

Calculation Methods



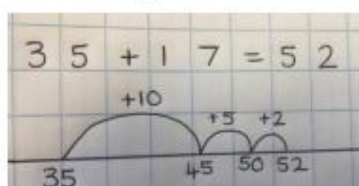
Year Two

ADDITION

National Curriculum Objectives: Addition objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
Solve problems with addition - Using concrete objects and pictorial representations, including those involving numbers, quantities and measures. - Apply their increasing knowledge of mental and written methods. Add numbers using concrete objects, pictorial representations and mentally: - Add two-digit numbers and ones. - Add two-digit numbers and tens. - Add two, two-digit numbers. - Add three one-digit numbers. - Recall and use addition facts up to 20 fluently and derive and use related facts up to 100. - Show that addition can be done in any order. - Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing box number problems.	- Count in steps of 2, 3 and 5 and count in tens from any number - Understand the place value of 2-digit numbers (tens, ones) - Compare and order numbers to 100 and use $<$, $>$ and $=$ signs. - Read and write numbers to at least 100 in numerals and words. - Identify, represent and estimate numbers using different representations, including the number line.	Addition, add, altogether, put together, sum, and, plus, total Equals, equal to, makes more than, less than, fewer, most, least, double <i>N.B: Same vocabulary as Year 1, to be consolidated and extended in different contexts.</i>

Children should:

- Have access to a wide range of practical resources and equipment, counting materials, models and images and should be given the opportunity to use these to support their understanding of mental and written methods at all stages.



- Spend time learning and practising mental methods for addition, starting with questions which do not cross boundaries and progressing to those that do. This will include exploring number and different ways to partition number, to support addition strategies as well as adding the nearest multiple of 10 and adjusting (e.g. to add 9, 19 etc.), using near doubles and partitioning and recombining.

Mental Methods: The children should be taught to use the following mental strategies, and to use jottings to support their methods:

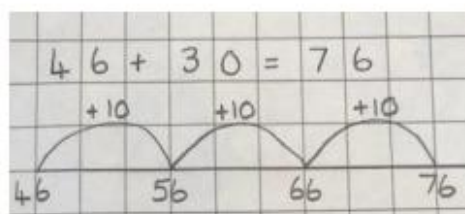
- Reordering numbers when adding
- Count on in tens or ones
- Using knowledge of pairs making 10 and place value
- Compensating: add 9, 19, 11 or 21 by rounding and adjusting
- Compensating: doubling and adjusting.
- Partitioning: Bridge through 10 when adding.
- Partition and combine multiples of tens and ones.
- Looking for number bonds/known facts when adding 3 one-digit numbers.

Steps for Written Methods:

All steps to be supported by concrete and pictorial, with a focus on Year 2 children becoming confident in using a blank number line as a jotting for their mental method as well as a pictorial representation to prepare them for more formal written methods in the future.

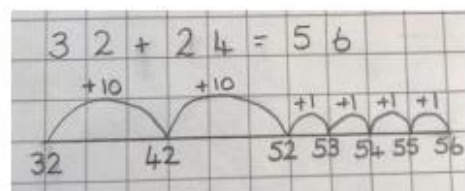
Step 1: Adding two, two-digit numbers and tens

Children build on their previous learning and progress from adding one-digit numbers to adding multiples of 10.



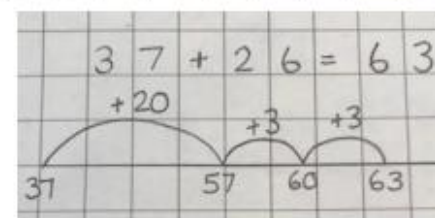
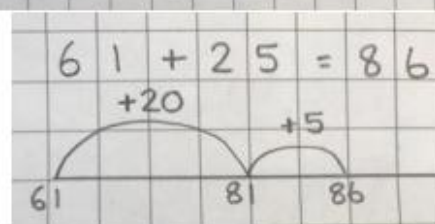
Step 2: Adding two, two-digit numbers

Once confident with the above, and using their ability to partition two-digit numbers into tens and ones, children add two two-digit numbers on a number line.



Step 3: Using number lines efficiently

When children are showing a secure understanding of the above steps, they should be taught to use number lines to calculate in the most efficient way. This will include partitioning numbers to bridge tens, as in the second example.



Step 4: Partitioned Column Method

Those children who are ready, may progress to a partitioned column method. Children to progress only when they have really mastered the previous steps and have shown understanding through their mental methods. Children to work with examples which do not cross boundaries first, before progressing (if they are ready) to those which do.



$$\begin{array}{r} 32 + 27 = \\ + 30 + 2 \\ \hline 20 + 7 \\ \hline 50 + 9 = 59 \end{array}$$

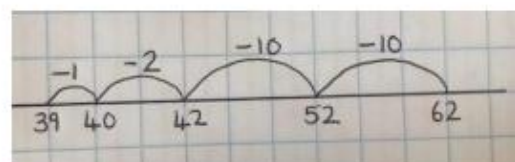
$$\begin{array}{r} 58 + 36 = \\ + 50 + 8 \\ \hline 30 + 6 \\ \hline 80 + 14 = 94 \end{array}$$

SUBTRACTION

National Curriculum Objectives: Subtraction objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
Solve problems with subtraction - Using concrete objects and pictorial representations, including those involving numbers, quantities and measures. - Apply their increasing knowledge of mental and written methods. Add numbers using concrete objects, pictorial representations and mentally: - Subtract two-digit numbers and ones. - Subtract two-digit numbers and tens. - Subtract two, two-digit numbers. - Recall and use subtraction facts within 20 fluently and derive and use related facts up to 100. - Show that subtraction cannot be done in any order. - Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing box number problems.	- Count in steps of 2, 3 and 5 and count in tens from any number - Understand the place value of 2-digit numbers (tens, ones) - Compare and order numbers to 100 and use $<$, $>$ and $=$ signs. - Read and write numbers to at least 100 in numerals and words. - Identify, represent and estimate numbers using different representations, including the number line.	Subtraction, subtract, take away, minus Halve, half, Difference, distance between Less, least, few, fewest <i>N.B: Same vocabulary as Year 1, to be consolidated and extended in different contexts.</i>

Children should:

- Continue to have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different contexts.
- Consolidate their understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. They should then use practical resources alongside pictures to make the link between concrete and pictorial representations.



- Read and write the subtraction ($-$) and equals ($=$) signs within number sentences. Specific learning should continue, through exploration of number and use of practical resources, around the equals sign, ensuring children understand it's role within a number sentence and that it does not always just indicate where the answer goes.

- Interpret addition number sentences and solve missing box problems, using concrete objects and number line subtraction to solve them: E.g $28 - 3 = \square$ $35 - \square = 21$ and $\square = 24 - 9$.
- Be introduced to finding the difference, continuing to develop understanding of this e.g. find the distance, how many more, how many less etc. Children to start to develop an understanding of the different methods that can be used for this (counting back, counting on) and when we might use each.

Mental Methods:

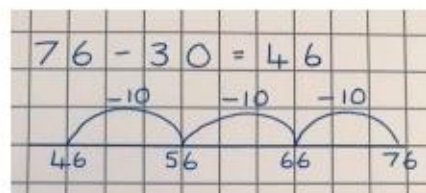
- Counting back in tens and ones.
- Subtract mentally a 'near multiple of 10' by subtracting and adjusting
- Subtract a small number by counting back.
- Find a small difference by counting up from the smaller to the larger number (on a number line)
- Recalling subtraction facts for numbers to 20 and using these to derive the related facts up to 100.
- Subtract by partitioning the second number and subtracting tens then ones.
- Use patterns of similar calculations.

Steps for Written Methods.

All steps to be supported by concrete and pictorial, with a focus on Year 2 children becoming confident in using a blank number line as a jotting for their mental method as well as a pictorial representation to prepare them for more formal written methods in the future.

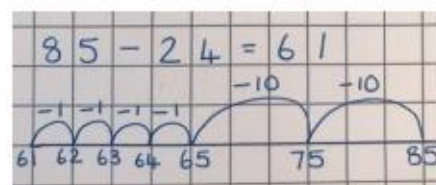
Step 1: Subtracting two-digit numbers and tens.

Children build on their previous learning and progress from subtracting one-digit numbers to subtracting multiples of 10.



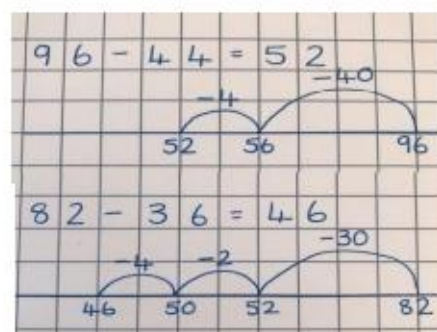
Step 2: Subtracting two, two-digit numbers.

Once confident with the above, and using their ability to partition two-digit numbers into tens and ones, children subtract a two-digit number from a larger two-digit number on a number line.



Step 3: More efficient methods for subtraction.

When children are showing a secure understanding of the above steps, they should be taught to use number lines to calculate in the most efficient way. This will include partitioning numbers to bridge tens, as in the second example.



MULTIPLICATION

National Curriculum Objectives: Multiplication objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Recall and use multiplication facts for the 2, 5 and 10 times tables. - Calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication signs and equals signs. - Show that the multiplication of two numbers can be done in any order. - Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in context.	- Recognise odd and even numbers. - Count in steps of 2,3 and 5 from zero and in 10s from any number.	<i>Year 1 vocab plus</i> Array, multiplied by, repeated addition, Two times, three times, five times, ten times

Children should:

- Develop their understanding of multiplication through the use of practical resources and pictorial representations.
- Multiply using arrays and repeated addition.

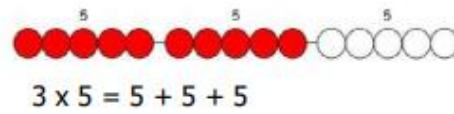
Mental Methods:

- Counting in twos, fives and tens
- Repeated addition
- Use of arrays
- Children should recall multiplication facts for the 2, 5 and 10 times tables through practising counting and understanding of the operation and number patterns.
- Using doubling and understanding that this is the same as multiplying by 2.
- Reordering a calculation, knowing that multiplication can be done in any order.

Written Methods:

Step 1: Practical Apparatus

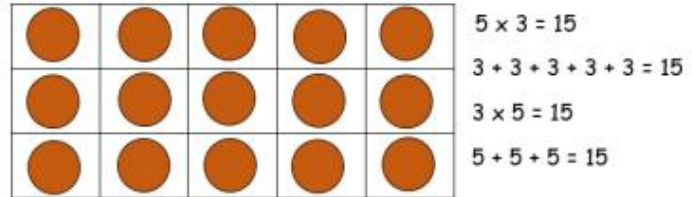
Children continue to explore multiplication through use of real-life problems using a range of practical equipment.



Step 2: Arrays

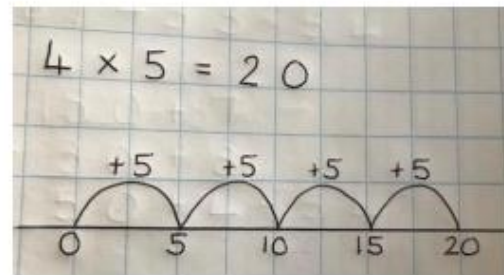
Use arrays to help teach the children that multiplication can be done in any order and explore examples such as

$$3 \times \dots = 6$$



Step 3: Repeated Addition on a number line.

Children start from 0 and make equal jumps on a number line in order to work out multiplication facts and write multiplication statements using X and = symbols.



DIVISION

National Curriculum Objectives: Division objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Recall and use division facts for the 2, 5 and 10 times tables. - Calculate mathematical statements for division within the multiplication tables and write them using the multiplication signs and equals signs. - Show that the division of two numbers cannot be done in any order. - Solve problems involving division, using materials, arrays, repeated addition, mental methods and multiplication facts, including problems in context.	Counting in 2s, 5s, 10s and 3s.	<i>Year 1 vocabulary plus:</i> Division, divided by, shared by, Grouping, sharing, left, left over

Children should:

- Have plenty of opportunities to use objects, arrays and pictorial representations to group and share.
- Develop their understanding of the divide and equals signs through recording their practical activities and exploration.

Mental Methods:

- Counting in 2s, 5s, 10s and 3s
- Links to arrays
- Recalling the division facts for the 2, 5 and 10 times tables
- Using knowledge that halving is the inverse of doubling and the same as dividing by 2.
- Use known facts and place value to divide.

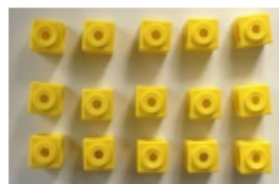
Written Methods:

Step 1: Understanding Arrays and the link between multiplication and division Children

should be taught to interpret arrays and use these to understand the link between multiplication and division. For example, by being able to generate the 4 linked multiplication and division sentences.

Eg $15 \div 3 = 5$ $5 \times 3 = 15$

$15 \div 5 = 3$ $3 \times 5 = 15$



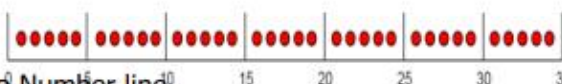
Step 2: Practical problem solving with a focus on recognising grouping and sharing.

Children should be given the opportunity to recap their practical work on sharing and grouping, with a focus on understanding the difference and being taught to recognise whether problems involve grouping or sharing.

Children can use pictures or shapes to divide quantities and start to record the division number sentence alongside these.

Children to experience grouping in various different contexts, to ensure they are confident with the concept before looking at grouping using a number line.

Sam has 20 sweets, which she shares equally between 5 friends. How many will each friend get?



Step 3: Subtracting groups of a number, using a Number line

Children use a number line, by jumping back equal amounts from 12 to find out for example, how many groups of 3 there are in 12, as a response to questions such as: A toy costs £3, how many toys can I buy with £12?

