

Calculation Methods



Year Four

ADDITION

National Curriculum Objectives: Addition objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Add numbers with up to 4 digits using the formal methods of columnar addition where appropriate. - Estimate and use the inverse operations to check answers to a calculation. - Solve two-step addition problems in contexts, deciding which operations to use and why.	- Find 1,000 more than a given number. - Recognise the place value of each digit in a four-digit number. - Identify, represent and estimate numbers using different representations. - Compare and order numbers beyond 1000.	<i>All previously taught vocabulary, plus:</i> Inverse, operation, opposite, increase

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.
- Be given time to extend their previous work on adding multiples of 10 and 100 to adding 1000s too.
- Spend time learning and practising mental methods for addition. This will include exploring number and different ways to partition number, to support addition strategies as well as adding the nearest multiple of 10, 100 and 1000 and adjusting (e.g. to add 9, 49, 99 999 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, where appropriate:

- Count in steps of thousands, hundreds, tens and ones.
- Reorder numbers in a calculation
- Add 3 or 4 small numbers
- Partition: adding the most significant digit first
- Compensating: doubling and adjusting
- Compensating: Adding the nearest multiple of 10 or 100 and then adjust
- Using knowledge of place value and related calculations e.g. working out $150 + 140 = 290$ by using $15 + 14 = 29$.

Written Methods:

Recap the children's understanding of Year 3 calculation strategy, moving to the compact column method adding the ones first and carrying numbers underneath the calculation.



$$\begin{array}{r} 3721 \\ + 498 \\ \hline 4219 \\ \text{1 1} \end{array}$$

Ensure correct use of vocabulary throughout. E.g. we are adding 5 hundreds and 3 hundreds, not 5 add 3 for example.

Teach children to apply their use of the column methods to decimal numbers.



$$\begin{array}{r} £24.32 \\ £12.84 \\ £37.16 \\ \hline \end{array}$$

The decimal point should be aligned in the same way as the other place value columns and must be in the same column in the answer.

Apply column method to money and measurement values.

SUBTRACTION

National Curriculum Objectives: Subtraction objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Subtract numbers with up to 4 digits using the formal methods of columnar addition where appropriate. - Estimate and use the inverse operations to check answers to a calculation. - Solve two-step addition problems in contexts, deciding which operations to use and why.	- Find 1,000 more than a given number. - Recognise the place value of each digit in a four-digit number. - Identify, represent and estimate numbers using different representations.	<i>All previously taught vocabulary, plus</i> Reverse, backwards, remove, decrease, inverse

Children should:

- Continue to use concrete and pictorial resources to build their understanding as they apply their previous learning to subtracting four-digit numbers.
- Be given the opportunity to explore and use different written and mental strategies in a range of contexts, discussing how effective the strategies are and why. Children should start to select the most effective strategies.
- Continue to develop their understanding of finding the difference, choosing the most appropriate strategies to do so.

Mental Methods

- Counting on and back in thousands, hundreds, tens, ones.
- Use known facts and place value to subtract
- Counting on to subtract when the numbers are close together.
- Find a different by counting up through the next multiple of 10, 100 and 1,000
- Compensating: Subtracting the nearest multiple of 1, 10, 100 or 1,000 and adjust

Written Methods:

Step 1:

Return to the expanded column method and use practical resources and pictures to reinforce previous learning and extend to subtracting four-digit numbers.



$$3652 - 1565 = 2087$$

Step 2:

Compact column subtraction.
Ensure children have the opportunity to apply this method to a variety of different contexts, including money and measures.



$$\begin{array}{r} 3882 \\ - 1565 \\ \hline 2087 \end{array}$$

Ensure children have experience of using this method for subtraction where there is a 0 in the column they need to exchange from, and that they understand, through clear modelling (using practical resources) how to move to the next column and exchange then 'move' the value along.

	2	9		
	~~8~~	~~0~~	4	7
-	1	2	6	5
	1	7	8	2

MULTIPLICATION

National Curriculum Objectives: Multiplication objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Recall multiplication facts for multiplication tables up to 12 X 12. - Use place value, known and derived number facts to multiply mentally including multiplying by 0 and 1. - Multiply 3 numbers together - Multiply two-digit and three-digit numbers by a one-digit number using formal written layout. - Solve problems involving multiplication	Count in multiples of 6, 7, and 9	<i>All previous vocabulary, plus:</i> inverse

Children should:

- Be taught specifically, through exploration of place value, to multiply by 10, 100 and 1,000. Children should be confident in discussing the place value of each digit and how these change.
- Have the opportunity to apply their known number facts to solve other calculations. E.g. if $7 + 4 = 11$, then $70 + 40 =$, $700 + 400 =$ etc.
- Be given the opportunity to consolidate and practise their previous learning on multiplication before new content is introduced.
- Be practising their recall of their previously learnt times tables (2,5,10,3,4 and 8) from the start of year 4, before any new times tables are introduced.
- Be given regular opportunity to approximate before they calculate and use this to check the accuracy of their calculations.

Mental Methods:

- Counting in 6s, 7s, 9s, 25s and 100s
- Recall previously learnt multiplication facts with increasing confidence (2, 5, 10, 3, 4 and 8 times tables).
- Recall multiplication facts for the 6,7,9, 11 and 12 times tables.
- Partitioning: multiplying hundreds, tens and ones separately and then recombining.
- Using understanding of when a number is multiplied by 10, 100 or 1,000.
- Using knowledge of number facts and place value e.g. $7 \times 8 = 56$ to find 70×8 , 7×80 etc.

Written Methods:

Step 1: Grid method for multiplying two and three-digit numbers by a one-digit number.

Recap previous multiplication using the grid method and extend this to multiplying two-digit and three-digit numbers by a one-digit number. Track back for any children who are not confident.



$$125 \times 6 = 750$$

X	1	0	0	2	0	5
6	6	0	0	1	2	0
	6	0	0			
				1	2	0
						3
						0
						7
						5
						0

Step 2: Short multiplication for multiplying by a one-digit number.

Pupils can be asked to work out a calculation using the grid method, and then compare to 'your' column method. What are the similarities and differences? Unpick the steps together and show how it reduces the steps.



X	3	0	0	4	0	7
3	9	0	0	1	2	0
						2
						1
						0
						4
						1
						2
						3

Children start by completing a short multiplication method alongside the grid method until they are secure and able to see and understand the links between the two.

DIVISION

National Curriculum Objectives: Division objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Recall division facts for multiplication tables up to 12X12 - Use place value, known and derived facts to divide mentally- including dividing by 1. - Recognise and use factor pairs and commutativity in mental calculations.	Counting in 6s, 7s, 9s, 25s and 1000s	Previous vocabulary, plus: Divisible by, factor

Children should:

- Continue to develop their understanding of division and extend their previous learning to dividing 3-digit numbers by a single digit.
- Be given a wide variety of real-life contexts to work with and problem solve to help develop a secure understanding of division and how to apply it to problems.

Mental Methods:

- Counting in 6s, 7s, 9s, 25s and 1000s.
- Recall division facts for all the times tables, up to 12×12
- Use understanding of place value and what happens to the value of each digit when it is divided by 10, 100 or 1,000.
- Use known facts and place value to solve calculations and to become more efficient in mental calculations e.g. $92 \div 4$ by taking away 4 lots of 20, to be left with 12, then taking away 3×4 to get the answer of 23.
- Use related facts to divide
- Use factor pairs to divide
- Scaling down using known facts
- Use the relationship between multiplication and division

Written Methods: Dividing numbers with up to 3-digits by a one-digit number.

Children move into dividing numbers with up to 3 digits by a one-digit number in a wide range of contexts. At this stage this will not include calculations which result in a final answer with a remainder. However, this could be taught as an extension for children who have exceeded this objective (see Year 5).



$$\begin{array}{r} 159 \\ 6 \overline{)954} \end{array}$$

Where the answer to the first column is 0, children should initially write 0 above to acknowledge this, then carry to number over to the next digit as a remainder.



$$\begin{array}{r} 036 \\ 5 \overline{)180} \end{array}$$