



KS1 Maths Calculations Framework



Progression of Methods for Addition, Subtraction, Multiplication and Division

This framework has been designed with the National Curriculum Aims at its core. The aims are 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.

Each of the four operations (addition, subtraction, multiplication and division) build on a solid understanding of number and place value. Children will learn through practical and hands-on experiences using **concrete** resources (counters, cubes, tens and ones, numicon) before progressing onto their own **pictorial** (maths pictures) and **abstract** representations.

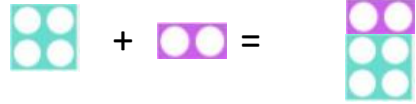
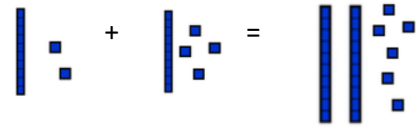
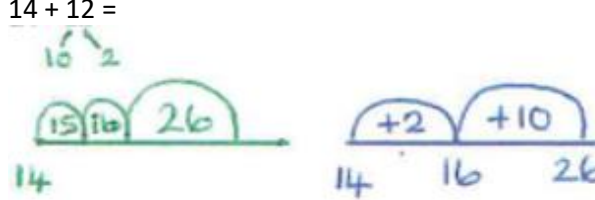
Children will need to:

- use correct vocabulary to be able to verbalise their calculation strategies.
- make considered decisions to choose the most appropriate, fluent, efficient and accurate method to do a particular calculation.
- progress between the stages at their own pace working towards formal written methods. Previous stages may need to be revisited or used alongside new methods/strategies to consolidate understanding.

As new methods of calculations are introduced, children should have the opportunity to examine them, alongside the method they have consolidated, to make connections between the methods and establish the similarities and differences between them

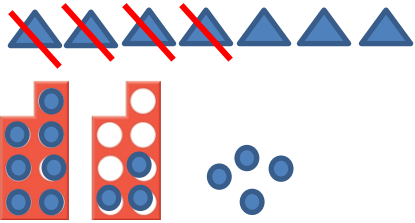
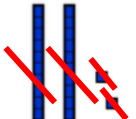
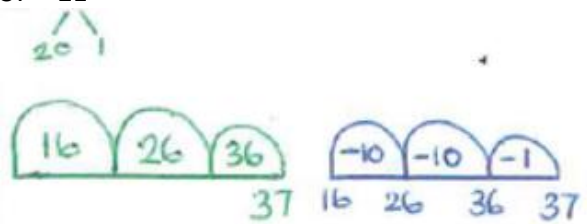
KS1 - ADDITION

Vocabulary: Add, plus, more, equal (balanced/the same), count on, total, altogether, part-part whole, number sentence, representation, represent, maths pictures (for the children's own representations) number bonds, partition, tens and ones, number line, tens or one jump, fact family, inverse

Year Group	Progression and Vocabulary	What it looks like....	Further guidance
Reception and Year 1	Children are taught to use a range of manipulatives including everyday objects, counters, cubes, coins, Numicon, tens and ones to combine to find a total.	$4 + 2 = 6$  	Ensure that children understand that you are joining two sets of objects to find out how many altogether. Children may begin to understand that addition is commutative (can be added in any order and the answer will still be the same).
Year 2	Children are taught to use tens and ones visuals to support their understanding of place value when adding with 2-digit numbers. Children then draw their own representations (maths pictures) of tens and ones.	$12 + 14 = 26$ 	Some children will continue to use this method throughout Yr2.
	Children move onto learning how to formally record their work using number lines. Manipulatives are used alongside this formal written method. They are taught to add the ones first to prepare them for column addition in KS2.	Adding three 1-digit numbers: $4 + 2 + 3 =$  Adding TO + O: $14 + 5 =$  Adding TO + TO $14 + 12 =$ 	Children will know that the answer will be larger. Children will understand that addition is commutative (can be added in any order and the answer will still be the same). $4 + 2 = 6$ or $2 + 4 = 6$ Children must have secure knowledge of place value and be able to confidently partition the tens and ones. ← (Green examples show how children's recordings will begin. Blue examples is how they should be recording by the end of the year).

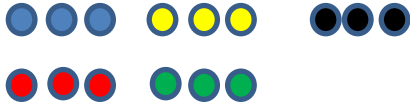
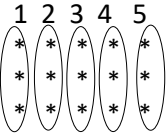
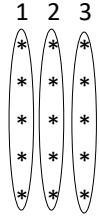
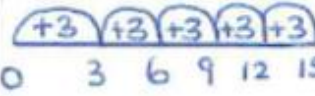
KS1 - SUBTRACTION

Vocabulary: take away, subtract, less, equal (balanced/the same), left, difference, count on/back, part-part whole, number sentence, representation, represent, partition, maths pictures (for the children's own representations), tens and ones, exchange, number line, tens or ones jump, fact family, inverse

Year Group	Progression	What it looks like....	Further guidance
Reception and Year 1	Children are taught to subtract by taking away from a range of manipulatives including everyday objects, counters, cubes, coins, Numicon, tens and ones.	$7 - 4 = 3$ 	Children understand that the answer becomes smaller. Children may begin to understand that subtraction is not commutative. The larger number must go first.
Year 2	Children are taught to use tens and ones visuals to support their understanding of place value when subtracting with 2-digit numbers. Children then draw their own representations (maths pictures) of tens and ones.	$14 - 12 = 2$  Exchanging: <i>There are not enough ones in the first number to subtract so you must exchange 1 ten for 10 ones.</i> $22 - 17 =$ 	Some children will continue to use this method throughout Yr2.
	Children move onto learning how to formally record their work by counting back on a number line. Manipulatives are used alongside this formal written method. Children will also be taught to count on the find the difference if the numbers are close together (eg. $17 - 15$). <i>They are taught to take away the ones first to prepare them for column subtraction in KS2.</i>	Subtracting 1-digit numbers: $7 - 4 =$  Subtracting TO - O: $17 - 4 =$  Subtracting TO - TO: $37 - 21 =$ 	Children will know that the answer will be smaller. Children will understand that subtraction is not commutative. The larger number must go first. Children must have secure knowledge of place value and be able to confidently partition the tens and ones. ← (Green examples show how children's recordings will begin. Blue examples is how they should be recording by the end of the year).

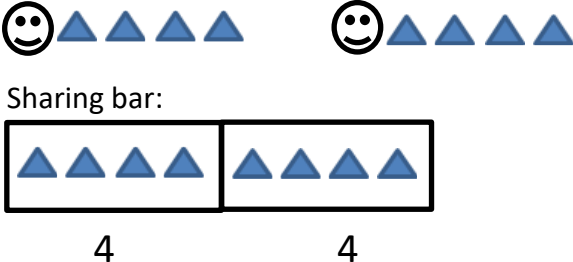
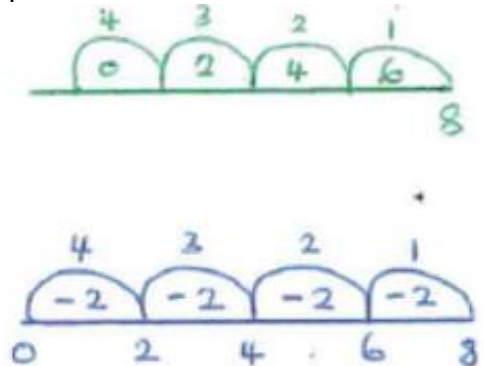
KS1 - MULTIPLICATION

Vocabulary: groups of, lots of, multiply, times, double, arrays, repeated addition, number line, representation, represent, maths pictures (for the children's own representations), equal, number or fact family, fact family, inverse

Year Group	Progression	What it looks like....	Further guidance
Reception and Year 1	Children are taught to multiply by using repeated addition followed by grouping using a range of manipulatives including everyday objects, counters, Numicon and coins. They will begin to draw their own representations (maths pictures). Children are taught to count in 2s, 5s and 10s.	There are 5 dogs. They all have 3 balls. How balls altogether?  $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$	Children understand that the answer becomes larger. Children will understand that all groups must be equal. Children are NOT formally introduced to the multiplication symbol (x). Learning is practical and within context.
Year 2	Children move onto learning how to formally record their work by using arrays and repeated addition on a number line. Manipulatives are used alongside this formal written method. Children are taught the 2x, 5x, 10x and 3x tables. <i>Children will use arrays and repeated addition in Year 2 (often independently choosing the method they prefer).</i>	$5 \times 3 =$ (5 groups of 3 or 3 groups of 5) Arrays:  1 2 3 4 5 3 6 9 12 15 $3 \times 5 = 15$  1 2 3 5 10 15 $5 \times 3 = 15$ Repeated Addition on a Number Line:    	Children understand that the answer becomes larger. Children will understand that multiplication is commutative (the numbers can go in any order and the answer will still be the same). $5 \times 3 = 15$ or $3 \times 5 = 15$ ← (Green examples show how children's recordings will begin. Blue examples is how they should be recording by the end of the year).

KS1 - DIVISION

Vocabulary: share, equal, divide, halve, repeated subtraction, number line, representation, represent, maths pictures (for the children's own representations), equal, fact family, inverse

Year Group	Progression	What it looks like....	Further guidance
Reception and Year 1	Children are taught to divide using repeated subtraction moving onto sharing into groups (which we call a sharing bar) using a range of manipulatives including everyday objects, counters, cubes, Numicon and coins. They will begin to draw their own representations (maths pictures).	Katie has 8 sweets and shares them with her friend. How many do they get each?  Sharing bar:  4  4	Children understand that the number becomes smaller. Children will understand that all groups must be equal. Children are NOT formally introduced to the division symbol ($\div$). Learning is practical and within context.
Year 2	Children move onto learning how to formally record their work by using repeated subtraction on a number line. Manipulatives are used alongside this formal written method. <i>Children will use the sharing bar and repeated subtraction in Year 2 (often independently choosing the method they prefer).</i>	$8 \div 2 =$ Repeated Subtraction on a Number Line: 	Children understand that the number becomes smaller. Children will understand that division is not commutative. The larger number must go first in the number sentence. ← (Green examples show how children's recordings will begin. Blue examples is how they should be recording by the end of the year).