

How we teach calculations:

# **Calculation Policy for Mathematics**

April 2014  
y4

# 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

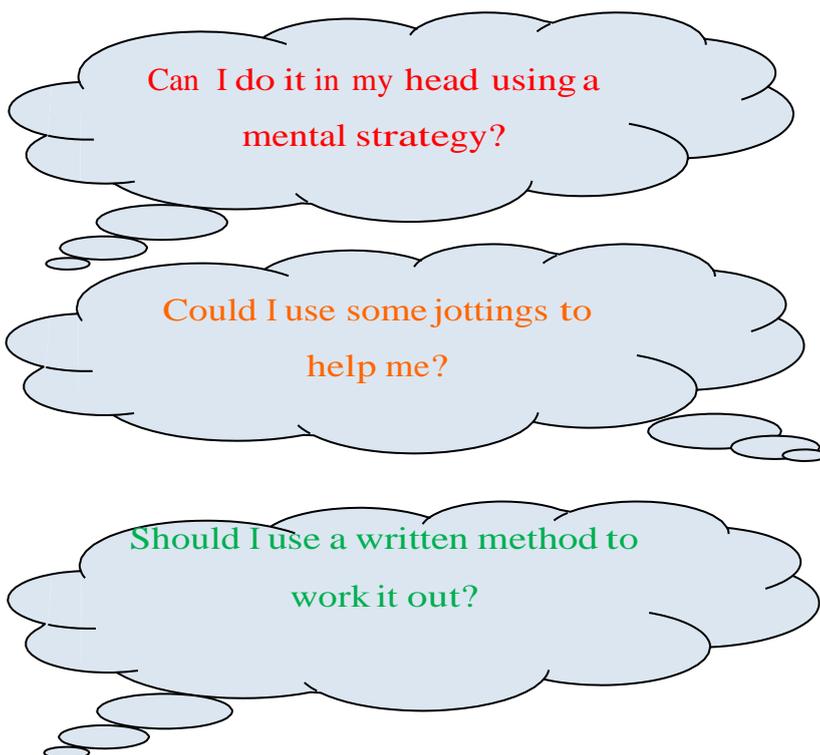
The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught according to the stage that they are currently working at**, being moved onto the next level as soon as they are ready, or working at a lower 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:



To work out a tricky calculation:
Approximate,
Calculate,
Check it mate!

# Addition

## 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	
<hr/>					
	3	9	1	3	

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.

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.

Use and apply this method to money and measurement values.

**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**

### Key skills for addition at **Y4**:

- Select most appropriate method: mental, jottings or written and explain why.
- 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 inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.
- 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.
- Estimate and use inverse operations to check answers to a calculation.

Video clips: 1—[Subtraction—teaching children to consider the most appropriate methods before calculating](#)  
2—[Introducing partitioned column subtraction method, from practical to written](#)

# Subtraction

## Year 4 Subtract with up to 4-digit numbers

Partitioned column subtraction with 'exchanging' (decomposition):

$$\begin{array}{r} 2754 - 1562 = 1192 \\ \hline 2000 + \overset{600}{\cancel{700}} + 50 + 4 \\ - 1000 + 500 + 60 + 2 \\ \hline 1000 \quad 100 + 90 + 2 \end{array}$$

As introduced in Y3, but moving towards more complex numbers and values. Use **place value counters** to reinforce 'exchanging'.

Subtracting money: partition into £1 + 30 + 5 for example.

Compact column subtraction (see video)

$$\begin{array}{r} 2754 \\ - 1562 \\ \hline 1192 \end{array}$$

To introduce the compact method, ask children to perform a subtraction calculation with the familiar partitioned column subtraction then display the compact version for the calculation they have done. Ask pupils to consider how it relates to the method they know, what is similar and what is different, to develop an understanding of it (shown on video).

Give plenty of opportunities to apply this to money and measures.

Always encourage children to consider the best method for the numbers involved—mental, counting on, counting back or written method (see video).

### Mental strategies

A variety of mental strategies must be taught and practised, including counting on to find the difference where numbers are closer together, or where it is easier to count on (see video below).

Approximate,  
Calculate,  
Check it mate!

**Key vocabulary:** equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is?, difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse

### Key skills for subtraction at Y4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 1000 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve the above, with increasingly large positive numbers.

Videos: 1—[Subtraction—teaching children to consider the most appropriate methods before calculating](#)

2—[Introducing partitioned column subtraction method, from practical to written](#)

3—[Moving to the compact column method of subtraction \(youtube\)](#)

# Multiplication



**Year 4** Multiply 2 and 3-digits by a single digit, using all multiplication tables up to  $12 \times 12$

Developing the grid method:

Eg.  $136 \times 5 = 680$

X	100	30	6	
5	500	150	30	$\begin{array}{r} + 30 \\ \hline 680 \end{array}$

500

150

+ 30

680

Encourage column addition to add accurately.

Move onto **short multiplication** (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way, and are already confident in "carrying" for written addition.

Children should be able to:

- Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g:  
 $346 \times 9$  is approximately  $350 \times 10 = 3500$   
Record an approximation to check the final answer against.
- Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.
- Recall all times tables up to  $12 \times 12$

Approximate,  
Calculate,  
Check it mate!

**Key vocabulary:** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, **inverse**

**Key skills for multiplication at Y4:**

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for **all multiplication tables up to  $12 \times 12$** .
- Recognise place value of digits in up to 4-digit numbers
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to multiply 3 numbers.
- Use commutativity and other strategies mentally  $3 \times 6 = 6 \times 3$ ,  $2 \times 6 \times 5 = 10 \times 6$ ,  $39 \times 7 = 30 \times 7 + 9 \times 7$ .
- Solve problems with increasingly complex multiplication in a range of contexts, including scaling.
- Count in multiples of 6, 7, 9, 25 and 1000
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

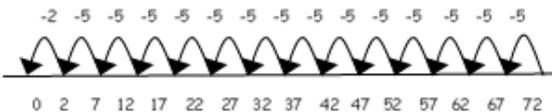
# Division

## Year 4 Divide up to 3-digit numbers by a single digit

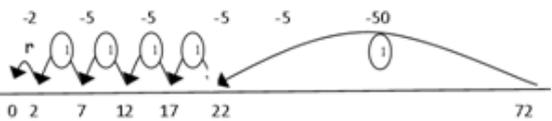
(without remainders initially)

### chunking

Children will develop their use of repeated subtraction to be able to subtract multiples of the divisor. Initially, these should be multiples of 10s, 5s, 2s and 1s – numbers with which the children are more familiar.



Leading to;



Then moving onto

Short division TU ÷ U		
$72 \div 3$		
	3 ) 72	
	- 30	10x
	42	
	- 30	10x
	12	
	- 6	2x
	6	
	- 6	2x
	0	
Answer :	24	

### 'bus stop'

Short division should only be taught once children have secured the skill of calculating

Continue to develop short

STEP 1: Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (those that do not result in a final remainder — see steps in Y3), but must understand how to calculate remainders, using this to „carry“ remainders within the calculation process (see example).

$$\begin{array}{r} 18 \\ 4 \overline{) 72} \end{array}$$

STEP 2: Pupils move onto dividing numbers with up to 3-digits by a single digit, however problems and calculations provided should not result in a final answer with remainder at this stage. Children who exceed this expectation may progress to Y5 level.

$$\begin{array}{r} 218 \\ 4 \overline{) 872} \end{array}$$

When the answer for the first column is zero (1 ÷ 5, as in example), children could initially write a zero above to acknowledge its place, and must always „carry“ the number (1) over to the next digit as a remainder.

$$\begin{array}{r} 037 \\ 5 \overline{) 185} \end{array}$$

Include money and measure contexts when confident.

Real life contexts need to be used routinely to help pupils gain a full understanding, and the ability to recognize the place of division and how to apply it to problems.

**Key Vocabulary:** share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor

**Key number skills needed for division at Y4:**

- Recall multiplication and division facts for all numbers up to  $12 \times 12$ .
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example  $200 \times 3 = 600$  so  $600 \div 3 = 200$
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

