Skills and Knowledge Progression Document for Maths

Headings from the National Curriculum (+reasoning exemplification)	**Rec** Early Learning Goals (underlined)	**Year 1**	**Year 2**
Number: Place Value			
Counting	• Children 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. • Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. • They solve problems, including doubling, halving and sharing. Children have experience of: • saying number words in sequence Counting: tagging each object with one number word • knowing the last number counted gives the total so far • Subitising: recognising small quantities without needing to count them all • numeral meanings • knowing that the number does not change if things are rearranged (as long as none have been added or taken away)	• 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	• count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward

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Reasoning	**Do, then explain** correcting a puppet who may say that there are more or fewer objects now, as they have been moved around, e.g. spread out or pushed together	**Spot the mistake:** 5,6,8,9 What is wrong with this sequence of numbers? **True or False?** I start at 2 and count in twos. I will say 9 **What comes next?** 10+1 = 11 11+1= 12 12+1 = 13	**Spot the mistake**: 45,40,35,25 What is wrong with this sequence of numbers? **True or False?** I start at 3 and count in threes. I will say 13? **What comes next?** 41+5=46 46+5=51 51+5=56
Comparing Numbers	Children have experience of: • Finding numbers that are more than / less than a given number • Identifying groups with the same number of things • Comparing numbers and reasoning • Knowing the 'one more than/one less than' relationship between counting numbers	• 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
Reasoning	**Do, then explain** A child is shown two boxes and told one has 5 sweets in and the other has 3 sweets in. Which box would they pick to keep and why? Children can compare numbers that are far apart, near to and next to each other. For example, 8 is a lot bigger than 2 but 3 is only a little bit bigger than 2.	**Do, then explain** Look at the objects. (in a collection). Are there more of one type than another? How can you find out?	**Do, then explain** 37 13 73 33 3 If you wrote these numbers in order starting with the smallest, which number would be third? Explain how you ordered the numbers.
Identifying, representing and estimating numbers	Children have experience of: • Part–whole: identifying smaller numbers within a number • Finding a number can be partitioned into different pairs of numbers	• identify and represent numbers using objects and pictorial representations including the number	• identify, represent and estimate numbers using different representations, including the number

	• Finding a number can be partitioned into more than two numbers •	line	line
Reading and writing numbers		• 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
Understanding place value		• 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)
Reasoning		**Do, then explain** Show the value of the digit 2 in these numbers? 32 27 92 Explain how you know. **Make up an example** Create numbers where the units digit is one less than the tens digit. What is the largest/smallest number?	**Do, then explain** Show the3 value of the digit 3 in these numbers? 341 503 937 Explain how you know. **Make up an example** Create numbers where the digit sum is three. Eg 120, 300, 210 What is the largest/smallest number?
Problem solving			• use place value and number facts to solve problems
Number: Addition and Subtraction			
Number Bonds	Children have experience of: • Number bonds: knowing which pairs make a given number	• 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

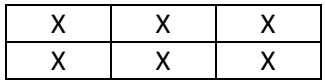
Reasoning		**Continue the pattern** 10 + 8 = 18 11 + 7 = 18 Can you make up a similar pattern for the number 17? How would this pattern look if it included subtraction? **Missing numbers** 9 + ☐ = 10 10 - ☐ = 9 What number goes in the missing box?	**Continue the pattern** 90 = 100 – 10 80 = 100 – 20 Can you make up a similar pattern starting with the numbers 74, 26 and 100? **Missing numbers** 91 + ☐ = 100 100 - ☐ = 89 What number goes in the missing box?
Mental calculation		• add and subtract one-digit and two-digit numbers to 20, including zero • read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs • (appears also in Written Methods)	• 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 • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot

Reasoning		**Working backwards** Through practical games on number tracks and lines ask questions such as “where have you landed?” and “what numbers would you need to throw to land on other given numbers?” **What do you notice?** 11 – 1 = 10 11 – 10 = 1 Can you make up some other number sentences like this involving 3 different numbers? **Fact families** Which four number sentences link these numbers? 12, 15, 3 **What else do you know?** If you know this: 12 – 9 = 3 what other facts do you know? **Missing symbols** Write the missing symbols (+ - =) in these number sentences: 17 ☐ 3 ☐ 20 18 ☐ 20 ☐ 2	**True or false?** Are these number sentences true or false?73 + 40 = 113 98 – 18 = 70 46 + 77 = 123 92 – 67 = 35 Give your reasons. **Hard and easy questions** Which questions are easy / hard? 23 + 10 = 93 + 10 = 54 + 9 = 54 + 1 = Explain why you think the hard questions are hard? **Other possibilities** ☐ ☐ ☐ = 14 What single digit numbers could go in the boxes? How many different ways can you do this? **Fact families** Which four number sentences link these numbers? 100, 67, 33 **What else do you know?** If you know this: 87 = 100 – 13 what other facts do you know?

			Missing symbols Write the missing symbols (+ - =) in these number sentences: 80 ☐ 20 ☐ 100 100 ☐ 70 ☐ 30 87 ☐ 13 ☐ 100
Written methods		• read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs • (appears also in Mental Calculation)	
Reasoning		**Convince me** In my head I have two odd numbers with a difference of 2. What could they be? Convince me **Missing numbers** Fill in the missing numbers (using a range of practical resources to support) 12 + ☐ = 19 20 - ☐ = 3	**Convince me** What digits could go in the boxes? 7 ☐ - 2 ☐ = 46 Try to find all of the possible answers. How do you know you have got them all? Convince me

Inverse operations, estimating and checking answers	Children have experience of: • Inverse operations- partition a number of things into two groups, and to recognise that those groups can be recombined to make the same total.		• recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
Reasoning		**Making an estimate** Pick (from a selection of number sentences) the ones where the answer is 8 or 9. **Is it true that?** Is it true that 3+4 = 4 + 3?	**Making an estimate** Which of these number sentences have the answer that is between 50 and 60 74 - 13 55 + 17 87 – 34 **Always, sometimes, never** Is it always, sometimes or never true that if you add three numbers less than 10 the answer will be an odd number
Problem Solving		• 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 (copied from Measurement)
Number: Multiplication and Division			
Multiplication 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) • recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
Reasoning		**Missing numbers** 10 = 5 x ☐ What number could be written in the box? **Making links** I have 30p in my pocket in 5p coins. How many coins do I have?	**Missing numbers** 24 = ☐ x ☐ Which pairs of numbers could be written in the boxes? **Making links** Cards come in packs of 4. How many packs do I need to buy to get 32 cards?
Mental calculation			• show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot

Reasoning		**Making links** If one teddy has two apples, how many apples will three teddies have? Here are 10 lego people If 2 people fit into the train carriage, how many carriages do we need?	**Making links** Write the multiplication number sentences to describe this array  What do you notice? Write the division sentences.
Written calculation			• calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
Reasoning		Practical If we put two pencils in each pencil pot how many pencils will we need?	**Prove It** Which four number sentences link these numbers? 3, 5, 15? Prove it.
Problem Solving		• solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial	• solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and

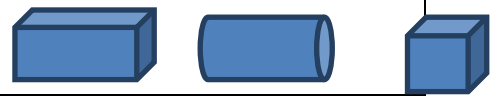
		representations and arrays with the support of the teacher	division facts, including problems in contexts
Fractions			
Counting in fractional steps			• *Pupils should count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line (Non Statutory Guidance)*
Reasoning			**Spot the mistake** 7, 7 ½ , 8, 9, 10 8 ½, 8, 7, 6 ½, … and correct it **What comes next?** 5 ½, 6 ½ , 7 ½ , …., …. 9 ½, 9, 8 ½, ……, …..
Recognising Fractions		• 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	• recognise, find, name and write fractions $^{1}/_{3}$, $^{1}/_{4}$, $^{2}/_{4}$ and $^{3}/_{4}$ of a length, shape, set of objects or quantity
Reasoning		**What do you notice?** Choose a number of counters. Place them onto 2 plates so that	**What do you notice?** ¼ of 4 = 1 ¼ of 8 = 2

		there is the same number on each half. When can you do this and when can't you? What do you notice? **True or false?** Sharing 8 apples between 4 children means each child has 1 apple.	¼ of 12 = 3 Continue the pattern What do you notice? **True or false?** Half of 20cm = 5cm ¾ of 12cm = 9cm
Equivalence		• 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
Reasoning			**Odd one out**. Which is the odd one out in this trio: ½ 2/4 ¼ Why? **What do you notice?** Find ½ of 8. Find 2/4 of 8 What do you notice?
Measurement			
Comparing and	Children use everyday language to talk about size, weight, capacity, position, distance, time and money to	• compare, describe and solve practical problems for:	* compare and order lengths, mass, volume/capacity and

Estimating	<u>compare quantities and objects and to solve problems</u>. Children have experience of: • using gestures or words to start to compare amounts of continuous quantities (length, capacity, weight), pointing to items that are big, tall, full or heavy. • learning vocabulary from the adults around them: long, tall, high, heavy, full, etc. rather than just 'big' (At this point children may not be using comparative language such as, 'You are taller than me.'). • finding something that is longer/shorter or heavier/lighter than a given reference item, placing objects side by side to determine which is longer. • comparing sizes, lengths, weights and capacities verbally and begin to use more specific terms, such as 'taller than', 'heavier than', 'lighter than', and 'holds more than', as well as more general comparative phrases, such as 'not enough', 'too much', and 'a lot more'. • comparing lengths directly, children need to ensure that they align the starting points • When comparing capacities directly, children can pour from one container to another to find which holds more, or find one that is the same. • Comparing weight, to identify that greater mass is shown by a greater downward pull. • comparing different attributes in everyday situations: cutting a piece of ribbon as long as a child's arm and encouraging them to find things in the environment that are longer, shorter or the same length • focusing on asking for specific things according to their attributes. • comparing directly, finding the odd one out	* 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] • sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]	record the results using >, < and = compare and sequence intervals of time

	• children are presented with large, light things and small, heavy things, to prevent the overgeneralisation that big means heavy and small means light. Showing awareness of comparison in estimating		
Reasoning		**Top tips** How do you know that this (object) is heavier / longer / taller than this one? Explain how you know. **Explain thinking** Ask pupils to reason and make statements about to the order of daily routines in school e.g. daily timetable e.g. we go to PE **after** we go to lunch. Is this true or false?	**Top tips** Put these measurements in order starting with the smallest. 75 grammes 85 grammes 100 grammes Explain your thinking **Position the symbols** Place the correct symbol between the measurements > or < 36cm ▭ 63cm 130ml ▭ 103ml Explain your thinking **Undoing** The film finishes two hours after it starts. It finishes at 4.30. What time did it start? Draw the clock at the start and the finish of the film.
Measuring and Calculating	Children have experience of: • comparing attributes, they can begin to estimate and to predict • put things in order of height, weight or capacity. • children use units to 'measure' and compare. • In order to tell the time, children need a sense of	• measure and begin to record the following: * **lengths and heights** * **mass/weight** * **capacity and volume** * **time** (hours, minutes,	• choose and use appropriate standard units to estimate and measure **length/height** in any direction (m/cm); **mass** (kg/g);

	number, space and time, the ability to count, and some notion of fractions (for half and quarter hours). • sequencing of activities, important times in their day, and some sequences of time that are significant to them. • Vocabulary that supports the understanding of this concept including the positional language of 'before', 'after', 'next', and the relative terms 'yesterday' and 'tomorrow' • Knowing days of the week • using timers in play • see how many things they can do in a minute.	seconds**)** • recognise and know the value of different denominations of **coins and notes** • 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 use language relating to dates, including days of the week, weeks, months and years	**temperature** (°C); **capacity** (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels • 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 • 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.

Reasoning		**Application** (Can be practical) Which two pieces of string are the same length as this book? **Possibilities** Ella has two silver coins. How much money might she have?	**Application** (Practical) Draw two lines whose lengths differ by 4cm. **Possibilities** How many different ways can you make 63p using only 20p, 10p and 1p coins?
Geometry: Properties of shapes			
Identifying shapes and their properties	<u>They explore characteristics of everyday objects and shapes and use mathematical language to describe them.</u> Children have experience of: • Shape awareness: developing shape awareness through construction • Representing spatial relationships • 'in front of', 'behind', 'on top of' etc • Identifying similarities between shapes • Showing awareness of properties of shape • Describing properties of shape • Developing an awareness of relationships between shapes	• 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 • 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]
Reasoning		**What's the same, what's different?** Find a rectangle and a triangle in this set of shapes. Tell me one thing that's the same about them. Tell me one thing that is	**What's the same, what's different?** Pick up and look at these 3-D shapes. 

		different about them. **Visualising** Put some shapes in a bag. Find me a shape that has more than three edges.	Do they all have straight edges and flat faces? What is the same and what is different about these shapes? **Visualising** In your head picture a rectangle that is twice as long as it is wide. What could its measurements be?
Comparing and Classifying			• compare and sort common 2-D and 3-D shapes and everyday objects
		True or false? All 2-D shapes have at least 4 sides **Other possibilities** Can you find shapes that can go with the set with this label? "Have straight sides"	**Always, sometimes, never** Is it always, sometimes or nerver true that when you fold a square in half you get a rectangle. **Other possibilities** Can you find shapes that can go with the set with this label? "Have straight sides and all sides are the same length"
Geometry: Position and Direction			
Position, Direction and Movement	<u>They recognise, create and describe patterns.</u> Children have experience of: • Developing spatial awareness: experiencing different	• describe position, direction and movement, including half, quarter	• use mathematical vocabulary to describe position, direction and

	viewpoints • Developing spatial vocabulary • Shape awareness: developing shape awareness through construction • Representing spatial relationships- 'in front of', 'behind', 'on top of' etc	and three-quarter turns.	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 turns (clockwise and anti-clockwise)
Reasoning		**Working backwards** The shape below was turned three quarter of a full turn and ended up looking like this.  What did it look like when it started? (practical)	**Working backwards** If I face forwards and turn three quarter turns clockwise then a quarter turn anti-clockwise describe my finishing position.
Pattern	Children have experience of: • Continuing an AB pattern • Make their own AB pattern • Spotting an error in an AB pattern • Identifying the unit of repeat • Continuing an ABC pattern • Continuing a pattern which ends mid-unit • Make their own ABB, ABBC patterns • Spotting an error in an ABB pattern • Symbolising the unit structure e.g. a red dot for the red dinosaur • Generalising structures to another context or mode e.g. describe what comes next, what is the rule, create it using different objects • Making a pattern which repeats around a circle		• order and arrange combinations of mathematical objects in patterns and sequences

	• Making a pattern around a border with a fixed number of spaces • Pattern-spotting around us		
Reasoning			**What comes next?**  **Explain why**
Statistics			
Interpreting, Constructing and Presenting Data			• 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 categorical data
Reasoning			**True or false?** (Looking at a simple pictogram) "More people travel to work in a car than on a bicycle". **Is this true or false?** **Convince me.** Make up you own 'true/false' statement about the pictogram **What's the same, what's different?**

			Pupils identify similarities and differences between different representations and explain them to each other **Create a questions** Pupils ask (and answer) questions about different statistical representations using key vocabulary relevant to the objectives.
Algebra			
Equations		• *solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and **missing number problems** such as 7 = □ - 9 (copied from Addition and Subtraction)* • *represent and use number bonds and related subtraction facts within 20 (copied from Addition and Subtraction)*	• *recognise and use the inverse relationship between addition and subtraction and use this to check calculations and **missing number problems.** (copied from Addition and Subtraction)* • *recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 (copied from Addition and Subtraction)*

Reasoning		**Connected Calculations** 11 = 3 + 8 12 = 4 + 8 13 = ☐ + 8 14 = ☐ + 8 What numbers go in the boxes? Can you continue this sequence of calculations?	**Connected Calculations** Put the numbers 19, 15 and 4 in the boxes to make the number sentences correct. ☐ = ☐ - ☐ ☐ = ☐ + ☐
Sequences		• *sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening* (copied from Measurement)	• *compare and sequence intervals of time* (copied from Measurement) • *order and arrange combinations of mathematical objects in patterns* (copied from Geometry: position and direction)
Reasoning		•	**True or false?** Explain The largest three digit number that can be made from the digits 2, 4 and 6 is 264. Is this true or false? Explain your thinking.