

## Implementation - Skills

	Number				Ratio & Proportion	Algebra	Measurement	Geometry	Statistics
	Place Value	Addition & Subtraction	Multiplication & Division	Fractions Decimals Percentages					
<b>EYFS</b>	-recognise and count reliably with numbers 1-20 and place them in order -count objects reliably -say which number is one more or less than a given number -records using marks that they can interpret and explain	-using quantities and objects children add and subtract two single digit numbers and count on or back to find the answer -begin to use the vocabulary involved in addition and subtraction -identify own mathematical problems based on own interests and fascinations	-solve problems involving doubling halving and sharing	-identify half and a quarter using concrete objects			-use everyday language to talk about size, weight, capacity, distance, time and money -compare objects and quantities and solve problems -order two or three items by length, weight, height and capacity -order and sequence three events within a day	-recognise, create and describe patterns -explore the characteristics of everyday objects and shapes 2-D/3-D and use mathematical language to describe them -use everyday language to talk about position and direction	
<b>Year 1</b>	-count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number -count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens -given a number, identify one more and one less -identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least -read and write numbers from 1 to 20 in numerals and words.-	-read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs -represent and use number bonds and related subtraction facts within 20 -add and subtract one-digit and two-digit numbers to 20, including zero -solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$ .	-solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	-recognise, find and name a half as one of two equal parts of an object, shape or quantity -recognise, find and name a quarter as one of four equal parts of an object, shape or quantity		- solve missing number problems such as $7 = ? - 9$ without introducing algebraic notation	-compare, describe and solve practical problems for: lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]; mass/weight [for example, heavy/light, heavier than, lighter than]; capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]; time [for example, quicker, slower, earlier, later] -measure and begin to record the following: lengths and heights; mass/weight; capacity and volume; time (hours, minutes, seconds) -recognise and know the value of different denominations of coins and notes -sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening] -recognise and use language relating to dates, including days of the week, weeks, months and years -tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	-recognise and name common 2-D and 3-D shapes, including: 2-D shapes [for example, rectangles (including squares), circles and triangles]; 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] - describe position, direction and movement, including whole, half, quarter and three-quarter turns	
<b>Year 2</b>	-count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward -recognise the place value of each digit in a two-digit number (tens, ones) -identify, represent and estimate numbers using different representations, including the number line -compare and order numbers from 0 up to 100; use <, > and = signs -read and write numbers to at least 100 in numerals and in words -use place value and number facts to solve problems.	-solve problems with addition and subtraction using concrete objects and pictorial representations -apply their increasing knowledge of mental and written methods -recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 -add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a 2-digit number and ones; a 2-digit number and tens; two 2-digit numbers; add three one-digit numbers -show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot -recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	-recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers -calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs -show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot -solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	-recognise, find, name and write fractions, $\frac{1}{4}$ , $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity -write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of two quarters and one half.		-recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems	-choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels -compare and order lengths, mass, volume/capacity and record the results using >, < and = -recognise and use symbols for pounds (£) and pence (p). combine amounts to make a particular value -find different combinations of coins that equal the same amounts of money -solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change -compare and sequence intervals of time -tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times -know the number of minutes in an hour and the number of hours in a day.	-identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line -identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces -identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] -compare and sort common 2-D and 3-D shapes and everyday objects -order and arrange combinations of mathematical objects in patterns and sequences -use mathematical vocabulary to describe position, direction and movement	-interpret and construct simple pictograms, tally charts, block diagrams and simple tables -sorting categories by quantity -total and compare data
<b>Years 3&amp;4</b>	-count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number -recognise the place value of each digit in a 3-digit number (hundreds, tens, ones) -compare and order numbers up to 1000 -identify, represent and estimate numbers using different representations -read and write numbers up to 1000 in numerals and in words -solve number problems and practical problems involving these ideas.	-add and subtract numbers mentally, including: a 3-digit number and a 1-digit number; a 3-digit number and a 2-digit number; a 3-digit number and a 3-digit number -use formal written methods of column addition and subtraction -estimate the answer to a calculation and use inverse operations to check answers -solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction	-recall and use multiplication and division facts for the 3, 4, 6, 7, 8, 9, 11, 12 multiplication tables -write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods -solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	-count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 -recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators -recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators -recognise and show, using diagrams, equivalent fractions with small denominators -add and subtract fractions with the same denominator within one whole [for example, $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ ] -compare and order unit fractions with the same denominator -solve problems that involve all of the above. -round decimals with one decimal place to the nearest whole number (year 4) -compare numbers with the same number decimal places, up to 2 decimal places (year 4) -Divide a one 1 or 2-digit number by 10 and 100 (year 4)		-solve missing number problems	-measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) -measure the perimeter of simple 2-D shapes -add and subtract amounts of money to give change, using both £ and p in practical contexts -tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks -estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight -know the number of seconds in a minute and the number of days in each month, year and leap year -compare durations of events [for example to calculate the time taken by particular events or tasks].	-draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them -recognise angles as a property of shape or a description of a turn -identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle -identify horizontal and vertical lines and pairs of perpendicular and parallel lines -identify lines of symmetry -in 2-D shapes presented in different orientations complete a simple symmetric figure with respect to a specific line of symmetry	-interpret and present data using pictograms, bar charts and tables -solve comparison, sum and difference problems using information presented in bar charts, pictograms and tables
<b>Years 5&amp;6</b>	-add and subtract numbers mentally with increasingly large numbers -add and subtract whole numbers with more than 4 digits, including using formal written methods (column addition and subtraction) -use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy -solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why -perform mental calculations, including with mixed operations and large numbers -use their knowledge of the order of operations to carry out calculations involving addition and subtraction -use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy -solve addition, subtraction, multi-step problems in contexts, deciding which operations and methods to use and why	-count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 -multiply and divide numbers mentally drawing upon known facts -multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 -multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers -divide numbers up to 4-digits by a two-digit whole number using the formal written method of short division where appropriate for the context divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division -interpret remainders as whole number remainders, fractions, or by rounding -identify common factors, common multiples and prime numbers	-recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents -compare and order fractions whose denominators are all multiples of the same number -read, write, order and compare numbers with up to three decimal places -round decimals with two decimal places to the nearest whole number and to one decimal place -identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths -read and write decimal numbers as fractions -add and subtract fractions with the same denominator and multiples of the same number -recognise mixed numbers fractions and improper fractions and convert from one form to the other and write mathematical statements $> 1$ as a mixed number (e.g. $2 \frac{1}{5} + \frac{4}{5} = 6 \frac{5}{5} = 1 \frac{1}{5}$ )	-solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts -solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison -solve problems involving similar shapes where the scale factor is known or can be found -solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. (just year 6 statements connected to previous learning of fractions, multiplication and division)		-use simple formulae -generate and describe linear number sequences -express missing number problems algebraically -enumerate possibilities of combinations of two variables -find pair of numbers that satisfy an equation with two unknowns	-calculate and compare -the area of squares and rectangles including using standard units, square centimetres (cm <sup>2</sup> ) and square metres (m <sup>2</sup> ) and estimate the area of irregular shapes (also included in measuring) -estimate volume and capacity -solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate -recognise that shapes with the same areas can have different perimeters and vice versa -calculate the area of parallelograms and triangles -calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres -recognise when it is possible to use formulae for area and volume of shapes -use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a	=identify 3-D shapes, including cubes and other cuboids, from 2-D representations - draw given angles, and measure them in degrees -use the properties of rectangles to deduce related facts and find missing lengths and angles - distinguish between regular and irregular polygons based on reasoning about equal sides and angles - recognise, describe and build simple 3-D shapes, including making nets - illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius - recognise, describe and build simple 3-D shapes.	-complete, read and interpret information in tables including timetables -solve problems using information presented in a line graph -interpret and construct pie charts and use these to solve problems -calculate and interpret the mean as an average

			<ul style="list-style-type: none"> <li>-use common factors to simplify fractions; use common multiples to express fractions in the same denomination</li> <li>-calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed and cubic metres and extending to other units</li> <li>-use their knowledge of the order of operations to carry out calculations involving the four operations</li> <li>-use estimation to check answers</li> <li>-solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates</li> </ul>	<ul style="list-style-type: none"> <li>-multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams</li> <li>-solve problems involving numbers up to three decimal places</li> <li>-solve problems which require knowing percentage and decimal equivalents of <math>1/2</math>, <math>1/4</math>, <math>1/5</math>, <math>2/5</math>, <math>4/5</math> and those with a denominator of a multiple of 10 or 25.</li> <li>-identify the value of each digit in numbers given to three decimal places</li> <li>-associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. <math>3/8</math>)</li> <li>-recall and use equivalences between simple fractions, decimals and percentages, including in different contexts</li> <li>-add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</li> <li>-multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. <math>1/4 \times 1/2 = 1/8</math>)</li> <li>-multiply one-digit numbers with up to two decimal places by whole numbers</li> <li>-divide proper fractions by whole numbers (e.g. <math>1/3 \div 2 = 1/6</math>)</li> <li>-multiply one-digit numbers with up to two decimal places by whole numbers</li> <li>-multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places</li> <li>-use written division methods in cases where the answer has up to two decimal places</li> </ul>			<ul style="list-style-type: none"> <li>smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places</li> <li>-solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate</li> <li>-convert between miles and kilometres</li> </ul>	<ul style="list-style-type: none"> <li>including making nets</li> <li>-compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons</li> </ul>	
Year 7	<ul style="list-style-type: none"> <li>-Order and compare integers using inequality notation</li> <li>-Find the HCF and LCM of a set of numbers</li> <li>-Solve worded problems involving LCM</li> <li>-Perform Prime Factor decompositions</li> <li>-Apply BIDMAS to solve a calculation</li> <li>-Round a given number to significant figures</li> </ul>			<ul style="list-style-type: none"> <li>-Reduce a ratio to its simplest form</li> <li>-Work with ratios with different units</li> <li>-Sharing in a ratio</li> <li>-Solve problems involving ratios</li> <li>-Identify link between ratios and fractions</li> <li>-Find the cost of items by using the unitary method</li> <li>-Solve best value problems</li> </ul>	<ul style="list-style-type: none"> <li>-Simplify expressions by collecting like terms</li> <li>-Factorise simple expressions</li> <li>-Substitute positive and negative integers into expressions</li> <li>-Expand and simplify multiple single brackets</li> <li>-Find the nth term of a linear sequence</li> <li>-Identify the gradient and y intercept from a straight-line graph</li> </ul>		<ul style="list-style-type: none"> <li>-Find the area of triangles, parallelograms and trapeziums</li> <li>-Classify triangles using angle and side properties</li> <li>-Solve functional problems by finding the area or perimeter of compound shapes made from rectangles</li> <li>-Accurately draw angles of a given size</li> <li>-Calculate the area and circumference of a circle</li> <li>-Find unknown interior angles in polygons</li> </ul>	<ul style="list-style-type: none"> <li>-Find mode, median and range from a list of data</li> <li>-Interpret mode, median, mean and range of two data sets and make comparisons</li> <li>-Find averages from a frequency table</li> <li>-Read and complete a two-way table</li> <li>-Draw and interpret bar charts</li> <li>-Identify misleading chart figures</li> <li>-Complete and interpret scatter graphs including correlation and lines of best fit</li> </ul>	
Year 8	<ul style="list-style-type: none"> <li>-Use HCF and LCM to find pairs of numbers</li> <li>-Recognise and find reciprocals as a multiplicative inverse</li> <li>-Estimate roots</li> <li>-Use rounding to significant figures to estimate in calculations</li> <li>-Use inequality notation to specify simple error intervals due to rounding</li> </ul>		<ul style="list-style-type: none"> <li>-Solve direct proportion problems</li> <li>-Solve simple inverse proportion problems</li> <li>-Use scale factors, diagrams and maps</li> <li>-Adapt a recipe and use this to solve problems</li> </ul>	<ul style="list-style-type: none"> <li>-Substitute negative integers into expressions and formulae including with powers</li> <li>-Solve one and two step linear equations</li> <li>-Identify a term, expression, equation, formula and identity</li> <li>-Write simple equations from a problem of area and perimeter of shapes</li> <li>-Change the subject of a simple formula</li> <li>-Solve linear inequalities and represent them on a number line</li> </ul>		<ul style="list-style-type: none"> <li>-Construct and interpret plans and elevations of 3D shapes</li> <li>-Calculate the volume of cubes and cuboids</li> <li>-Calculate the volume of prisms</li> <li>-Identify parallel and perpendicular lines</li> <li>-Find areas of compound shapes involving circles</li> <li>-Carry out transformations on shapes</li> </ul>	<ul style="list-style-type: none"> <li>-Find modal class, class in which median lies and estimated mean from a grouped frequency table</li> <li>-Compare distributions of grouped, discrete or continuous data</li> <li>-Construct and interpret pie charts</li> <li>-Find experimental probabilities and list outcomes</li> </ul>		
Year 9	<ul style="list-style-type: none"> <li>-Solve complex BIDMAS calculations</li> <li>-Calculate with fractional and negative indices</li> <li>-Multiply and divide numbers in standard form</li> <li>-Simplify expressions involving surds</li> </ul>		<ul style="list-style-type: none"> <li>-Solve complex problems using direct and inverse proportion</li> <li>-Form an equation using variables in direct proportion</li> <li>-Find missing lengths in similar shapes by using scale factors</li> <li>-Solve ratio problems involving concentrations of different liquids</li> </ul>	<ul style="list-style-type: none"> <li>-Solve linear equations with unknowns on both sides</li> <li>-Change the subject of a formula where factorisation is required</li> <li>-Factorise a quadratic expression when the coefficient is &lt;1</li> <li>-Recognise Fibonacci sequences</li> <li>-Solve complex problems on a coordinate grid</li> <li>-Use a table of values to plot graphs</li> <li>-Use <math>y = mx + c</math></li> <li>-Find the equation of a line given two points</li> <li>-Simplify expressions using index laws</li> </ul>		<ul style="list-style-type: none"> <li>-Construct and measure bearings on diagrams</li> <li>-Use Pythagoras's theorem to find missing lengths in right angled triangles</li> <li>-Use trigonometry to find missing lengths and angles in right angled triangles</li> <li>-Solve problems using trigonometry and Pythagoras</li> </ul>	<ul style="list-style-type: none"> <li>-Apply statistics to describe a population</li> <li>-Apply statistics in a capture recapture problem</li> </ul>		
Year 10	<ul style="list-style-type: none"> <li>-Solve problems using upper and lower bounds</li> <li>-Rationalise the denominator involving surds</li> <li>-Expand and simplify brackets involving surd</li> </ul>		<ul style="list-style-type: none"> <li>-Solve direct and inverse proportion problems using K – constant of proportionality</li> <li>-Set up, solve and interpret problems in growth and decay including compound interest and exponential growth</li> </ul>			<ul style="list-style-type: none"> <li>-Use and apply 3D Pythagoras and trigonometry</li> <li>-Prove two triangles are congruent</li> <li>-Use and apply the cosine and sine rule to solve problems</li> <li>-Solve bearing problems using advanced trigonometry</li> </ul>	<ul style="list-style-type: none"> <li>-Plot and interpret cumulative frequency diagrams</li> <li>-Plot and interpret box plot diagrams</li> <li>-Calculate quartiles and interquartile ranges</li> <li>-Interpret time graphs for time series data</li> <li>-Read basic Venn diagrams</li> <li>-Form and solve problems using tree diagrams</li> </ul>		
Year 11	<ul style="list-style-type: none"> <li>-Round using truncation and identify error intervals</li> </ul>			<ul style="list-style-type: none"> <li>-Use algebra to construct arguments and prove identities</li> <li>-Expand the product of three binomials</li> <li>-Solve simultaneous equations involving a quadratic</li> <li>-Simplify and solve algebraic fractions</li> <li>-Change the subject of complex formulas</li> <li>-Find the equation of a circle</li> <li>-Find acceleration from a curved speed time graph</li> <li>-Construct algebraic proofs</li> </ul>		<ul style="list-style-type: none"> <li>-Describe directional vectors as column vectors</li> <li>-Add and subtract vectors</li> <li>-Use vectors to solve geometrical problems</li> <li>-Use vectors to construct geometrical proofs</li> </ul>	<ul style="list-style-type: none"> <li>-Find experimental and theoretical probabilities</li> <li>-Form and interpret Venn diagrams using set theory</li> <li>-Solve conditional probability problems</li> <li>-Find probabilities of combined events using tree diagrams with or without replacement</li> </ul>		
Year 12	<ul style="list-style-type: none"> <li>-Solve logarithmic equations</li> <li>-Use Numerical methods to solve problems in context</li> <li>-Carry out binomial expansion</li> </ul>		<ul style="list-style-type: none"> <li>-Solving vector problems involving ratio</li> </ul>	<ul style="list-style-type: none"> <li>-Apply the laws of indices</li> <li>-Rationalise Surds</li> <li>-Work with Quadratic functions and discriminant</li> <li>-Solve simultaneous equations</li> <li>-Solve inequalities</li> <li>-Understand graphs and functions</li> </ul>	<ul style="list-style-type: none"> <li>-Understand and use the equation of a straight line</li> <li>-Understand and use coordinate geometry of a circle</li> </ul>	<ul style="list-style-type: none"> <li>-Solve trigonometrical equations and problems</li> <li>-Solve Vector problems involving magnitude</li> </ul>	<ul style="list-style-type: none"> <li>-Interpret diagrams for single variable data</li> <li>-Understand how to calculate probability</li> <li>-Understand hypothetical testing</li> </ul>		
Year 13	<ul style="list-style-type: none"> <li>-Work out arithmetic and geometric sequences</li> <li>-Work out the sum of a series</li> <li>-Understand and use numerical integration</li> <li>-Use the trapezium rule to estimate areas under a curve</li> </ul>		<ul style="list-style-type: none"> <li>-Work out trigonometric ratios</li> <li>-Use and interpret kinematics</li> </ul>	<ul style="list-style-type: none"> <li>-Work with partial fractions and algebraic division</li> <li>-Understand and use functions including composite functions</li> <li>-Understand and use parametric equations</li> </ul>	<ul style="list-style-type: none"> <li>-Understand and use Newtons first law</li> <li>-Understand and use moments</li> </ul>	<ul style="list-style-type: none"> <li>-Understand and use moments in simple static contexts</li> <li>-Understand and use the coefficient of frictions</li> </ul>	<ul style="list-style-type: none"> <li>-Understand and use normal distribution</li> <li>-Conduct a statistical hypothesis test</li> </ul>		