| MATHEMATICS | Using and applying mathematics | Calculating, numbers and the number system | Algebra | Geometry \& measures | Statistics \& probability | Ratio, proportion and rates of change |
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| Beginning | -Recall and select the mathematics they use in a range of classroom activities <br> -Identify different approaches and find ways of overcoming difficulties when problem solving <br> - Needs help to organise their work <br> Recall, and use and mathematical symbols and diagrams <br> -Describe a general statement by finding particular examples that match it <br> -Review their work and reasoning | - Read and write numbers up to 100 <br> - Begin to add and subtract two-digit and three digit numbers mentally <br> - With support multiply two digit numbers by 2,3 , 4 or 5 as well as 10 with whole number answers and remainders <br> - Develop mental strategies for division by halving and halving again etc. <br> - Identify place value and use this to make approximations <br> - Round positive whole numbers to the nearest 10, 100 and 1000. <br> - Recognise and interpret negative numbers in contexts such as temperature and money with the support of a number line | - Recognise a small range of basic sequences <br> - Begin to use pictures/symbols to represent unknown numbers or variables <br> - Begin to understand the role of ' $=$ ' (the 'equals' sign) <br> -Relate the numbers of a linear sequence to their position on a number line or on a counting stick or equivalent <br> -Describe positions on the full coordinate grid (all four quadrants) | - Classify 3-D and 2-D shapes in various ways using mathematical properties such as reflective symmetry for 2-D shapes <br> - Begin to identify nets of familiar 3-D shapes, e.g. cube, cuboid, triangular prism, squarebased pyramid <br> - Identify shapes in different orientations and reflect shapes, presented on a grid, in a vertical or horizontal mirror line <br> - use a range of measures including nonstandard units and standard metric units of length, capacity and mass <br> - use standard units of time <br> - Identify different types of angles | -Collect information <br> -Construct bar charts and pictograms, where the symbol represents a group of units <br> - Use a Venn diagrams to record and classify information <br> -Describe information presented in simple tables, lists, bar charts, pictograms and state simple trends <br> -Begin to identify the mode of data sets | -Describe the connection between division and fractions with support <br> -Starting to identify simple fractions such as a half and a quarter <br> -Identify the percent symbol (\%) and be able to describe how per cent relates to 'number of parts per hundred'. <br> -Begin to solve simple problems involving direct proportion by scaling quantities up or down |
| Developing | -Develop own strategies for solving problems and give reasons <br> -Identify their own strategies within mathematics and in applying mathematics to practical contexts <br> -Present information and results in a clear and organised way <br> -Search for a solution by trying out ideas of their own | - Use efficient written methods of addition ,subtraction, short multiplication and division <br> - Multiply a simple decimal by a single digit <br> - Give reasons for results with reference to the context or size of numbers <br> - Identify and describe number patterns <br> - Identify number relationships including multiple, factor and square <br> - Start to use negative numbers and decimal notation in contexts <br> - use place value to multiply and divide whole numbers by 10 or 100 <br> - order decimals to three decimal places | - Begin to use simple formulae expressed in words <br> - Substitute positive numbers into simple expressions with more than one unknown <br> - Use and interpret coordinates in the first quadrant <br> - Understand the concept of simplification <br> - Represent simple functions with function machines. | - Use the properties of 2-D and 3-D shapes <br> - Make 3-D models by linking given faces or edges and draw common 2-D shapes in different orientations on grids <br> - Reflect simple shapes in a mirror line, translate shapes horizontally or vertically and begin to rotate a simple shape or object about its centre or a vertex <br> - Choose and use appropriate units and instruments <br> - Describe with appropriate accuracy, numbers on a range of measuring instruments <br> - Identify perimeters of simple shapes and find areas by counting squares | - Collect and record discrete data <br> - Group data, where appropriate, in equal class intervals <br> - Construct and interpret frequency diagrams and simple line graphs <br> - Identify the mode and range of data sets and use this to describe sets of data | -Begin to understand simple ratio <br> -Describe one quantity as a fraction of another, where the fraction is less than 1 and greater than 1. <br> - Give reasons as to why fractions are equivalent <br> -Recognise approximate proportions of a whole and use simple fractions and percentages to describe these <br> -Identify simple percentages of diagrams |
| Secure | -Consistently identify and obtain relevant information to carry through a task and solve mathematical problems <br> -Check results, and explain whether these are reasonable <br> - Solve word problems and investigations from a range of contexts <br> - Show understanding of situations by describing them mathematically using symbols, words and diagrams <br> -Draw simple conclusions of their own and give an explanation of their using and applying mathematics | -use known facts, place value, knowledge of operations and brackets to calculate <br> -use all four operations with decimals to two places <br> -Use a relevant non-calculator method for solving problems that involve multiplying and dividing any three-digit number by any two-digit number - Solve simple problems involving ordering, adding, subtracting negative numbers in context <br> - Apply inverse operations and approximate to check answers to problems are of the correct magnitude <br> - Use place value to multiply and divide whole numbers and decimals by 10,100 and 1000 and explain the effect <br> -Round decimals to the nearest decimal place and order negative numbers in context <br> - calculate fractions of quantities <br> -Recognise and use number patterns and relationships multiply and divide an integer by a fraction <br> - Use the order of operations, excluding brackets and indices within a calculation | - Construct, express in symbolic form, and use simple formulae involving one or two operations <br> - Interpret coordinates in all four quadrants <br> - Identify a term to term rule for a sequence <br> - Simplify and manipulate simple algebraic expressions <br> - Solve two step linear equations including brackets. | - Use a wider range of properties of 2-D and 3-D shapes and identify all the symmetries of 2-D shapes <br> - Use language associated with angles and know and use the angle sum of a triangle and that of angles at a point <br> - Reason about position and movement and transform shapes <br> - Measure and draw angles to the nearest degree, when constructing models and drawing or using shapes <br> - Read scales on a range of measuring instruments, explaining what each labelled division represents <br> - Solve problems involving the conversion of units and make sensible estimates of a range of measures in relation to everyday situations <br> - Understand and use the formula for the area of a rectangle <br> - Explain the difference between area from perimeter | - Structure questions, plan how to answer them and collect the data required <br> - In probability, select methods based on equally likely outcomes and experimental evidence, as appropriate <br> - Explain how to use the probability scale from 0 to 1 <br> - Use the mean of discrete data and compare two simple distributions, using the range and one of mode, median or mean <br> - understand that different outcomes may result from repeating an experiment <br> - Interpret graphs and diagrams, including pie charts, and draw conclusions <br> - create and interpret line graphs where the intermediate values have meaning | - Solve problems involving ratio and direct proportion <br> - Use equivalence between fractions and order fractions and decimals <br> -Reduce a fraction to its simplest form by cancelling common factors <br> -Convert between mixed numbers and improper fractions <br> -Describe how to simplify a ratio and be able to use this to solve problems <br> - Explain how to extend percentage calculation strategies to find any percentage |


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| Confident | - Independently solve tasks by breaking them down into smaller more manageable tasks <br> - Consider and discuss information presented in a variety of forms <br> - Present a precise argument with reasons, using symbols, diagrams, graphs and related explanatory text. | - Explain how to find the HCF and LCM using prime factor decomposition <br> - Strengthen and extend mental methods of calculations to independently solve complex contextual problems <br> -Solve problems by applying the order of operations to more complex calculations involving positive and negative numbers | - Use systematic trial and improvement and ICT to find solutions to equations such as $\mathrm{X}^{3}+\mathrm{x}=20$ <br> - Construct and solve linear equations with whole-number coefficients <br> - Generate terms of a sequence using term to term and position to term definitions of the sequence <br> - Find the nth term of a linear sequence <br> - Plot the graphs of linear functions <br> - Recognise that equations of the form $y=m x+c$ represent a straight line. <br> - Construct graphs arising from real-life problems, interpret graphs arising from real situations <br> - Know and use the laws of indices <br> - Solve linear equations with letters both side, fractional and negative solutions <br> - Solve simple inequalities e.g. $3 x+1<16$ <br> - Factorise algebraic expressions including quadratics | - classify quadrilaterals by their geometric properties providing reasons <br> - Solve geometrical problems using angle properties of intersecting and parallel lines, of triangles and other polygons <br> - Prove that the angle sum of a triangle is $180^{\circ}$ and of a quadrilateral is $360^{\circ}$ <br> - Visualise and use 2-D representations of 3-D objects <br> - Explore enlargement of shapes given a centre of enlargement and a positive whole number scale factor <br> - Use straight edge and compasses to do standard constructions <br> - Use the formula for the area of a triangle, parallelogram and circle and a circle's circumference <br> - Calculate volumes and surface areas of cuboids | -Design a survey or experiment; design, trial and modify data collection sheets <br> -Construct tables for large data sets choosing suitable class intervals <br> -Design and use two-way tables <br> -Construct and modify pie charts <br> -Construct and modify bar charts for continuous data <br> -Construct and modify simple time graphs for time series <br> -Construct frequency polygons <br> -Construct and modify scatter graphs <br> -Find and record all mutually exclusive outcomes for a single events and two successive events <br> -Use knowledge that the total probability of all the mutually exclusive outcomes of an experiment is 1. <br> -Consider interpretations of a survey or experiment, using selected tables, graphs and diagrams in support | -Use the equivalences between fractions, decimals and percentages to compare proportions <br> -Compare and order fractions of different dominators <br> -Add and subtract fractions by writing them with a common denominator <br> - Explore the effect of dividing simple pairs of proper fractions, writing the answer in its simplest form. <br> -calculate percentages and find the outcome of a given percentage increase or decrease <br> -divide a quantity into two or more proportions <br> -use proportional reasoning to solve a problem |
| Exceptional | - Explore and analyse connections in mathematics across a range of contexts - Give reasons for the choice of presentation, explaining and showing insight into the problem <br> - Justify generalisations, arguments or solutions <br> -Appreciate the difference between mathematical explanation and experimental evidence | - Analyse the effects of multiplying and dividing by numbers between 0 and 1 <br> - Add, subtract, multiply and divide improper fractions <br> -Use approximations through rounding to estimate answers <br> -Solve numerical problems involving multiplication and division with numbers of any size, using a calculator efficiently and appropriately. <br> - Justify the use of simple index laws <br> - Interpret and compare numbers in standard form. | - Multiply two expressions of the form ( $\mathrm{x} \pm$ n ) and simplify the corresponding quadratic expressions <br> - Use algebraic and graphical methods to solve simultaneous linear equations in two variables <br> - Substitute numbers into expressions and formulae from mathematics and other subjects <br> - Derive a formula e.g. from a table of values found during an 'investigation' <br> - Change the subject of a formula, simple ones only <br> - Find the next term or nth term of quadratic sequences <br> - Plot graphs of simple quadratic and cubic functions <br> - Solve quadratic equations graphically and by factorisation | - Interpret and apply Pythagoras' theorem when solving problems <br> - Calculate lengths, areas and volumes in prisms <br> - Find the locus of an object moving according to a rule | - Analyse a problem, identify possible sources of bias and plan how to minimise it <br> - Draw a line of best fit on a scatter diagram, by inspection <br> - Estimate the mean, median and range of sets of grouped data and determine the modal class, selecting the most relevant statistic for the data <br> - Compare two or more distributions using measures of average and range <br> - Understand relative frequency as an estimate of probability and use this to compare outcomes of experiments <br> - Examine the results of a survey or experiment and justify the choice of diagrams and statistics used in your presentation | - Interpret and use proportionality, calculate the result of any proportional change using multiplication <br> - Enlarge 2-D shapes by a fractional scale factor, and recognise the similarity of the resulting shapes <br> - Interpret and use compound measures, such as speed, density and pressure, to solve problems |
| Beyond | -Develop and follow a wide range of methods and approaches; <br> -Evaluate lines of enquiry when exploring mathematical tasks <br> -Convey mathematical meaning through precise and consistent use of symbols <br> -Examine generalisations or solutions reached in an activity, commenting <br> -Critique the reasoning and logic or the process employed, or the results obtained <br> -Distinguish between practical demonstration and proof | -Work interchangeably with terminating decimals and their corresponding fractions <br> - Use fractions or percentages to solve problems involving repeated proportional changes (compound interest) <br> -Calculate possible errors resulting from rounding and express this as an inequality <br> -Evaluate the use of fractional and negative indices <br> -solve problems involving calculating with powers, roots and numbers expressed in standard form | - Factorise quadratic expressions including the difference of two squares <br> - Manipulate algebraic formulae, equations and expressions, finding common factors and multiplying two linear expressions. <br> - Transform a formula to change its subject <br> - Evaluate algebraic formulae, substituting fractions, decimals and negative numbers <br> - Solve inequalities in two variables <br> - Sketch and interpret graphs of linear, quadratic, cubic and reciprocal functions, and graphs that model real situations <br> - Understand the effect on a graph of addition (or multiplication) by a constant <br> - Construct and solve a pair of simultaneous equations. | - use sine, cosine and tangent in right-angled triangles when solving problems in two dimensions, including bearings <br> - Evaluate the difference between formulae for perimeter, area and volume, by considering dimensions <br> - Use similarity of triangles to solve a wide variety of problems | - Estimate and find the median, quartiles and inter-quartile range for large data sets, including using a cumulative frequency diagram <br> - Critique two or more distributions and make inferences, using the shape of the distributions and measures of average and spread including median and quartiles <br> - know when to add or multiply probabilities <br> - Use a wide range of strategies to calculate probabilities of combinations of independent events including tree diagrams | - Understand the effect of enlargement of area and volume. <br> -calculate the original quantity given the result of a proportional change <br> - understand and use congruence and mathematical similarity e.g. problems involving ratios of length, area and volume <br> - Solve problems involving inverse proportionality <br> - Set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative process |

