

Calculation Methods



Year Five

ADDITION

National Curriculum Objectives: Addition objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Add whole numbers with more than 4 digits, including using formal written methods (columnar addition). - Add increasingly large numbers mentally. - Solve addition multi-step problems in contexts, deciding which operations and methods to use and why.	- Read, write and compare numbers to at least 1,000,000 and determine the value of each digit. - Count forwards in steps of powers of ten for any given number up to 1,000,000.	<i>All previously taught vocabulary, plus</i> Tenths, hundredths, thousandths, decimal places, decimal point

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. 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; partitioning and recombining; inverse and using number bonds.

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

- Counting on in steps of 0.1, 1, 10, 100 or 1,000
- Reorder the numbers in a calculation
- Partitioning, adding the most significant digit first
- Compensating: Add a multiple of 10, 100 or 1,000 and adjust.
- Compensating: Double and adjust.
- Use knowledge of place value and related calculations e.g. $6.3 + 4.8$ using $63 + 48$

Written Methods:

To include money, measures and decimals with different numbers of decimal places.

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



£	2	4	·	3	2
£	1	2	·	8	4
£	3	7	·	1	6
		1			

Numbers should exceed 4 digits.


$$\begin{array}{r} 23438 \\ + \quad 2725 \\ \hline 26163 \\ \quad \quad 1 \quad \quad 1 \end{array}$$

Pupils should be able to add more than two values, carefully aligning place value columns.

Children should understand the place value of tenths and hundredths and use this to align numbers with different numbers of decimal places.


$$\begin{array}{r} 19.01 \\ + 3.82 \\ \hline 23.43 \end{array}$$

Empty decimal places should be filled with zero to show the place value of the column.

Ensure correct vocabulary is used throughout.
E.g. 6 tenths and 7 tenths equals 13 tenths.

SUBTRACTION

National Curriculum Objectives: Subtraction objectives from Addition and Subtraction Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
- Subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction). - Subtract increasingly large numbers mentally. - Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	- Read, write and compare numbers to at least 1,000,000 and determine the value of each digit. - Count backwards in steps of powers of ten for any given number up to 1,000,000.	<i>All previously taught vocabulary, plus</i> Tenths, hundredths, decimal, decimal point

Children should:

- Continue to be given the opportunity to work with practical resources and pictorial representations in order to consolidate and extend their understanding of the maths which underpins the methods. They should be interpreting pictorial representations as part of their varied fluency, reasoning and problem solving.
- Be becoming, through regular practise, discussion and modelling, more independent in their ability to select the most efficient methods. They should be given regular opportunities to solve the same problem in several different ways and discuss their findings (this includes finding the difference).

Mental Methods:

- Counting back steps of 0.1, 1, 10, 100 or 1000
- Use known facts and place value to subtract
- Find a difference by counting on through the next multiple of 10, 100 or 1,000
- Subtract by counting up from the smaller to the larger number where this is the most efficient method
- Subtract the nearest multiple of 1, 10 or 100 then adjust
- Use knowledge of place value and related calculations e.g. $4.5 - 3.6$ using $45 - 36$
- Use the relationship between addition and subtraction

Written Methods: Compact Column Subtraction

Children use this method to subtract increasingly large and complex numbers, in a range of contexts.

Those children who are not ready for this, should become confident with the expanded column method first.



	2		7		
	6	~~8~~	2	~~8~~	1
-		2	3	7	6
	6	0	9	0	5

Children should be taught to use this method to subtract decimals, including mixtures of whole numbers and decimals, ensuring they align the decimal point correctly.

Children should be taught to add a zero in any empty decimal places to aid understanding of what to subtract in that column.



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

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		5		
	~~8~~	~~0~~	~~6~~		0		4
-	2	6	8		3		2
	0	3	7		7		2

Children to have lots of opportunities for subtracting and finding the differences with money and measures.

MULTIPLICATION

National Curriculum Objectives: Multiplication objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives (Place Value)	Key Vocabulary
• Multiply numbers up to 4 digits by a one-digit or two-digit number including long multiplication for multiplying by two-digit numbers. • Identify multiples and factors • Multiply mentally, drawing upon known facts. • Multiply whole numbers and those involving decimals by 10, 100 and 1,000. • Recognise and use square and cube numbers. • Solve problems using the 4 operations, and a combination of these, including understanding the meaning of the equals sign. • Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.	• Count forwards in steps of powers of 10 for any given number up to 1,000,000.	<i>All previous vocabulary, plus:</i> Square number, cube number integer, short multiplication, long multiplication

Children should:

- Now be able to recall the multiplication facts for ALL their times tables up to 12 X 12. Children need to be given regular opportunities to increase their speed and confidence with this, as well as apply these facts to other calculations.
- 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 regular opportunity to approximate before they calculate and use this to check the accuracy of their calculations.

Mental Methods:

- Counting in steps of powers of 10
- Use commutativity and tables to multiply
- Use known facts and place value to multiply
- Use related facts to multiply
- Scaling up using known facts to multiply
- Recall of all times tables up to 12 X 12
- Using times table facts to recognise and use square and cube numbers.

- Use understanding of multiplying by 10, 100 or 1,00 and how the digits change in their place value.
- Use the relationship between multiplication and division.

Written Methods:

Step 1: Short multiplication for multiplying by a one-digit number

Children use this method to multiply four-digit numbers by a one-digit number, in a range of contexts and units.



Step 2: Introduce long multiplication for multiplying by two-digits.

The grid method can be used to introduce long multiplication as this method not only shows each row clearly but will be a familiar method to the children.

Children when multiplying by the tens number, children should be taught to put the '0' in the ones column then think

'1 times 8, 1 times 1' etc., as long as they understand the place value involved.



x	10	9
10	100	90
4	40	36

x	1000	300	50	7
10	10000	3000	500	70

DIVISION

National Curriculum Objectives: Division objectives from Multiplication and Division Strand	Key Skills/ other linked NC Objectives	Key Vocabulary
- Divide numbers mentally, drawing upon known facts. - Divide numbers up to 4 digits by a one-digit number using short division and interpret remainders appropriately for the context. - Divide whole number and those involving decimals by 10, 100 and 1,000. - Solve problems using division and a combination of the four operations.	- Identifying all factor pairs of a number and common factors of 2 numbers. - Know and use vocabulary of prime numbers, prime factors and composite (non-prime) numbers. - Establish whether a number up to 100 is prime and recall prime numbers up to 19.	<i>Previous vocabulary, plus:</i> Quotient, prime number, prime factors, common factor, composite (non- prime) number

Children should:

- Be given the opportunity to continue to explore division in an increasingly wide range of real-life problems.
- They should consolidate and extend their use of short division, to include those calculations with remainders in their final answers.
- Significant time and teaching should be spend considering the meaning of those remainders and how they should be presented and interpreted, as this will enable children to have a more secure understanding in preparation for more complex problem solving in Year 6.

Mental Methods:

- Counting in steps of powers of 10.
- Recall division facts for all the times tables, up to 12X12
- 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.
- Use related facts to divide
- Use factor pairs to divide
- Scaling down using known facts
- Use knowledge of division facts e.g. when carrying out a division to find a remainder.
- Use the relationship between multiplication and division.

Step 1: Short division with no remainder in the final answer.



3	4	0	8	÷	6	=
	0	5	6	8		
6	3	4	0	8		

$$\begin{array}{r} 0456 \\ 6 \overline{) 2^2 7^3 3^3 9} \end{array} \quad r \ 3$$
$$= 456 \frac{3}{6} \quad \text{or} \quad 456 \frac{1}{2}$$
$$\begin{array}{r} 0456.5 \\ 6 \overline{) 2^2 7^3 3^3 9.0} \end{array}$$