problems with percentages and the eight term.	Interpret, analyse and generate strategies to use and solve problems involving angles in a variety of situations.	Interpret, analyse and generate strategies to use and solve problems using linear equations.	Interpret, analyse and generate strategies to use and solve problems involving area and circumference of a circle and volume of a prism.	Interpret, analyse and generate strategies to use and solve problems involving area and circumference of a circle and volume of a prism.	Interpret, analyse and generate strategies to find averages, decide which statistical representation to use and compare data sets.	
Secure	Recall, use, select and apply the knowledge of prime factorisation, extension and standard form.	Recall, use, select and apply the knowledge of all four operations, negative numbers, powers, roots and bearings.	Recall, use, select and apply the knowledge of probability.	Recall, use, select and apply the knowledge of probability.	Recall, use, select and apply the knowledge of multiplying algebraic notation, factoring an expression, substitution and changing the subject of a formula.	Recall, use, select and apply the knowledge of fractions, decimal and percentage equivalents, proportion and compound units.	Recall, use, select and apply the knowledge of angles in a variety of situations.	Recall, use, select and apply the knowledge of linear equations.	Recall, use, select and apply the knowledge of area and circumference of a circle and volume of a prism.	Recall, use, select and apply the knowledge of area and circumference of a circle and volume of a prism.	Recall, use, select and apply the knowledge of linear equations, quadratic functions in the form of $y = ax^2 + bx + c$.	Recall, use, select and apply the knowledge of averages, statistical representation and comparison of data sets.	
Developing	Use Venn diagrams and prime factorisation to find the HCF and LCM. Round to significant figures. Estimate calculations. Compare between ordinary numbers (large and small) and standard form.	Use BIDMAS with powers and roots. Substituting negative numbers into expressions. Rounding and finding with decimals. Using multiplication and short division including with decimals.	Describe and draw enlargements with a negative scale factor. Interpret plans and elevations. Scale and interpret a scale diagram. Draw bearings.	Work out theoretical or experimental probability for events. Know the probabilities for all outcomes, i.e. 1.	Relate an expression by taking out common factors. Know and use the laws of indices. Understand about the powers and that negative powers can raise. Substitute into common scientific formulae. Change the subject of a formula when two steps are required.	Write a decimal or a fraction as a percentage. Solve linear equations including simple interest. Solve angle chase problems with parallel lines. Establish the size of an interior angle in a regular polygon. Solve angle chase problems with parallel lines.	Use the position to term rule for a given sequence using the first term and the common difference. 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 to find the original value when working with percentages. Solve finance problems including simple interest. Recognise that the point of intersection of two graphs corresponds to the solution of a simultaneous equation. Create and solve equations using geometric area and properties of shapes and angles.	Solve linear equations (can include brackets) with the unknown on both sides when the solution can be a negative, integer or fraction. Recognise that the point of intersection of two graphs corresponds to the solution of a simultaneous equation. Create and solve equations using geometric area and properties of shapes and angles.	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. Find the volume of a cylinder.	Describe between a linear and quadratic graph. 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. Find the volume of a cylinder.	Use theoretical and experimental probability to calculate expected outcomes. Draw and interpret histograms, with equal class intervals, for grouped data. Plot and interpret scatter diagrams of bivariate graphs. Draw and use lines of best fit on a scatter diagram. Find the modal class, class containing the median and an interval for the range and mean of a set of grouped data. Find approximate solutions to trigonometric problems.
Emerging	Recall factors, multiples. Round prime numbers, prime factors and prime factor decomposition. Round to decimal places. Multiply and divide by powers of 10. Using a calculator with standard form.	Add/subtract with decimals. All four operations with fractions and powers of 10. Squaring/cubing/roots of a negative number. Using a calculator with including functions and powers/roots.	Describe and drawing enlargements with positive and fractional scale factors. Draw plans and elevations. Measure and state bearings.	Know and use the vocabulary of probability. Understand the use of the scale to measure probability. Use all the outcomes for an experiment will identify probabilities of the outcomes.	Simplify algebraic notation by multiplying. Simplify an expression involving terms with combinations of variables e.g. $3a^2b + 2a^2b^2 + 3a^2b$. Substitute positive and negative numbers into formulae. Know the meaning of the 'subject' of a formula and change the subject of a formula when one step is required.	Convert a fraction to a decimal and identify a decimal as a fraction. Write a decimal as a fraction. Convert a fraction to a decimal by dividing. Use a calculator to change any fraction to any decimal. Identify a unit in a real life context, write a ratio to describe a situation. Understand the meaning of compound units.	Generate a sequence from the term to term rule. Understand the meaning of a position to term rule. Use a position to term rule to generate a sequence.	Identify alternate and corresponding angles. Know the size of the exterior angle in any polygon and use this to find the exterior angle in a regular polygon.	Find the percentage of an amount. Reverse the multiplier for a percentage increase or decrease including when the percentage is greater than 100%. Use a calculator to increase an amount by a percentage greater than 100%.	Solve linear equations with the unknown on one side when the solution can be a negative, integer or fraction. Use substitution to find 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 formulae for the area of a circle. Know and use the formulae for finding the volume of a prism.	Describe 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 formulae for the area of a circle. Know and use the formulae for finding the volume of a prism.	Use Venn diagrams to list the elements of a set and their probabilities. Use outcomes of an event systematically to count sample space diagrams and find probabilities. Use frequency trees to model outcomes of probability experiments and make conclusions. Draw different types of data. Collect data and construct a grouped frequency table. Know the different types of correlation in a scatter graph. 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.
Keywords	prime, prime factor, prime factorisation, product, Venn diagram, highest common factor, lowest common multiple, standard form, significant figure	Negative number, divided number, operation, inverse, fraction, power, index, modulus, zero	Similar, similarity, enlarge, enlargement, 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, probability tree, experiment	Product, variable, term, coefficient, common factor, factors, power, index, formula, formulae, subject, change the subject	Fraction, mixed number, sequence, term, term rule, decimal, proportion, terminating, recurring, length, 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, alternate, parallel, alternate angles, corresponding angles, interior angle, exterior angle, regular polygon	Simplify, cancel, lowest term, percent, percentage, percentage change, original amount, multiplier, simple interest, exact	Algebra, algebraic, algebraically, unknown, equation, operation, solve, solution, breadth, symbol, substitute, graph, point of intersection	Circle, centre, radius, diameter, chord, circumference, Pi, prism, cone, sector, cylinder, polygon, perimeter, solid	Plot, equation, function, linear, linear, quadratic, simultaneous, solve, substitute, quadratic, process linear, model, kinematic, speed, distance, time	Outcome, event, experiment, combined equipment, frequency tree, Venn diagram, probability, sample space, equally likely outcomes, theoretical probability, median, class, interval, frequency table, frequency diagram, scatter diagram, bivariate data, linear correlation, positive correlation, negative correlation, average, spread, consistency, mean, median, mode, range, statistic, approximate, round, statistic, an estimate, grouped frequency midpoint
Resource Links	Use the number 5040 when writing prime factorisations KM: Ben News 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: Stick on the Maths: Plans and elevations	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: Connecting transformations with Algebraic representations: Miscellaneous: Olympic example KM: Solid problems (plans and elevations) WeWeb spider: Building houses NRICH: Who's the fairest of them all?	KM: Outdoor Lenses 13 KM: Airports and hillslope KM: Plans and elevations KM: Transformation template KM: Enlargement I KM: Enlargement II KM: Investigating transformations with Algebraic representations: Miscellaneous: Olympic example KM: Solid problems (plans and elevations) WeWeb spider: Building houses NRICH: Who's the fairest of them all?	KM: Probability loop cards KM: Probability loop cards NRICH: Dice and spinners interactive KM: Scientific substitution (Note: that page 2 is hard!) NRICH: Temperature NRICH: Matching fractions, decimals and percentages NRICH: Charlie's delightful machine NRICH: A little light thinking NRICH: Ratio or proportion? NRICH: Roasting old chestnuts 3 Standards Unit: N9: Developmental practical reasoning	KM: Fraction sort - Tasks one and two only KM: Maths to Infinity: Indices NRICH: Maths to Infinity: Linear sequences 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: N9: Developmental practical reasoning	KM: FDP conversion: Templates for taking notes KM: Spreadsheets: Sequences KM: Alternate and corresponding angles KM: Generating sequences KM: Perplexing parallels KM: Investigating polygons KM: Maths to Infinity: Lines and angles KM: Stick on the Maths: Alternating and corresponding angles NRICH: Stick on the Maths: Geometrical problems NRICH: Go forth and generalise	KM: Solving equations KM: Stick on the Maths: Proportional reasoning KM: Solving equations KM: Stick on the Maths: Multiplicative methods KM: Stick on the Maths: Constructing and solving equations NRICH: Think of Two Numbers NRICH: One or both NRICH: Stick on the Maths: Angles NRICH: Angles: matchbox NRICH: Blue and White NRICH: Efficient Cutting NRICH: Cola Can	KM: Circle connections - Circle connections of KM: Circle circumference - Circle problem 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: Make a 'human' scatter graph by asking pupils to stand at different points on a giant set of axes KM: Gather data KM: Spreadsheet statistics KM: Stick on the Maths HD2: Selecting and constructing graphs and charts with rounded data KM: Stick on the Maths HD3: Working with rounded data KM: Sallions KM: Lottery project NRICH: Half a Minute				
Career Opportunities	Why does Maths matter? Fighting Fire with Maths	Chartered Management Motor Mechanic	Equine Studies	Risk Analyst Forest Scientist	Guitar Maker	Marine Researcher	Cryptography Traffic Engineer	Hairdresser	Medical Physicist Sports Engineer	Navigational Officer	Costume Designer Maths in Plumbing Building Surveyor		