Maths Knowledge and Skills Ladder

INTENT: to be mathematicians so children can

- make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

	EYFS	Year 1	Year 2	Year 3
NUMBER AND PLACE VALUE				
COUNTING	say number words in sequence forwards and backwards starting from any number	count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number		
	tag each object with one number word (1:1 correspondence) including in an irregular arrangement	count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens	count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward	count from 0 in multiples of 4, 8, 50 and 100;
	know the last number counted gives the total so far (cardinality); count out 6 objects from a larger group	given a number, identify one more and one less	find 10 or 100 more or less than a given number	
	know the number does not change if things are rearranged but not added to or taken away (conservation)			
	with numbers 0-20 count reliably and place them in order			
COMPARE	use language of “more” and “fewer” when comparing 2 sets of objects	use the language of: equal to, more than, less than (fewer), most, least	compare and order numbers from 0 up to 100; use <, > and = signs	compare and order numbers up to 1000
	with numbers 1-20 say which number is one more or less than a given number			
IDENTIFY, REPRE-SENT AND ESTIMATE	recognise small quantities without needing to count them all (subitising); make a reasonable guess at a hidden number then check by counting	identify and represent numbers using objects and pictorial representations including the number line	identify, represent and estimate numbers using different representations, including the number line	identify, represent and estimate numbers using different representations
READING AND WRITING NUMBERS	match number symbols with numbers of things	read and write numbers from 1 to 20 in numerals and words.	read and write numbers to at least 100 in numerals and in words	read and write numbers up to 1000 in numerals and in words
	read and write numbers from 1-10 in numerals, correctly			*tell and write the time from an analogue clock, including using Roman*

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	orientated			*numerals from I to XII, and 12-hour and 24-hour clocks*
	count reliably with numbers from one to 20			
UNDER-STAND PLACE VALUE	in context, state 2 groups that make a larger number	recognise the place value of each digit in a two-digit number (tens, ones)	recognise the place value of each digit in a three-digit number (hundreds, tens, ones)	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
PROBLEM SOLVING			use place value and number facts to solve problems	solve number problems and practical problems involving these ideas.
ADDITION AND SUBTRACTION				
NUMBER BONDS	Part-part-whole: identify smaller numbers within a number for all numbers to 10	represent and use number bonds and related subtraction facts within 20	recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100	
	Know which pairs make a given number, to 10			
	Using quantities and objects, add and subtract two single-digit numbers and count on or back to find the answer			
MENTAL CALCULA-TION	See groups and combine a total	add and subtract one-digit and two-digit numbers to 20, including zero	add and subtract numbers using concrete objects, pictorial representations, and mentally, including: * a two-digit number and ones * a two-digit number and tens * two two-digit numbers * adding three one-digit numbers	add and subtract numbers mentally, including: * a three-digit number and ones * a three-digit number and tens * a three-digit number and hundreds
		read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Written Methods)	show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot	
WRITTEN METHODS	Record using marks they can interpret and explain	read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs (appears also in Mental Calculation)		add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
		recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing	estimate the answer to a calculation and use inverse operations to check answers	

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		number problems.		
INVERSE OPER-ATIONS, ESTI-MATING & CHECKING ANSWERS	with objects recognise that a number can be partitioned into a range of groups/pairs of numbers, then recombined		recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	estimate the answer to a calculation and use inverse operations to check answers
	Know that a number can be partitioned into more than two numbers.			
PROBLEM SOLVING	Begin to identify their own mathematical problems based on own interests and fascinations	solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = □ - 9	solve problems with addition and subtraction: * using concrete objects and pictorial representations, including those involving numbers, quantities and measures * applying their increasing knowledge of mental and written methods *solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change*	solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction
MULTIPLICATION AND DIVISION				
MULTI-PLICATION AND DIVISION FACTS		*count in multiples of twos, fives and tens* (copied from Number and Place Value)	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward* (copied from Number and Place Value)	*count from 0 in multiples of 4, 8, 50 and 100* (copied from Number and Place Value)
			recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
MENTAL CALCU-LATION				write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Written Methods)

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WRITTEN CALCU-LATION			calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods (appears also in Mental Methods)
PROBLEM SOLVING	solve problems, including doubling, halving and sharing	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	solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	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
FRACTIONS				
COUNTING IN FRACTION-AL STEPS			*Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)*	count up and down in tenths
		recognise, find and name a half as one of two equal parts of an object, shape or quantity	recognise, find, name and write fractions $^{1}/_{3}$, $^{1}/_{4}$, $^{2}/_{4}$ and $^{3}/_{4}$ of a length, shape, set of objects or quantity	recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
				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 name a quarter as one of four equal parts of an object, shape or quantity		recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
COMPAR-ING FRACTIONS	solve problems, including doubling, halving and sharing			compare and order unit fractions, and fractions with the same denominators
EQUIVA-LENCE INCLUDING FRACTIONS DECIMALS			write simple fractions e.g. $^{1}/_{2}$ of 6 = 3 and recognise the equivalence of $^{2}/_{4}$ and $^{1}/_{2}$.	recognise and show, using diagrams, equivalent fractions with small denominators

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AND PERCENT-AGES				
ADDITION AND SUBTRACT-ION OF FRACTIONS				add and subtract fractions with the same denominator within one whole (e.g. $^{5}/_{7} + {}^{1}/_{7} = {}^{6}/_{7}$)
MEASUREMENT				
COMPAR-ING AND ESTIMAT-ING	recognise AND compare the attributes of Capacity/Length/Weight developing language refinement (e.g. big becomes long/tall/full or heavy) reaching comparative language by end of year (he is taller than me). Compare different attributes: who has the longest snake; what weighs the same; which parcel is heavier Find appropriate containers for objects Find something that is longer/ shorter/heavier/lighter etc. than a specified reference item	compare, describe and solve practical problems for: * lengths and heights [e.g. long/short, longer/shorter, tall/short, double/half] * mass/weight [e.g. heavy/light, heavier than, lighter than] * capacity and volume [e.g. full/empty, more than, less than, half, half full, quarter] * time [e.g. quicker, slower, earlier, later]	compare and order lengths, mass, volume/capacity and record the results using >, < and =	
	sequence events: days of week; months; chronological vocab; retelling stories accuractely sequence a short series of events accurately use relative terms “yesterday” and “tomorrow”	sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]	compare and sequence intervals of time	compare durations of events, for example to calculate the time taken by particular events or tasks
	understand specific time			estimate and read time with increasing

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	durations: timers, clocks, sleeps, daily timetables, dates, birthdays			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 (appears also in Telling the Time)
MEASURE AND CALCU-LATE	Recognise the relationship between the size and the number of units (dough with size of cutters, for example) at an Estimation Station	measure and begin to record the following: * **lengths and heights** * **mass/weight** * **capacity and volume** * **time** (hours, minutes, seconds**)**	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	measure, compare, add and subtract: **lengths** (m/cm/mm); **mass** (kg/g); **volume/capacity** (l/ml)
	Use units to measure and compare (e.g. beads/cubes/ height charts) and at a Filling Station			measure the **perimeter** of simple 2-D shapes
MONEY		recognise and know the value of different denominations of **coins and notes**	recognise and use symbols for pounds **(£) and pence (p)**; combine amounts to make a particular value	add and subtract amounts of **money** to give change, using both £ and p in practical contexts
			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	
TELLING THE TIME		tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.	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.	tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
		recognise and use language relating to dates, including days of the week, weeks, months and years	know the number of minutes in an hour and the number of hours in a day. (appears also in Converting)	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 (appears also in Comparing and Estimating)
CONVERT-ING			know the number of minutes in an hour and the number of hours in a day. (appears also in Telling the Time)	know the number of seconds in a minute and the number of days in each month, year and leap year

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SHAPE				
DEVELOP-ING SPACIAL AWARE-NESS	Riding trikes around interesting routes; construct-ion activities; printing and making pictures and patterns with shapes; posting boxes; jigsaws; making a complete circuit with a train track; directing a simple robot or remote-controlled toy vehicle along a route; tangrams: 'Can you make a person with the shapes?'; with toys in a line: 'Can you say what the teddy on the other side is seeing?			
	use, understand and describe positional and directional language			
DEVELOP SHAPE AWARE-NESS	construct with structured and unstructured materials; justify choices showing intentionality about decisions			
IDENTI-FYING SHAPE	see shapes in different orientations and recognise they are still the same shape	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].	identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line	
	Recognise a range of triangles and say how they know what they are		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	

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			cylinder and a triangle on a pyramid]	
DRAWING AND CONSTRUCTING	Construct with shapes and identify similarities between shapes; use shapes to represent			draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
COMPARING & CLASSIFYING	Notice the properties of shapes: curvedness; numbers of sides and corners (2D) or edges, faces and vertices (3D); equal sides; parallel sides; angle size, including right angles; 2D shapes as faces of 3D shapes (possibly using own descriptive language e.g. fat triangle/pointy triangle) Use properties in decisions when constructing and be able to justify Spot shapes within shapes e.g. when folding or using pattern blocks		compare and sort common 2-D and 3-D shapes and everyday objects	
ANGLES	Use words such as pointy/fat to describe corners			recognise angles as a property of shape or a description of a turn
	Select and rotate shapes to fit a space			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
POSTION AND DIRECTION				
POSITION DIRECTION AND MOVEMENT	*Refer spacial awareness above*	describe position, direction and movement, including half, quarter and three-quarter turns.	use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter	

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			turns (clockwise and anti-clockwise)	
PATTERN *verbalise and generalise*	continue, copy and create an AB pattern		order and arrange combinations of mathematical objects in patterns and sequences	
	identify the pattern rule (unit of repeat) in an AB pattern			
	continue, copy and create ABB, ABBC (etc.) patterns			
	identify the pattern rule (unit of repeat) in an ABB, ABBC (etc.) patterns			
	spot an error and 'correct' a pattern			
	explain whether a circular pattern is continuous or not			
STATISTICS				
INTERPRET CON-STRUCT & PRESENT DATA			interpret and construct simple pictograms, tally charts, block diagrams and simple tables	interpret and present data using bar charts, pictograms and 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 categorical data	
SOLVE PROBLEMS				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.

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