Mathematics Year 8 Set 3

Term	1			2	
Topic	**Number 1**	**Number 2**	**Number 3**	**Geometry 1**	**Algebra 1**
Detail	Identify and use factors, multiples, prime numbers, powers and roots.	Ordering and comparing integers (positive and negative), fractions (including fractions greater than 1) and decimals	Consolidation of methods for addition, subtraction, multiplication and division	Construct and develop properties of 2D and 3D shapes **Students will require a pencil, rubber, ruler, protractor and pair of compasses**	Introduction to algebra, using algebra notation and substitution into a variety of functional representations.
Mastered	Interpret, analyse and generate strategies to solve problems concerning factors, multiples, prime numbers, HCF, LCM and prime factor decomposition	Interpret, analyse and generate strategies to solve problems concerning the ordering and comparison of integers, fractions and decimals	Interpret, analyse and generate strategies to solve problems concerning addition, subtraction, multiplication and division Perform long division accurately.	Interpret, analyse and generate strategies to solve problems concerning properties of 2D and 3D shapes.	Interpret, analyse and generate strategies to solve problems in an algebraic format.
Secure	Recall, use, select and apply the knowledge of factors, multiples, prime numbers, HCF and LCM effectively	Recall, use, select and apply the knowledge of ordering and comparing integers, fractions and decimals. Order a mix of fractions and decimals including positive, negative and fractions greater than 1.	Recall, use, select and apply the knowledge of addition, subtraction, multiplication and division Solve multiple-step problems involving any of the four operations. Multiplication of decimal numbers. Division by a decimal	Recall, use, select and apply the knowledge of properties of 2D and 3D shapes Draw accurate nets for common 3D shapes Define special triangles and quadrilaterals. Construct other shapes using a ruler, protractor and/or a pair of compasses.	Recall, use, select and apply the knowledge of algebraic notation.
Developing	Decompose a number and express it as a product of its prime factors. Identify the Highest Common Factor or Lowest Common Multiple of two or more numbers.	Order a mix of fractions, decimals including negative numbers. Use inequality symbols correctly.	Accurately perform long multiplication up to 4 digits x 2 digits Accurately perform short division. divide up to a 4 digit number by a two digit number Apply the order of operations (BIDMAS) correctly	Construct triangles with a ruler, protractor and/or a pair of compasses. Classify 3D shapes by key vocabulary. Visualise a 3D shape from its net.	Substitute positive numbers into expressions and formulae. Multiply a single term over a bracket. Given a function, establish inputs from given outputs. Use a mapping diagram/expression to represent a function.
Emerging	Identify and define a factor, multiple and prime number. Identify the common factors or multiples of two or more numbers. Understand powers. Identify square and cube numbers.	Order positive and negative integers including decimals.	Accurately perform column addition and subtraction Recall times tables up to 12 x 12 Perform short division accurately up to dividing a 3 digit number by a single digit	Identify faces, edges and vertices of any 3D shape. Know and identify parallel and perpendicular lines and use the correct notation. Understand regular polygons have line and rotation symmetry Use mathematical language to describe 2D and 3D shapes.	Know the meaning of expression, term, formula, equation and function. Understand and use basic algebraic notation . Use letters to represent variables and identify terms in an expression. Given a function, establish outputs from given inputs.
Keywords	Multiple, factor, common, divisible, prime number, composite number, power, index, exponent, root, cube, square	Positive number, negative number, integer, numerator, denominator, inequality, greater than, less than, equal	Addition, subtraction sum, total, difference, minus, less, column addition, column subtraction, operation, multiply, multiplication, times, product, commutative, short multiplication, long multiplication, estimate, division, long division, remainder, quotient, dividend, divisor, operation, inverse	protractor, measure, nearest, construct, sketch, cube, cuboid, cylinder, pyramid, prism, net, edge, face, vertex (vertices), visualise, quadrilateral, square, rectangle, parallelogram, trapezium, kite, rhombus, delta, arrowhead, triangle, scalene, isosceles, equilateral, circle, radius, diameter, circumference, centre, parallel, diagonal	Algebra, expression, term, formula (formulae), equation, function, variable, mapping diagram, input, output, represent, substitute, evaluate, like terms, simplify, collect
Resource Links	NRICH: Factor-multiple chains KM: Extend the idea of Eratosthenes' sieve to a 12 by 12 KM: Exploring primes activities: Artistic Eratosthenes sieve NRICH: The Moons of Vuvv NRICH: Round and round the circle NRICH: Counting cogs KM: Exploring primes activities: Factors of square numbers: Mersenne primes: LCM sequence: n^2 and $(n + 1)^2$: n^2 and $n^2 + n$: $n^2 + 1$: $n! + 1$: $n! – 1$: $x^2 + x + 41$ KM: Use the method of Eratosthenes' sieve to identify prime numbers, but on a grid 6 across by 17 down instead. What do you notice? KM: Square number puzzle KM: History and Culture: Goldbach's Conjectures NRICH: Factors and multiples NRICH: Powers and roots	KM: Farey Sequences KM: Decimal ordering cards 2 KM: Maths to Infinity: Fractions, decimals and percentages KM: Maths to Infinity: Directed numbers NRICH: Greater than or less than?	KM: Long multiplicatio KM: Dividing (lots) KM: Interactive long di KM: Misplaced points KM: Maths to Infinity: M NRICH: Cinema Probler NRICH: Funny factorisa NRICH: Skeleton NRICH: Long multiplica	KM: Visualising 3D shapes KM: Tessellating Tess KM: Fibonacci's disappearing squares KM: Unravelling dice KM: Investigate 'Platonic Solids' NRICH: Making spirals NRICH: Cut nets NRICH: Making cuboids KM: Investigate 'Tessellations' KM: Investigate exploring Pi (ratio of the circumference to the diameter) KM: Shape work: Many of the activities are suitable for this unit. NRICH: Quadrilaterals KM: 6 point circles, 8 point circles and 12 point circles can be used to support and extend the above idea NRICH: Where Are They? KM: Shape work (selected activities) KM: Rotational symmetry NRICH: Notes on a triangle KM: Euler's formula KM: Visualising 3D shapes KM: Dotty activities: Shapes on dotty paper KM: What's special about quadrilaterals? Constructing quadrilaterals from diagonals and summarising results KM: Investigating polygons. Tasks one and two should be carried out with irregular polygons NRICH: Property chart NRICH: Quadrilaterals game	KM: Pairs in squares. Prove the results algebraically. KM: Algebra rules KM: Use number patterns to develop the multiplying out of brackets KM: Algebra ordering cards KM: Spiders and snakes. See the 'clouding the picture' approach KM: Maths to Infinity: Brackets NRICH: Your number is ... NRICH: Crossed ends NRICH: Number pyramids and More number pyramids

Term	3			
Topic	**Number 4**	**Ratio and Proportion 1**	**Algebra 2**	**Geometry 2**
Detail	Understanding the connection between fractions and percentages between quantities.	Understand, describe and use a ratio	Describe and use rules for sequences.	Accurately measure/construct with a ruler and protractor, Convert between different units of measurement and understand and use the angle sum of a triangle .
Mastered	Interpret, analyse and generate strategies to solve problems involving comparing fractions and percentages.	Interpret, analyse and generate strategies to solve problems involving ratio	Interpret, analyse and generate strategies to solve problems involving sequences.	Interpret, analyse and generate strategies to solve problems involving measurement, converting units and angles.
Secure	Recall, use, select and apply the knowledge of fractions and percentages	Recall, use, select and apply the knowledge of ratio	Recall, use, select and apply the knowledge of sequences.	Recall, use, select and apply the knowledge of measurement, converting units and angles.
Developing	Express one quantity as a fraction of another. Write a quantity as a percentage of another.	Find a unit ratio e.g. 1 : n Divide a ratio into two parts.	Use a term to term rule to generate a linear/non-linear sequence	Convert between non-adjacent metric units e.g. mm-m, g-tonnes and vice versa. Calculate missing angles in geometrical diagrams.
Emerging	Write a fraction in its simplest form. Convert between mixed numbers and top-heavy fractions. Understand percentage and write a percentage as a fraction in its simplest form.	Describe a ratio in the correct notation. State a ratio of measurements in the same units. Simplify a ratio to its lowest terms and also	Find the term to term rule for any sequence including non-numerical sequences.	Convert between units of time and money. Convert between adjacent metric units e.g. mm-cm, cm-m, m-km and vice versa (using length, mass and capacity) Measure accurately with a ruler and protractor to the nearest millimetre/degree. Know and use that angles in a triangle add to 180°.
Keywords	fractions, improper fraction, proper fraction, vulgar fractions, top-heavy fraction, percentage, proportion	ratio, proportion, compare, comparison, part, simplify, common factor, cancel, lowest terms, unit	pattern, sequence, linear, term, term-to-term rule, ascending, descending	length, distance, mass, weight, volume, capacity, metre, centimetre, millimetre, tonne, kilogram, gram, milligram, litre, millilitre, hour, minute, second, inch, foot, yard, pound, ounce, pint, gallon, line segment, angle, degrees, right angle, acute, obtuse, reflex, protractor, vertically opposite, geometry, geometrical
Resource Links	KM: Crazy cancelling, silly simplifying NRICH: Rod fractions Learning review KM: 7M3 BAM Task	KM: Division in a ratio and checking spreadsheet KM: Maths to Infinity: FDPRP KM: Stick on the Maths: Ratio and proportion NRICH: Toad in the hole NRICH: Mixing lemonade NRICH: Food chains NRICH: Tray bake	KM: Maths to Infinity: Sequences KM: Growing patterns NRICH: Shifting times tables NRICH: Odds and evens and more evens	KM: Sorting units KM: Another length KM: Measuring space KM: Another capacity KM: Stick on the Maths: Units NRICH: Temperature KM: Maths to Infinity: Lines and angles KM: Stick on the Maths: Angles NRICH: Triangle problem NRICH: Square problem NRICH: Two triangle problem

Term	4		5		6	
Topic	**Number 5**	**Algebra 3**	**Geometry 3**	**Number 6**	**Geometry 4**	**Statistics 1**
Detail	Accurately perform arithmetic with fractions and calculating with percentages.	Finding a methodical approach to solving linear equations.	Explore perimeter and area of 2D shapes and volume of some 3D shapes	Understand rounding to a specific degree and use this skill to estimate calculations.	Perform and describe reflections, translations and rotations on a coordinate grid.	Construct and interpret a range of statistical charts and diagrams. **Students will need a pencil, ruler, protractor and pair of compasses.**
Mastered	Interpret, analyse and generate strategies to use and solve problems containing arithmetic of fractions or using percentages to make comparisons.	Interpret, analyse and generate strategies to solve problems involving solving equations.	Interpret, analyse and generate strategies to use and solve problems involving area and perimeter of 2D shapes or volume of a cuboid.	Interpret, analyse and generate strategies to estimate calculations by using rounding.	Interpret, analyse and generate strategies to solve problems involving translations and reflections.	Interpret, analyse and generate strategies to solve problems involving statistical diagrams and averages.
Secure	Recall, use, select and apply the knowledge of arithmetic with fractions, calculating with percentages. Multiply mixed numbers. Divide mixed numbers. Calculate percentage change	Recall, use, select and apply the knowledge of solving linear equations. Solve three-step equations (including brackets)	Recall, use, select and apply the knowledge of area and perimeter of 2D shapes or the volume of some 3D shapes.	Recall, use, select and apply the knowledge of rounding and estimating.	Recall, use, select and apply the knowledge of translations and reflections. Draw and identify the lines y = x, y = -x and perform reflections in these lines. Describe and use a 2D vector as a translation.	Recall, use, select and apply the knowledge of statistical diagrams and averages.
Developing	Add and subtract fractions with the different denominators using equivalent fractions. Multiply fractions. Divide fractions. Multiplying a decimal by a decimal. Use decimal or fraction equivalents to find a percentage of an amount. Identify and use the multiplier for a percentage increase or decrease.	Solve two step equations (including with brackets) when the solution is a whole number or fraction - showing a methodical approach and checking by substitution.	Find the area of a parallelogram. Find and use the area of a triangle. Know and use the formula for the area of a trapezium. Calculate the surface area of a cuboid. Find the volume of a cuboid using V = lwh	Approximate any number to a specified degree of accuracy e.g. nearest 20, 50, specific decimal place. Understand estimating as the process of finding a rough value of an answer or calculation by rounding to one significant figure.	Describe a translation. Describe a reflection which uses one of the axes as a mirror line. Perform and describe a rotation using a given angle, direction and centre of rotation.	Use a table of frequencies to work out the angles for a pie chart, where frequency is a factor of 360°. Use the mean to find a missing number in a data set. Calculate the mode, median and mean from a frequency table.
Emerging	Converts between mixed numbers and top heavy fractions. Add and subtract fractions with the same denominators. Multiplying by a decimal.	Solve one step equations by using inverse operations	Find perimeters of different 2D shapes. Recognise that shapes with the same area can have different perimeters and vice versa. Estimate the volume of a cube or cuboid using appropriate units. Find the volume of a cuboid by counting cubes.	Approximate any number by rounding (up to 1,000,000)	Perform a translation Perform a reflection using one of the axes as a mirror line.	Construct t and interpret pictograms, bar charts and tables. Read values from a line graph. Understand that pie charts are used to show proportion. Draw and measure angles in a pie chart. Find the mode, median, mean and range of a set of data.
Keywords	mixed number, equivalent fraction, simplify, cancel, lowest terms, proper fraction, improper fraction, top-heavy fraction, vulgar fraction, percent, percentage, multiplier, increase, decrease	algebra, algebraic, algebraically, unknown, equation, operation, solve, solution, brackets, symbol, substitute	perimeter, area, volume, capacity, surface area, square, rectangle, parallelogram, triangle, trapezium (trapezia), polygon, cube, cuboid, square millimetre, square centimetre, square metre, square kilometre, cubic centimetre, centimetre cube, formula, formulae, length, breadth, width, height, depth	approximate, round, decimal place, check, solution, answer, estimate, order of magnitude, accurate, accuracy, significant figure, cancel, inverse, operation	2-D, grid, axis, axes, x-axis, y-axis, origin, quadrant, (cartesian) coordinates, point, translation, reflection, transformation, rotation, object, image, congruent, congruence, vector, centre of rotation	data, scale, axis, axes, graph, frequency, time graph, time series, line graph, pie chart, sector, angle, protractor, degrees, maximum, minimum, categorical data, discrete data, pictogram, symbol, key, frequency table, tally, bar chart, bar-line graph, vertical line chart,
Resource Links	KM: Stick on the Maths: Percentage increases and decreases KM: Maths to Infinity: FDPRP KM: Percentage methods KM: Mixed numbers: mixed approaches NRICH: Would you rather? NRICH: Keep it simple NRICH: Egyptian fractions NRICH: The greedy algorithm NRICH: Fractions jigsaw NRICH: Countdpwn fractions	KM: Spiders and snakes. The example is for an unknown on both sides but the same idea can be used. NRICH: Inspector Remorse NRICH: Quince, quonce, quance NRICH: Weighing the baby	KM: Equable shapes (for both 2D and 3D shapes) KM: Triangle takeaway KM: Surface area KM: Class of rice KM: Stick on the Maths: Area and Volume KM: Maths to Infinity: Area and Volume NRICH: Can They Be Equal?	KM: Approximating calculations KM: Stick on the Maths: CALC6: Checking solutions	KM: Lines KM: Moving house KM: Transformations: Bop It? KM: Dynamic Autograph files: Reflection, Rotation, Translation KM: Autograph transformations KM: Stick on the Maths SSM7: Transformations NRICH: Transformation Game	KM: Stick on the Maths HD6: Graphs and diagrams NRICH: Match the Matches NRICH: Graphing Number Patterns NCETM: A little bit of history (Britain since 1945) KM: Constructing pie charts KM: Maths to Infinity: Averages, Charts and Tables NRICH: Picturing the World NRICH: Charting Success KM: Maths to Infinity: Averages KM: Maths to Infinity: Averages, Charts and Tables KM: Stick on the Maths HD4: Averages NRICH: M, M and M NRICH: The Wisdom of the Crowd