Maths Knowledge Progression

Early Learning Goal/EYFS Link: Maths (Specific Area of Learning) including Number and Numerical Patterns

Please all refer to EYFS Progression Documents for:

- **Communication and Language**
- **Mathematics**

National 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.

National curriculum aims: The national curriculum for maths 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.

School intent:
We intend to make Maths meaningful, exciting and engaging. We place great emphasis upon developing the key knowledge in mathematics so that all children can apply a solid understanding of number, data handling, shape, space and measures, in order to solve problems in a wide range of real-life situations. We want children to think like mathematicians as they ask questions of the mathematics, debate possible approaches and spot patterns that help them to solve problems.

We use a wide range of practical and pictorial representations to ensure that students can see the structure of the mathematics. This allows all pupils equal access to mathematics and to experience success and enjoyment that will prepare them for the mathematical skills they will need in the future. Over time, children will become resilient learners who are able to accept that to struggle is a necessary step in their learning.

Children will be appropriately challenged and supported through varied fluency, reasoning and problem solving. Irrespective of personal starting points, children will explore maths in depth, and use a range of mathematical vocabulary to reason and explain. Pupils will persevere by building on previous knowledge and skills and apply these to a wide variety of contexts both within maths and across the curriculum. They will appreciate the relevance of maths in real life situations, recognising that it is not simply a set of rules.

Knowledge	**Nursery**	**Reception**	**Year 1**	**Year 2**	**Year 3**
Place Value: **-Counting** **-Represent** **-use PV and compare** **-Problems and rounding**	Pupils will know how to: • Recite numbers past 5. • Say one number name for each item in order 1, 2, 3, 4, 5. • Know that the last number reached when counting a small set of objects tells you how many there are in total (cardinal principle). • Develop fast recognition of up to 3 objects, without having to count them individually ('subitising'). • Show 'finger numbers' up to 5. • Link numerals and amounts (up to 5). • Experiment with their own symbols and marks as well as numerals. • Compare quantities using language 'more than', 'fewer than'.	Pupils will know how to: • Count objects, actions and sounds. • Count beyond ten. • **Verbally count beyond 20, recognising the pattern of the counting system.** • **Subitise up to 5.** • Link the number symbol (numeral) with its cardinal number value. • Compare numbers • **Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.** • Understand the 'one more than/one less than' relationship between consecutive numbers. • Explore the composition of numbers to 10. • **Have a deep understanding of numbers to 10, including the composition of each number.**	Pupils will know how to: • Count to and across 100, forwards and backwards beginning with 0 or 1, or from any given number • Count numbers to 100 in numerals, count in multiples of 2,5 and 10s • Read and write numbers 1 to 20 in words and numerals • Read and write numbers to 100 in numerals • Identify and represent numbers using objects and pictoral representations • Give a number, identify one more and one less	Pupils will know how to: • Count in steps of 2,3 and 5 from 0, and in tens from any number, forward and backward • Read and write numbers to at least 100 in numerals and in words • Identify, represent and estimate numbers using different representations, including the number line • Recognise the place value of each digit in a two-digit number (tens, ones) • Compare and order numbers from 0 to 100; use <, > and = signs • Use place value and number facts to solve problems	Pupils will know how to: • Count from 0 in multiples of 4, 8, 50 and 100 • Identify, represent and estimate numbers using different representations • Read and write all numbers up to 1000 in words and numerals • Compare and order numbers to 1000 • Recognise the place value in each digit in a three-digit number • Solve number problems and practical problems involving these ideas
Vocabulary (revision) (new vocab)	Number, one, two, three … up to 5, how many, count, more than, fewer than.	Number, one, two, three … up to 10, how many, count, more than, fewer than. None, zero, twelve, thirteen … all numbers up to 20 and beyond, count up and on, count back, more, less	Count up and on, count back, more, less, All numbers up 100, ones, tens, the same number as, bigger, greater, fewer, smaller, less, fewest, smallest, least, most, biggest, largest, greatest, one more, ten more, one less, ten less, equal to	All numbers up 100, ones, tens, the same number as, bigger, greater, fewer, smaller, less, fewest, smallest, least, most, biggest, largest, greatest, one more, ten more, one less, ten less, equal to order, first, second, third… twentieth. Digit, value, represents,	Digit, value, represents, greater than, less than, compare, order, hundreds. Numbers one to 1000.

			order, first, second, third… twentieth.	greater than, less than, compare, order, hundreds.	
Addition and Subtraction: **-Recall, Represent, Use** **-Calculations** **-Solve Problems**	Pupils will know how to: • Solve real world maths problems with numbers up to 5.	Pupils will know how to: • **Automatically recall number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.** • **Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly.**	Pupils will know how to: • Read, write and interpret mathematics statements involving +, - 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 0 • Solve one- step problems that involve addition and subtraction, and missing number problems such as 7= ()-9	Pupils will know how to: • Recall and use addition and subtractions to 20 fluently, and derive and use related facts to 100 • Show that addition of 2 numbers can be done in any order (communtative) and subtraction of one number from another cannot. • Recognise the inverse relationship between addition and subtraction and check calculations to solve missing number problems • Add and subtract numbers using concrete objects, pictoral representations and mentally, including: -2-digit number and ones -2-digit number and tens -two 2-digit numbers • Solve problems with addition and subtraction: -using concrete objects and pictorial representations, involving numbers, quantities, and measures -applying knowledge of mental and written methods	Pupils will know how to: • Estimate the answer to a calculation and use inverse operations to check answers • Add and subtract numbers mentally, including: - a three-digit number and ones - a three digit number and tens - a three digit number and hundreds • Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.
Vocabulary (revision) (new vocab)	add, more, altogether	add, more, altogether, double, one more, make, total, two more, three more, make, how many, how many more to make, add, takeaway, number bonds.	add, more, altogether, double one more, make, total, double, two more, three more, make, how many, how many more to make, add, takeaway, number bonds.	add, more, altogether, double one more, make, total, double, two more, three more, make, how many, how many more to make, add, takeaway, number bonds.	Difference between, plus, sum, total, one hundred more, how much more is…? minus, leave, how much fewer is…?

			Addition, total, near double, half, halve, ten more, how many more is … than …? Subtract, how many are left? one less, two less, ten less … missing number, tens and ones.	Addition, total, near double, half, halve, ten more, how many more is … than …? Subtract, how many are left? one less, two less, ten less … missing number. Difference between, plus, sum, total, one hundred more, how much more is…?	Column addition and subtraction.
Multiplication and Division : **-Recall, Represent, Use** **-Calculations** **-Solve Problems**	Pupils will know how to:	Pupils will know how to: • **Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly.**	Pupils will know how to: • Solve one-step problems involving multiplication and division, by calculating the answer using concrete resources, pictorial representations, and arrays with the support of the teacher	Pupils will know to: • Recall and use multiplication and division facts for 2,5 and 10 x tables, including recognising odd and even numbers • Show that x of 2 numbers can be done in any order (commutative) and division of one number by another cannot • Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x) and division (÷) and equals (=) signs • Solve one-step problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and related facts, including problems in context.	Pupils will know how to: • Find and recall multiplication and division facts for numbers in the 3,4 and 8 times tables • Write and calculate mathematical statements for multiplication and division using the multiplication tables they know, including for 2-digit numbers times 1-digt numbers, using mental and formal written methods • Solve one-step problems involving multiplication and division, including positive integer scaling problems.
Vocabulary (revision) (new vocab)		Share, two groups of, half, double, odd, even, pairs	Share, two groups of. Half, double, odd, even, lots of, multiply, multiplication, divide, division, array.	Share, two groups of. Half, double, odd, even, lots of, multiply, multiplication, divide, division, array. Multiplied, multiple groups of, repeated addition, divided, equal groups, left over, multiplication fact, division fact.	Multiplied, multiple groups of, repeated addition, divided, equal groups, left over, multiplication fact, division fact.Product Multiples of four, eight,

					fifty and one hundred Scale up
Fractions : **-Recognise and Write** **-Compare** **-Calculations**	Pupils will know how to: • Double and halve and share numbers to 5.	Pupils will know how to: • **represent double facts and how quantities can be distributed evenly.**	Pupils will know how to: • Recognise, find and name ½ and ¼ of objects, shapes and quantity.	Pupils will know how to: • Recognise, find, name and write, fractions 1/3, ¼. 2/4 and ¾ of a length, shape, set of objects or quantity • Recognise the equivalence of 2/4 and ½ • Write simple fractions for example ½ of 6= 3	Pupils will know how to: • Count up and down in tenths • Recognise, find and write fractions of a discrete set of objects; unit fractions and non-unit fractions with small denominators • Recognise and show, using diagrams, equivalent fractions • Compare and order unit fractions • Add and subtract fractions with same denominator
Vocabulary (revision) (new vocab)	Share, two lots of.	Share, two lots of. Half, double	Share, two lots of, half, double, Fraction, equal part, equal groups, parts of a whole, one of two equal parts, quarter, one of four equal parts	Share, two lots of, half, double, Fraction, equal part, equal groups, parts of a whole, one of two equal parts, quarter, one of four equal parts, Two quarters, three quarters, equivalent fraction, numerator, denominator.	Two quarters, three quarters, equivalent fraction, numerator, denominator. unit fraction, non unit fraction, compare and order, tenths.
Measures: **-Using Measures** **-Money** **-Time**	Pupils will know how to: • Make comparisons between objects relating to size, length, weight and capacity. • Begin to describe a sequence of events, real or fictional, using words such as 'first', 'then'.	Pupils will know how to: • Compare length, weight and capacity. • Order and sequence important times in their day. • Recognise that regular events happen on the same day each week. • Describe significant events in their lives	Pupils will know how to: • Compare, describe and solve practical problems for: -length and height -mass/weight -capacity and volume -time • Measure and begin to record the following: -lengths and heights -mass/weight -capacity and volume -Time	Pupils will know how to: • Choose and use appropriate units to estimate and measure length, height (m/cm), weight (kg/g) and temperature; capacity (l/ml) • Compare and order length, mass, volume/capacity and record the results using <, > and =	Pupils will know how to: • Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml). • Add and subtract amounts of money to give change, using both £ and p in practical contexts

		and talk about events they are looking forward to.	• Recognise and know the value of different coins and notes • Sequence events in chronological order. • Tell the time on the hour and half past the hour and draw clock faces to show these times • Recognise and use language relating to days, weeks, months, and years.	• Recognise coins and symbols (£ and p) • Make amounts using coins. • Find different combination of coins to make the same amount • Solve simple problems in a practical context, involving addition and subtraction of money, including change • Tell and write the time for five minutes' intervals, including quarter past/to the hour and draw hands on clock face to show these times • Compare and sequence different time intervals. • Know the number of minutes in an hour and the number of hours in a day	• Compare durations of events, for example to calculate the time taken by events or tasks. • Recall the number of seconds in a minute and the number of days and months in each year and leap year. • Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks. • Read time to the nearest minute
Vocabulary (revision) (new vocab)	First, then, heavy, light, heavier, lighter, bigger, smaller, more, less, longer, shorter	First, then, heavy, light, heavier, lighter, bigger, smaller, more, less, longer, shorter, heavier than, heaviest, lighter than, lightest, weight, height, taller, tallest, short, shortest, Full, empty, nearly full, nearly empty, half full, days of the week, measure, size, yesterday, today, tomorrow.	Next to, above, heavier, lighter. Days of the week, measure, size, height, weight, full, empty, half, yesterday, today, tomorrow. Measurement, size, compare, estimate, pounds, pence, hour, O'clock, half past, days of the week, weeks, months of the year, longer, shorter,	Measurement, size, compare, estimate, pounds, pence, hour, O'clock, half past, days of the week, weeks, months of the year. Heaviest, lightest, roughly, exactly, scale, five past, ten past etc, too the hour, quarter past, quarter too, total, cost.	Heaviest, lightest, roughly, exactly, scale, five past, ten past etc, too the hour, quarter past, quarter too, total, cost. Leap year, twelve hour/twenty-four hour clock, roman numerals I to XIII
Geometry: **-2D shapes** **-3D shapes** **-Position and Direction**	Pupils will know how to: • Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides',	Pupils will know how to: • Select, rotate, and manipulate shapes in order to develop spatial reasoning skills. • Compose and decompose shapes so that children can	Pupils will know how to: • Recognise and name common 2d (rectangles, circles and triangles) • Recognise and name common 3D shapes (e.g. cuboids, cubes, pyramids, spheres)	Pupils will know how to; • Identify and describe the properties of 2D shapes, including the number of sides and line symmetry in a vertical line • Identify 2D shapes on the surface of 3D shapes	Pupils will know how to: • Draw 2-D shapes and make 3-D shapes using modelling materials. • Recognise 3-D shapes in different

	'corners', 'straight', 'flat', 'round'. • Select shapes appropriately: flat surfaces for a building, a triangular pattern for a roof, etc. • Combine shapes to make new ones – an arch, a bigger triangle, etc. • Understand position through words alone - for example, "The bag is under the table," – with no pointing. • Describe a familiar route. • Discuss routes and locations, using words like 'in front of' and 'behind'. • Talk about and identify the patterns around them. For example, stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs', etc. • Extend and create ABAB patterns – stick, leaf, stick, leaf. • Notice and correct an error in a repeating pattern.	recognise a shape can have other shapes within it, just as numbers can. • Draw information from a simple map (UtW). • Continue, copy and create repeating patterns.	• Describe position, movement including half, whole, quarter, and three-quarter turns.	• Compare and sort common 2Dshapes and everyday objects • Recognise and name common 3D shapes. • Common and sort common 3D shapes and everyday objects • Order and arrange mathematical objects into patterns and sequences. • Use mathematical vocabulary to describe position, direction and movement including clockwise and anti-clockwise.	orientations and describe them. • Recognise angles as a property of shape or a description of a turn. • Recognise that two right angles make a half-turn; three make three quarters of a turn and four a complete turn. • Identify whether an angle is greater than or less than a right angle.
Vocabulary (revision) (new vocab)	Triangle, circle, square, rectangle, shape, next to, above, below, in front of, behind, pattern, sides, corners, straight, flat, round.	Triangle, circle, square, rectangle, shape, next to, above, below, in front of, behind, pattern, sides, corners, straight, flat, round. Solid, curved, cylinder, cuboid, cube,	Pattern, flat, solid, corners, sides, curved, straight, round, below, under, cuboid, cube, cylinder, sphere, hollow, 2d, 3d, bigger, smaller, cone, pentagon, hexagon, turns	Pattern, flat, solid, corners, sides, curved, straight, round, , 3d, bigger, smaller, cone, symmetry, symmetrical, symmetrical pattern, repeating pattern, pyramid, vertices, faces, edges, vertical ,	symmetry, symmetrical, symmetrical pattern, repeating pattern, pyramid, vertices, faces, edges. ninety degrees, orientation (same orientation, different orientation)

		sphere, cone, pyramid, repeating patterns,		compare, sort, classify, clockwise, anti-clockwise	horizontal, vertical, perpendicular and parallel lines,
Statistics: **-Present and Interpret** **-Solve Problems**				Pupils will know how to: • 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 comparing	Pupils will know how to: • Interpret and present data using bar charts, pictograms and tables • Solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables
				count, tally, sort, vote, graph, block graph, pictogram, represent, group, set, list, table label, title, most popular, most common least popular, least common, category	count, tally, sort, vote, graph, block graph, pictogram, represent, group, set, list, table label, title, most popular, most common least popular, least common Chart, bar chart, frequency table, carroll diagram, venn diagram, axis, axes.

Impact: How will we know what the pupils have learnt?

Ongoing formative assessment takes place within each maths lesson. This includes teacher observations, questioning, discussions and marking and feedback. These outcomes are fed forward into timely teacher intervention and subsequent planning to ensure gaps in knowledge are closed and progress is not limited.

Outcomes from both end of unit and end of term assessments are used to identify gaps in knowledge and will inform future planning. Pupil progress will also identify precise actions and objectives for targeted focus children, including the lowest 20% who are not likely to meet end of year expectations and/or not making expected progress.

We also use a system of pre-teaching and flashbacks to teach new skills and assess previous skills and knowledge taught throughout and at the start of different units of work.