

## About our calculation policy

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. Please note that early learning in number and calculation in Reception follows the 'Development Matters' EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

### Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, however it is vital that pupils are taught according to the stage that they are currently working at, being moved onto the next level when they are ready or working at a lower stage until they are secure enough to move on.

### Providing a context for calculation

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

### Choosing a calculation method

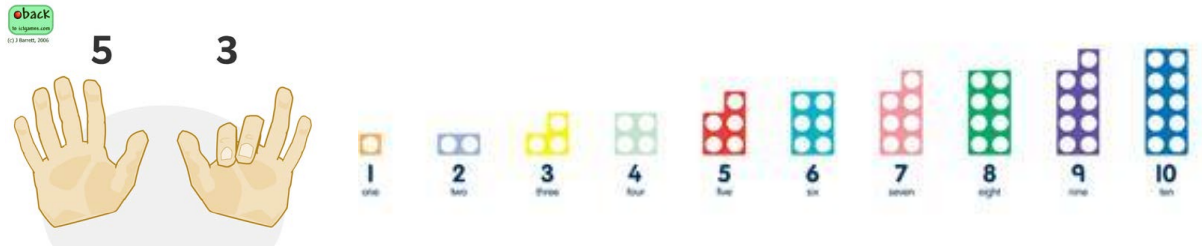
Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved...

Can I do it in my head?

Could I use some jottings to help me?

Should I use a written method to work it out?

**Early Years** Add with numbers up to 20 combining two sets of objects into one group (5 cubes and 3 cubes)



## Key skills for addition in **Early Years**:

- Recognise numerals 1 to 20 and place them in order.
- Count reliably up to 20 objects by saying one number name for each item.
- Count actions or objects which cannot be moved.
- Counts out objects from a larger group.
- Estimate how many objects they can see and check by counting.
- Find the total number of items in two groups by counting all of them.
- Says the number that is one more than a given number using fingers, number lines and objects.
- Record, using marks and pictures that they can interpret and explain.
- Solve problems, including doubling, e.g. 'You have 2 grapes, how many do you have when I give you 2 more?'

Vocabulary: **add, more, too many, not enough, enough, total, altogether, double, twice, count on, number line**

# Addition

**Year 1 Add with numbers up to 20** Moving from adding on (aggregation) to combining sets (augmentation)

Use numbered number lines to add, by counting on in ones. Encourage children to start with the larger number and count on.

+1 +1 +1



**Key skills for addition at Y1:**

- Read and write words and numbers to 100
- Recall bonds to 10 and 20, and addition facts to 20
- Count to and across 100
- Count in multiples of 1 2, 5 and 10
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them:  $8 + 3 = \square$   $15 + 4 = \square$
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.



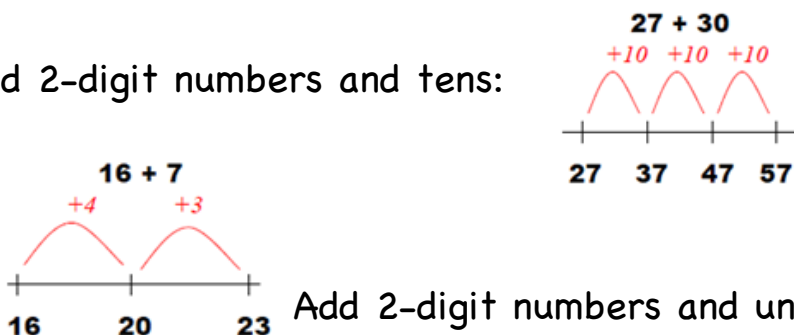
Vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

# Addition

## Year 2 Add with 2-digit numbers Developing mental fluency with addition and place value involving 2-digit numbers, then establish more formal methods.

Use empty number lines, concrete equipment, hundred squares etc. to build confidence and fluency in mental addition skills

Add 2-digit numbers and tens:



Add 2-digit numbers and units:

5	0	+	8	
4	0	+	3	
9	0	+	1	
				= 101

Add pairs of 2-digit numbers, moving to the partitioned column method when secure adding tens and units:

### Key skills for addition at Y2:

- Add a 2-digit number and ones (e.g.  $27 + 6$ )
- Add a 2-digit number and tens (e.g.  $23 + 40$ )
- Add pairs of 2-digit numbers (e.g.  $35 + 47$ )
- Add three single-digit numbers (e.g.  $5 + 9 + 7$ )
- Show that adding can be done in any order (the commutative law).
- Recall number bonds to 20 and bonds of tens to 100
- Count in steps of 2, 3, 5 and tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using  $<$   $>$  and  $=$  signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers,

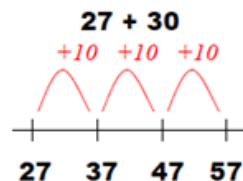
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

2	0	+	3	
+	3	0	+	4
	5	0	+	7
				= 57

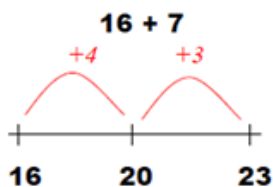
# Addition

## Year 2 Advice for staff

**STEP 1:** Only provide examples that do NOT cross the tens boundary until they are secure with the method itself.



**STEP 2:** Once children can add a multiple of ten to a 2-digit number mentally (e.g. 80+11), they are ready for adding pairs of 2-digit numbers that DO cross the tens boundary (e.g. 58 + 43).



**STEP 3:** Children who are confident and accurate with this stage should move onto the expanded addition methods with 2 and 3-digit numbers (see Y3).

5	0	+	8	
4	0	+	3	
9	0	+	1	
			=	10

To support understanding, pupils may physically make and carry out the calculation with Dienes Base 10 apparatus or place value counters, then compare their practical version to the written form, to help them to build an understanding of it.

# Addition

## Year 3 Add numbers with up to 3-digits

Introducing the expanded column addition method:

	2	3	6
+		7	3
<hr/>			
			9
	1	0	0
	2	0	0
<hr/>			
	3	0	9

### Key skills for addition at Y3:

In their head:

- Add 2-digit numbers mentally, incl. those exceeding 100.
- Add a three-digit number and ones mentally ( $175 + 8$ )
- Add a three-digit number and tens mentally ( $249 + 50$ )
- Add a three-digit number and hundreds mentally ( $381 + 400$ )
- Estimate answers to calculations, using inverse to check answers.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.)

On paper:

- Read and write numbers to 1000 in numerals and words.
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact

# Addition

## Year 3 Advice for staff

Add the units first, in preparation for the compact method.

In order to carry out this method of addition:

- Children need to recognise the value of the hundreds, tens and units without recording the partitioning.
- Pupils need to be able to add in columns. Move to the compact column addition method, with 'carrying'

	2	3	6
+		7	3
			9
	1	0	0
	2	0	0
	3	0	9

Children who are very secure and confident with 3-digit expanded column addition should be moved onto the compact column addition method, being introduced to carrying for the first time. Compare the expanded method to the compact column method to develop an understanding of the process and the reduced number of steps involved.

- Add units first
- Carry numbers underneath the bottom line.
- Remind pupils the actual value is three tens

## Year 4 Add numbers with up to 4 digits

Move from expanded addition to the compact column method, adding units first, and carrying numbers underneath the calculation. Also include money and measures contexts. e.g.  $3517 + 396 = 3913$

	3	5	1	7
+		3	9	6
	3	9	1	3

- Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hundreds, not 5 add 3, for example.
- Use and apply this method to money and measurement values.

### Key skills for addition at Y4:

In their head:

- Select most appropriate method: mental, jottings or written.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use subtraction to check answers.
- Find 1000 more or less than a given number.
- Continue to practise number bonds, adding the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.
- Estimate and use subtraction to check answers.

On paper:

- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, carry, expanded, compact, thousands, hundreds, digits, inverse



# Addition

## Year 4 Advice for staff

Introduce the compact column addition method by asking children to add the two given numbers together using the method that they are familiar with (expanded column addition—see Y3). Teacher models the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.

	3	5	1	7
+		3	9	6
	3	9	1	3

- Add units first
- Carry numbers underneath the bottom line.
- Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hundreds, not 5 add 3, for example.

## Year 5 Add numbers with more than 4 digits including money, measures and decimals with different numbers of decimal

$$\begin{array}{r} \text{£ } 23.59 \\ + \text{£ } 7.55 \\ \hline \text{£ } 31.14 \end{array}$$

$$\begin{array}{r} 23,481 \\ + 1,362 \\ \hline 24,843 \end{array}$$

$$\begin{array}{r} 19.01 \\ 3.65 \\ + 0.7 \\ \hline 23.36 \end{array}$$

### Key skills for addition at Y5:

In their head:

- Add numbers mentally with increasingly large numbers, ie. add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and re-combining; using number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.

On paper:

- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using formal written method of columnar addition.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, carry, expanded, compact, vertical, thousands, hundreds, digits, inverse & decimal places, decimal point, tenths, hundredths, thousandths

# Addition

## Year 5 Advice for staff

Numbers should now exceed 4 digits.

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

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.

Say '6 tenths add 7 tenths' to reinforce place value.

Include calculations with money, measures and decimals with different numbers of decimal

$$\begin{array}{r} \text{£ } 23.59 \\ + \text{£ } 7.55 \\ \hline \text{£ } 31.14 \end{array}$$

$$\begin{array}{r} 23481 \\ + 1362 \\ \hline 24843 \end{array}$$

$$\begin{array}{r} 19.01 \\ 3.65 \\ + 0.7 \\ \hline 23.36 \end{array}$$

Children should:

- Fill empty decimal places with zero to show the place value in each column.
- Understand the place value of tenths and hundredths and use this to align numbers with different numbers of decimal places.

## Year 6 Add several numbers of increasing

**complexity** Adding several numbers with different numbers of decimal places (including money and measures):

### Key skills for addition at Y6:

In their head:

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

	2	3	.	3	6	1
		9	.	0	8	
	5	9	.	7	7	
+		1	.	3		
	9	3	.	5	1	1
	2	1		2		

On paper:

- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.

	8	1	,	0	5	9
		3	,	6	6	8
		1	5	,	3	0
+	2	0	,	5	5	1
	1	2	0	,	5	7
		1		1	1	1

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, carry, expanded, compact, vertical, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths

# Addition

## Year 6 Advice for staff

Adding several numbers with more than 4 digits.

Children should be encouraged to add several numbers with different numbers of decimal places (including money and measures)

	2	3	.	3	6	1	
		9	.	0	8		
	5	9	.	7	7		
+		1	.	3			
	9	3	.	5	1	1	
	2	1		2			

Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.

Zeros could be added into any empty decimal places, to show there is no value to add. **Empty decimal places can be filled with zero to show the place value in each column.**

	8	1	,	0	5	9	
		3	,	6	6	8	
		1	5	,	3	0	1
+	2	0	,	5	5	1	
	1	2	0	,	5	7	9
	1	1		1	1		