Maths: Maths No Problem years 1-4, White Rose Maths Hub Years 5 & 6. Knowledge engaged Curriculum.

Purpose of Study:
Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Aims:
The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.
The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Maths knowledge progression

Nursery	**Number** Recite numbers in order to 10. Count up to ¾ objects. Begin to recognise some numbers of personal significance. Begin to recognise numerals 1 to 5. Represent numbers using marks on paper. Begin to show an interest in number problems.	**SSM** Show an awareness of similarities of shapes in the environment. Use shapes appropriately for tasks. Begin to use mathematical names for 2D shapes. Use positional language.
Reception	Number Count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Use quantities and objects, add and subtract two single-digit numbers and count on or back to find the answer. Solve problems, including doubling, halving and sharing.	SSM Use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems. Recognise, create and describe patterns. Explore characteristics of everyday objects and shapes and use mathematical language to describe them.

	Number and Place Value	**addition and Subtraction**	**Multiplication and ÷**	**Fractions, Decimals %**	**Measures**	**Geometry**	**Data**
Year 1	- 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 different multiples including 1s, 2s, 5s and 10s - given a number, identify one more and one less - identify and represent numbers using concrete objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least - read & write numbers from 1 to 20 in digits and words.	- read, write and interpret mathematical statements involving addition (add), 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 (9 add 9, 18 – 9), including zero - solve simple one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems.	- solve simple one-step problems involving multiplication and ÷, 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.	- compare, describe and solve practical problems for: - lengths and heights - mass or weight - capacity/volume - time to record the following: - lengths and heights - mass/weight - capacity and volume - time - recognise and know the value of diff coins and notes - sequence events in chronological order using language - 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 (e.g. rectangles (including squares), circles and triangles) - 3-D shapes (e.g. cuboids (including cubes), pyramids and spheres).	
Year 2	- count in steps of 2, 3, and 5 from 0, and count in 10s from any number, forward or backward - recognise the place value of each digit in a two-digit number - identify, represent and estimate numbers using different representations, including the number line - compare and order	- solve simple one-step problems with add and - . - using concrete objects and pictorial rep, incl, quantities and measures - applying their increasing knowledge of mental and written methods - recall and use add and – facts to 20 fluently, and derive and use related facts up to 100 - add and – - a two-digit number and 1s - a two-digit number and 10s - adding three one-digit nos - show that add 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 missing number probs.	- recall and use x ÷ facts for the 2, 5 and 10 tables, incl recog odd and even nos - calculate mathematical statements for x and ÷ within the x tables and write them using x (×), ÷ (÷) and equals (=) signs - recognise and use the inverse relationship between x and ÷ in calculations - show that x of two	- recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity - write simple fractions e.g. ½ of 6 = 3 and recognise the equivalence of two quarters and one half.	- choose and use app standard units to est and measure length/height in any direction (m/cm); mass (kg/g); tem (°C); capacity (l/ml) to the nearest app unit, using rulers, scales, thermometers and vessels - compare and order lengths, mass, volume/capacity and record the results using >, < and =	- identify and describe the properties of 2-D shapes, including the number of sides and 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	- interpret and construct simple pictograms, tally charts, block diagrams and simple tables - ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity - ask and answer questions about totalling and compare categorical data.

	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.		numbers can be done in any order (commutative) and ÷ of one number by another cannot - solve one-step problems involving x and ÷, using materials, arrays, repeated addition, mental methods, and x and ÷ facts, including problems in contexts.		- read relevant scales to the nearest numbered unit - recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value and match diff comb of coins to equal the same amounts of money; add and – money of the same unit, incl giving change - solve simple problems in a practical context inv add – of money - com and seq int of time - tell and write time to 5 min	cylinder and a triangle on a pyramid - compare and sort common 2-D and 3-D shapes and everyday objects. - order and arrange comb of shapes in patterns - use math vocab to describe position, direction and movement, incl distinguish between rotation as a turn and in terms of right angles for quarter, ½ and ¾ turns (clockwise and anti-clockwise), and movement in a straight line.	
Year 3	- count from 0 in multiples of 4, 8, 50 and 100; finding 10 or 100 more or less than a given number - recognise the PV 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 to at least 1000 in numerals and in words - solve number problems and practical problems involving these ideas.	- + and –numbers mentally, including: - a 3 digit number and ones - a 3 digit number and tens - a 3 digit number and 100s - add and subtract numbers with up to 3 digits, using the efficient written methods of column add and – - 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 add and -.	- recall and use x and ÷ facts for the 3, 4 and 8 tables - write and calculate math statements for x and ÷ using the tables that they know, including for 2 digit numbers times 1 digit numbers, using mental and progressing to efficient written methods solve problems, including missing number problems, involving x and ÷, including integer scaling problems and correspondence problems in which n objects involving x and ÷, including integer scaling problems and correspondence problems in which n objects are connected to m objects.	- count up and down in 1/10s; recognise that tenths arise from dividing an object into 10 equal parts and in dividing 1 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 - + and – fractions with the same denominator within one whole - compare and order unit fractions with the same denominator	- 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, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight	- draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations; and describe them with increasing accuracy - recognise angles as a property of shape and associate angles with turning - 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, vertical, perpendicular and parallel lines in relation to other lines.	- interpret and present data using bar charts, pictograms and tables - solve one-step and two-step questions such as 'How many more?' and 'How many fewer?' using information presented in scaled bar charts and pictograms and tables.
Year 4	- count in multiples of 6, 7, 9, 25 and 1000 - find 1000 more or less - count backwards through zero to include neg numbers - recognise the PV of each digit in a four-digit number - order and compare numbers beyond 1000 - identify, represent and estimate numbers using different representations - round any number to the nearest 10, 100 or 1000 - solve number and practical problems that involve all of the above and with increasingly large positive numbers - read Roman numerals to 100 (I to C) and understand how, over time, the numeral system changed to include the concept of zero and place value.	- add and subtract numbers with up to 4 digits using the efficient written methods of columnar addition and subtraction where appropriate - estimate and use inverse operations to check answers to a calculation - solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	- recall multiplication and division facts for multiplication tables up to 12 × 12 - use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers - recognise and use factor pairs and commutativity in mental calculations - multiply two-digit and three-digit numbers by a one-digit number using formal written layout. - solve problems involving multiplying and adding, including using the distributive law and harder multiplication problems such as which n objects are connected to m objects	- count up and down in 1/100 ; recognise that 1/100 arise when ÷ an object by a hundred and ÷ tenths by ten - solve prob using harder fractions to calc quantities, and fractions to ÷ quantities, including non-unit fractions where the answer is a whole - identify, name and write equ fractions of a given fraction, inc 1/10 and 1/100 - + and – fractions with the same denominator. - recognise and write decimal equivalents of any number of t or hts - recognise and write decimal eq to ¼ ; ½ ¾ - find the effect of ÷ a 1- or 2-digit number by 10 and 100, identifying the PV of digits - round decimals with 1dp to the nearest whole number compare numbers with the same number of decimal places up to two decimal places - solve simple measure and money problems involving fractions and decimals to two decimal places	- convert between different units of measure (e.g. kilometre to metre; hour to minute) - measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres - find the area of rectilinear shapes by counting - estimate, compare and calculate different measures, including money in pounds and pence - read, write and convert time between analogue and digital 12 and 24-hour clocks - solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.	- compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes - identify acute and obtuse angles and compare and order angles up to two right angles by size - identify lines of symmetry in 2-D shapes presented in different orientations - complete a simple sym figure with respect to a specific line of symmetry - describe positions on a 2-D grid as coordinates in the first quadrant - describe movements between positions as translations of a given unit to the left/right and up/down - plot specified points and draw sides to complete a given polygon.	- interpret and present discrete data using bar charts and continuous data using line graphs - solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and simple line graphs
Year 5	- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit	- add and subtract whole numbers with more than 4 digits, including using efficient written methods (columnar addition and subtraction) - add and subtract numbers mentally with increasingly large numbers - use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy	- identify multiples and factors, including finding all factor pairs - solve probs involving x and	- compare and order fracs whose denominators are all multiples of the same no - rec mixed numbers and	-convert between different units of measure (e.g. kilometre and metre; metre and centimetre; centimetre	-identify 3-D shapes, including cubes and cuboids, from 2-D representations - know angles are measured	Solve comparison, sum and difference problems using information presented in line graphs - complete, read and interpret

	- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 - interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero - round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 - solve number problems and practical problems that involve all of the above - read Roman numerals to 1000 (M) and recognise years written in Roman numerals	- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.				÷ where larger numbers are used by decomposing them into their factors - know and use the vocab of prime numbers, prime factors and composite (non-prime) numbers - establish whether a number up to 100 is prime and recall prime numbers up to 19 - x numbers up to 4 digits by a 1 or 2-digit number using an efficient written method, including long x for 2 digit numbers - x and ÷ numbers mentally drawing upon known facts - ÷ numbers up to 4 digits by a one-digit number using the efficient written method of short division and interpret remainders appropriately for the context - x and ÷ whole numbers and those involving decimals by 10, 100 and 1000 - recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) - solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign - solve problems involving x / including scaling by simple fractions and problems involving simple rates.	improper fractions and convert from one to another - + - the same denominator and related fractions; write mathematical statements >1 as a mixed number - x proper fractions and mixed numbers by whole numbers, supported - read and write decimal numbers as fractions - recognise and use 1/1000 and relate them to tenths, hundredths and decimal eq - round decimals with 2dp to the nearest whole number and to 1dp - read, write, order compare numbers with up to 3dp - solve problems involving number up to 3dp - recognise the per cent symbol (%) and understand that per cent relates to "number of parts per hundred", and write percentages as a fraction with denominator hundred, and as a decimal fraction solve problems which require knowing percentage and decimal equivalents of ½, ¼, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25.	and millimetre; kilogram and gram; litre and millilitre) - understand and use basic equivalences between metric and common imperial units and express them in approximate terms - measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres - calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes - recognise and estimate volume (e.g. using 1 cm3 blocks to build cubes and cuboids) and capacity (e.g. using water) - solve problems involving converting between units of time - solve problems involving addition and subtraction of units of measure (e.g. length, mass, volume, money) using decimal notation.	in degrees; estimate and measure them and draw a given angle, writing its size in degrees (o) - identify: . multiples of 90o . angles at a point on a straight line and ½ a turn (total 180o) . angles at a point and one whole turn (total 360o) . reflex angles, and compare different angles - draw shapes using given dimensions and angles - state and use the properties of a rectangle (including squares) to deduce related facts - distinguish between regular and irregular polygons based on reasoning about equal sides and angles Pupils should be taught to: - identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.	information in tables, including timetables.

Year 6	**Place Value** - read, write, order and compare numbers up to 10 000 000 and determine the value of each digit - round any whole number to a required degree of accuracy - use negative numbers in context, and calculate intervals across zero - solve number problems and practical problems that involve all of the above.	**Four Operations** - multiply multi-digit numbers up to 4 digits by a two-digit whole number using the efficient written method of long multiplication - divide numbers up to 4 digits by a two-digit whole number using the efficient written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context - perform mental calcs, including with mixed ops and large numbers - identify common factors, common multiples and prime numbers - use their knowledge of the order of operations to carry out calculations involving the four operations - addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why - solve problems involving +, -, x and / - use estimation to check answers to calculations and determine, in the context of a problem, levels of acc.	**Algebra** - express missing number problems algebraically - use simple formulae expressed in words - generate and describe linear number sequences - find pairs of numbers that satisfy number sentences involving two unknowns. **Ratio and Proportion** - solve problems involving the relative sizes of two quantities, including similarity - solve problems involving unequal sharing and grouping.	**Fractions, Decimals %** - use common factors to simplify fractions; use common multiples to express fractions in the same denomination - compare and order fract, including fractions >1 - associate a fraction with ÷ to calculate decimal fraction equivalents for a simple frac - + - fractions with different denominators and mixed numbers, using the concept of equivalent fractions - x simple pairs of proper fractions, writing the answer in its simplest form - / proper fractions by whole - identify the value of each digit to 3dp and x ÷ numbers by 10, 100 and 1000 where the answers are up to 3dp - multiply 1 digit numbers with up to 2dp by whole no - use written ÷ methods where the ans has up to 2 dp - solve problems which need answers to be rounded to degrees of accuracy. - solve probs involving the calc of % of whole numbers or measures such as 15% of 360 and the use of % for comparison - recall and use equivalences between simple FDP	**Measures** - solve problems involving the calculation and conversion of units of measure, using decimal notation to three decimal places where appropriate - use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to three decimal places convert between miles and kilometres - recognise that shapes with the same areas can have different perimeters and vice versa - calculate the area of parallelograms and triangles - recognise when it is necessary to use the formulae for area and volume of shapes - calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm3) and cubic metres (m3) and extending to other units, such as mm3 and km3.	**Geometry** - recognise, describe and build simple 3-D shapes, including making nets - compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons - illustrate and name parts of circles, including radius, diameter and circumference - find unknown angles where they meet at a point, are on a straight line, and are vertically opposite. - describe positions on the full coordinate grid (all four quadrants) - draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	**Data** - interpret and construct pie charts and line graphs and use these to solve problems - calculate and interpret the mean as an average.