

# Calculation Policy

As adopted by all schools within the Bredon Moles cluster:

- Ashton First School
- Bredon Hancock's Endowed First School
- Bredon Hill Middle School
- Broadway First School
- Broadway St Mary's Catholic School
- Cropthorne C of E First School
- Eckington C of E First School
- Elmley Castle C of E First School
- Overbury C of E First School
- Sedgeberrow C of E First School

Supported by Nina Holden from Worcestershire County Council.





# Calculation Policy

- This policy has been devised to give children a consistent and smooth progression of learning in calculations.
- 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 or building their confidence by working at a lower age stage.
- It is important that any type of calculation is given a real life context or problem solving approach to enhance their understanding of the purpose of the calculation.

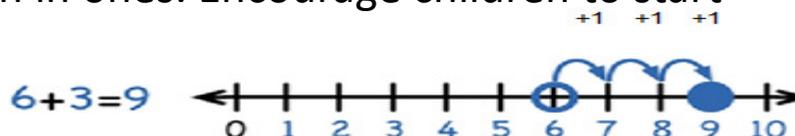
# Addition – Year 1

## Add with numbers up to 20.

Read, write and interpret number sentences with + and = signs.

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

Children should:



- Have access to a wide range of counting equipment, everyday objects, number tracks and number lines and be shown numbers in different contexts.
- Understand that addition can be done in any order.
- Read and write the addition (+) and equals (=) signs within number sentences.
- Strengthen their understanding of the = sign.
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them.  $8 + 3 = \square$     $15 + 4 = \square$     $5 + 3 + 1 = \square$     $\square + \square = 6$

This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.



$$8 + 5 =$$

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

### Key number skills for addition at Year 1:

- Read and write numbers to 100 forwards and backwards, from any given number.
- Read and write numbers from 1 – 20 in numerals and words.
- Recall bonds to 10 and 20 and addition facts within 20.
- Count to and across 100.
- Count in multiples of 1, 2, 5 and 10.
- Solve simple one step problems involving addition using objects, number lines and pictorial representations.

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

# Subtraction – Year 1

## Subtract from numbers up to 20.

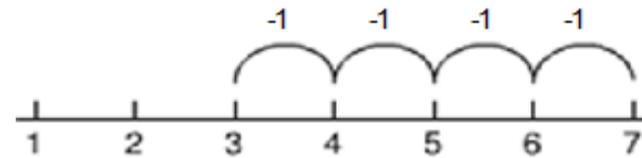
Read, write and interpret number sentences with - and = signs.

Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc and in familiar contexts. Children are introduced to more formal recording using number lines.

### Subtracting by taking away

Count back in ones on a numbered number line to take away, with numbers up to 20:

$$7 - 4 = 3$$



### Finding the difference

This will be introduced practically with the language 'find the difference' and 'how many more?' in a range of contexts.

7



4



### Mental Subtraction

Children should start recalling subtraction facts up to and within 10 and 20 and should be able to subtract zero.

### **Key number skills for subtraction at Year 1:**

- Given a number say one more or one less.
- Count to and over 100, forward and back, from any number.
- Represent and use subtraction facts to 20 and within 20.
- Subtract with one-digit and two-digit numbers to 20 including zero.
- Solve one step problems that involve addition and subtraction, using concrete objects (i.e. Bead string, objects, cubes) and pictures and missing number problems.
- Read and write numbers from 0 to 20 in numerals and words.

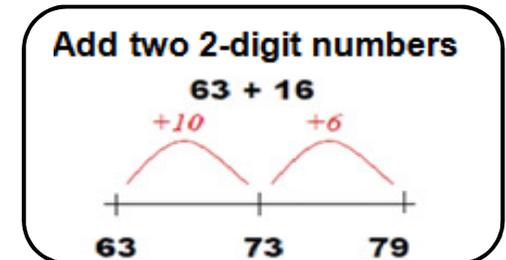
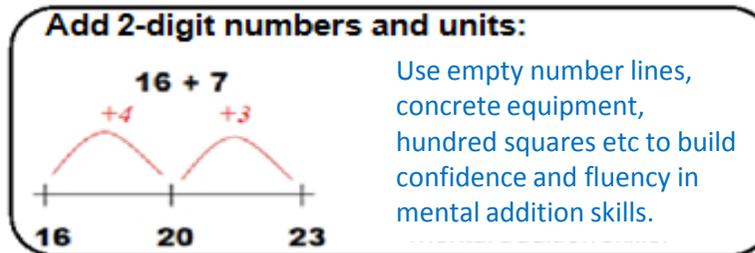
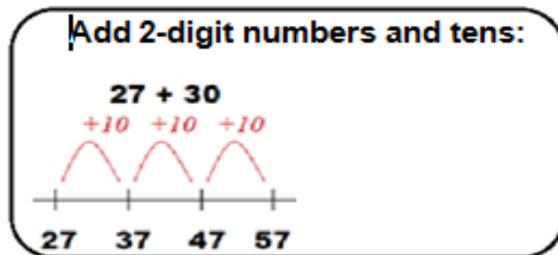
### Key Vocabulary

Equal to, take, take away, less, minus, subtract, leaves, difference, how many more / less, most, least, count back, how many left?

# Addition – Year 2

## Add with 2-digit numbers.

Children develop mental fluency with addition and place value involving 2-digit numbers.



### Key number skills for addition at Year 2

- Add a 2-digit number and units (e.g.  $27 + 6$ ).
- Add a 2-digit number and tens (e.g..  $23 + 40$ ).
- Add pairs of 2-digit numbers which bridge ten (e.g.  $35 + 47$ ).
- Add three single digit numbers ( $5 + 9 + 7$ ).
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100.
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers.
- Compare and order numbers up 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, quantities and measures and applying mental and written methods.

#### Key Vocabulary:

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

# Subtraction – Year 2

## Subtract with 2-digit numbers.

Subtract on a number line by **counting back**, aiming to develop mental subtraction skills and making links about the relationship between addition and subtraction.

This strategy will be used for:

\* 2-digit numbers subtract units (e.g.  $36 - 7$ )

\* 2-digit numbers subtract tens ( e.g.  $48 - 30$ )

\* Subtracting pairs of 2-digit numbers (see below)

**Subtracting pairs of 2-digit numbers on a number line:**

$47 - 23 = 24$  Partition the second number and subtract it in tens and units, as below:

Then subtract units.

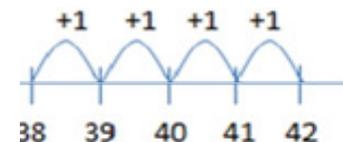
Subtract tens first.

Teaching children to **bridge through ten** can help them to become more efficient, for example  $42 - 25$ :

Move towards more efficient jumps back, as below:

Combine methods with use of a hundred square to reinforce understanding of number value and order.

**Mental strategy** subtract numbers close together by counting on:  $42 - 38 = 4$



children are taught to recognise that when numbers are close together it is more efficient to count on the difference.

### Key number skills for subtraction Year 2:

- Recognise the place value of each digit in a 2-digit number.
- Recall and use subtraction facts to 20 fluently and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, including a 2-digit number and units, a 2-digit number and tens and two 2-digit numbers.
- Show that subtraction cannot be done in any order.
- Read and write numbers to at least 100 in numerals and words.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representations and increasing confidence.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.

### Key Vocabulary:

equal to, take, take away, less, minus, subtract, leaves, difference between, how many more/less, most, least, count back, how many left, difference, count on, strategy, partition, tens, units.

# Addition – Year 3

## Add numbers with up to 3-digits.

*Step 1* - Introduce the expanded column addition method by adding the units first.

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

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

*Step 2* – Move to **compact column addition** method with exchanging. Compare the expanded method to the compact method to develop an understanding of the process. Make sure children add the units first. Exchange numbers underneath the bottom line.

*Step 3* – Adding money where only one exchange is required.

	£	1	.	2	7
+		0	.	3	4
<hr/>					
		1	.	6	1
				1	

### Key number skills for addition at Year 3:

- Read and write numbers to 100 in numerals and words.
- Add 2-digit numbers mentally including those exceeding 100.
- Add a 3-digit number and ones mentally.
- Add a 3-digit number and tens mentally.
- Add a 3-digit number and hundreds mentally.
- Estimate answers to calculations, using inverse to check answers.
- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number.
- Compare and order numbers up to 1000.
- Solve problems including missing number problems, using number facts, place value and money.
- Recognise place value of each digit in 3-digit numbers.
- Continue to practise a wide range of mental addition strategies i.e. Number bonds, adding nearest multiple of 10, 100 and adjusting, using near doubles, partitioning and recombining.

Fractions  
Add and subtract fractions with the same denominator within one whole.

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, increase, vertical, expanded, compact, exchange.

# Subtraction – Year 3

## Subtracting with 2 and 3-digit numbers.

*Step 1* – Introduce column subtraction where no exchanging is required.

	T	U
	8	9
-	3	5
	5	4

	T	U
	7	8
-	3	5
	4	7

*Step 2* – introduce exchanging through practical subtraction. Explore partitioning in different ways so they understand that when you exchange the value is the same

$82 = 80 + 2 = 70 + 12 = 60 + 22$  etc. Emphasise the value hasn't changed, we have just partitioned it in a different way.

*Step 3* – once secure with subtracting requiring one exchange extend to more than one exchange.

	H	T	U
	1	2	3
-	1	4	6
	0	9	2

### Key number skills at Year 3:

- Subtract mentally a 3-digit number and ones, tens and hundreds.
- Estimate answers and use inverse operations to check.
- Solve problems including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place-value of each digit in a 3-digit number.
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction strategies such as subtracting near multiples of 10 and adjusting and select most appropriate methods to subtract, explaining why.

Fractions  
Add and subtract fractions with the same denominator within one whole.

Key vocabulary:  
Equal to, take, take away, less, minus, subtract, leaves, distance between, how many less, least, count back, difference, count on, partition, tens, hundreds, units, exchange, decrease, value, digit.

# Addition – Year 4

## Add numbers with up to 4 digits.

Fractions  
Add and subtract fractions with the same denominator.

$$\begin{array}{r} 3517 \\ + 396 \\ \hline 3913 \end{array}$$

Reinforce the compact column addition method, adding units first and exchange numbers underneath the calculation. Also include money and measure contexts.

$$\begin{array}{r} 4.57 \\ + 3.21 \\ \hline \text{£}7.78 \end{array}$$

### Key number skills for addition at Year 4:

- Select most appropriate method and explain why.
- Recognise the place value of each digit in a 4-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 i.e. Number bonds, add the nearest multiple of 10, 100 and 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4-digits using the formal written method of column addition.
- Count in multiples of 6,7,9, 25 and 1000.
- Count backwards through zero to include negative numbers.
- Order and compare numbers beyond 1000.
- Read Roman numerals to 100.

### 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 / hundreds boundary, increase, vertical, exchange, compact, thousands, hundreds, digits, inverse

# Subtraction – Year 4

## Subtract with 4-digit numbers.

Fractions  
Add and  
subtract  
fractions  
with the  
same  
denominator

Subtracting using the column subtraction method as introduced in Year 3 but moving towards more complex numbers and values.

Reinforce exchanging.

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

A photograph of a handwritten subtraction problem on grid paper. The problem is  $2675 - 1562 = 1113$ . The digits are written in blue ink. A horizontal line is drawn under the second row of digits. The digits in the first row are 2, 6, 7, 5, 4. The digits in the second row are -, 1, 5, 6, 2. The digits in the third row are 1, 1, 9, 2. The digits in the fourth row are 1, 1, 1, 3.

### Key number skills for subtraction at Year 4:

- 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.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 100 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 and 1000.
- Solve number and practical problems involving subtraction.

#### Key vocabulary:

Equal to, take, take away, less, minus, subtract, leaves, how many fewer, less than, most, least, count back, difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse

# Addition – Year 5

## Add numbers with more than 4 digits.

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

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

Add including money, measures and decimals.

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

Numbers should exceed 4 digits.

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

Fractions  
Add and subtract fractions with the same denominator

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

### Key number skills for addition at Year 5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies i.e. add the nearest multiple of 10, 100 and 1000 and adjust.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1000000 to the nearest 10, 100, 1000, 10000 and 100000.
- Add numbers with more than 4-digits using formal written method of columnar addition.
- Interpret negative numbers in context.
- Count forwards or backwards in steps of powers of ten.
- Read Roman numerals to 1000.

### 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 / hundreds boundary, increase, vertical, exchange, compact, thousands, hundreds, digits, inverse, decimal place, decimal point, tenths, hundredths, thousandths.

# Subtraction – Year 5

## Subtract with at least 4-digit numbers.

$$\begin{array}{r} 2310486 \\ - \quad 28928 \\ \hline \end{array}$$

Compact column subtraction with exchanging.  
Subtract with larger integers.

Fractions  
Add and  
subtract  
fractions with  
the same  
denominator.

$$\begin{array}{r} 6796.5 \\ - \quad 372.5 \\ \hline \end{array}$$

Subtract with decimal values, including mixtures of  
integers and decimals, aligning the decimal point.

Create lots of opportunities for subtracting and finding  
differences with money and measure.

### Key vocabulary:

Equal to, take, take away,  
less, minus, subtract,  
leaves, how many fewer,  
less than, most, least,  
count back, difference,  
count on, strategy,  
partition, tens, units,  
exchange, decrease,  
hundreds, value, digit,  
inverse, tenths,  
hundredths, decimal point,  
decimal

### **Key number skills for subtraction at Year 5:**

- Subtract numbers mentally with increasingly large numbers.
- Use rounding and estimation to check answers to calculations and determine in a range of contexts levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10000 and 100000.

# Addition – Year 6

## Add several numbers of increasing complexity

$$\begin{array}{r} 23.361 \\ 9.080 \\ 59.770 \\ + 1.300 \\ \hline 93.511 \end{array}$$

Adding several numbers with different numbers of decimal places (including money and measures).

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

Zeros could be added into any empty decimal places to show there is no value to add.

$$\begin{array}{r} 81059 \\ 3668 \\ 15301 \\ + 20551 \\ \hline 120579 \end{array}$$

Adding several numbers with more than 4-digits.

### Key number skills for addition at Year 6:

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.
- Use negative numbers in context and calculate intervals across zero.

### Fractions

Add and subtract fractions with different denominators and mixed numbers.

### 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 / hundreds boundary, increase, vertical, exchange, compact, thousands, hundreds, digits, inverse, decimal place, decimal point, tenths, hundredths, thousandths.

# Subtraction – Year 6

## Subtracting with increasingly large and more complex numbers and decimal values.

A handwritten subtraction problem on grid paper. The top number is 148,169,9 and the bottom number is 89,949. The result is 60,750. The numbers are written in a compact column format with a horizontal line between the two numbers. The digits are: 1, 4, 8, 1, 6, 9, 9 in the top row and 8, 9, 9, 4, 9 in the bottom row. The result is 6, 0, 7, 5, 0.

Using the compact column method to subtract more complex integers.

Fractions  
Add and subtract fractions with different denominators and mixed numbers.

A handwritten subtraction problem on grid paper. The top number is 125,341,9 and the bottom number is 36,080. The result is 69,339 kg. The numbers are written in a compact column format with a horizontal line between the two numbers. The digits are: 1, 2, 5, 3, 4, 1, 9 in the top row and 3, 6, 0, 8, 0 in the bottom row. The result is 6, 9, 3, 3, 9 kg.

Using the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

### Key number skills for subtraction at Year 6:

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Use negative numbers in context and calculate intervals across zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

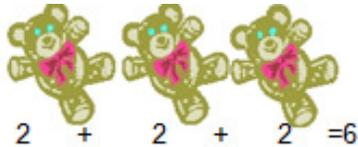
### Key vocabulary:

Equal to, take, take away, less, minus, subtract, leaves, how many fewer, less than, most, least, count back, difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal.

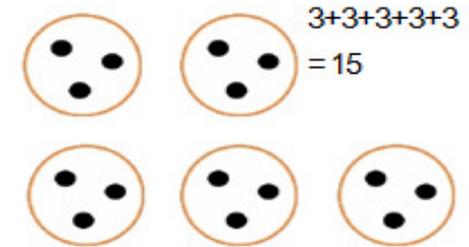
# Multiplication – Year 1

multiply with concrete objects, arrays and pictorial representations.

How many legs will 3 teddies have?



There are 3 sweets in one bag. How many sweets are in 5 bags altogether?



- Give children experience of counting equal groups of objects in 2s, 5s and 10s.
- Present practical problem solving activities involving counting equal sets or groups, as above.

## Key number skills for multiplication at Year 1:

- Count in multiples of 2, 5 and 10.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Key vocabulary:  
groups of, times,  
array, altogether,  
multiply, count,  
repeated addition.

# Division – Year 1

## Group and share small quantities.

Using objects, diagrams and pictorial representations to solve problems involving both grouping and sharing.

Give the children division problems in a familiar context e.g. There are 6 children on this table and there are 18 pieces of fruit to share between us. If we share them equally, how many will we get? Can they work it out and give a division statement?

Pupils should:

- Use lots of practical apparatus, arrays and picture representations.
- Be taught the difference between grouping and sharing.
- Count in multiples of 2s, 5s and 10s.
- Find half of a group of objects by sharing into 2 equal groups.

### Key number skills needed for division at Year1:

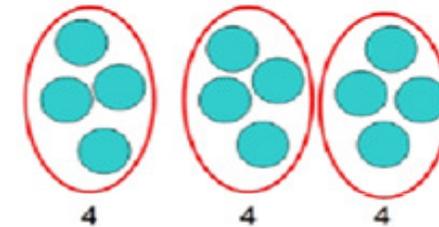
- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations, arrays with the support of the teacher.
- Through grouping and sharing small quantities, pupils begin to understand division and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

How many groups of 4 can be made with 12 stars? = 3

Grouping:



Sharing:



12 shared between 3 is 4

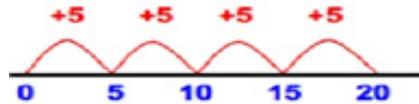
Fractions  
Recognise  $\frac{1}{2}$  and  $\frac{1}{4}$  as equal parts of an object, shape or quantity.

Key vocabulary:  
Share, share equally, one each, two each, group, groups of, array, divide.:

# Multiplication – Year 2

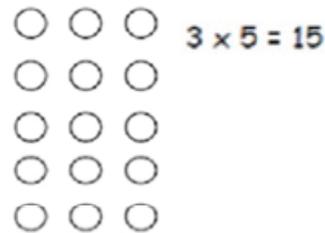
## Multiply using arrays and repeated addition (using at least 2s, 5s and 10s).

Use repeated addition on a number line:



Start from zero, make equal jumps to work out multiplication facts.

Use arrays:



Use arrays to help teach children to understand the commutative law of multiplication e.g.  $5 \times 3 = 15$ ,  $3 \times 5 = 15$ ,  $15 = 3 \times 5$ ,  $15 = 5 \times 3$ . Also show the repeated addition  $3 \times 5 = 3 + 3 + 3 + 3 + 3 = 15$ .

Use practical apparatus:



**Use mental recall:** children should begin to recall multiplication facts for 2, 5 and 10 times tables through practice in counting and understanding of the operation.

### Key number skills for multiplication at Year 2:

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the **2, 5 and 10** multiplication tables, including recognising odds and evens.
- Write and calculate number sentences using the x and = signs.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

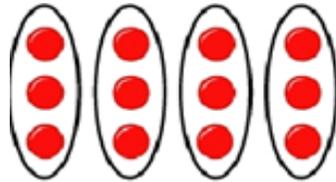
Key vocabulary:  
groups of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times

# Division – Year 2

## Group and share using the $\div$ and $=$ sign.

Use objects, arrays, diagrams, pictorial representations and grouping on a number line.

**Arrays:**



This represents  $12 \div 3$ , posed as how many groups of 3 are in 12?

Pupils should also show that  $12 \div 4 = 3$ .

### Fractions

- Simple fractions.
  - Recognise, find, name and write fractions.
- Make links to fractions, see National Curriculum.

### Know and understand sharing and grouping:

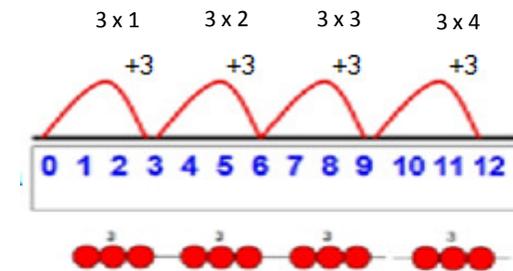
6 sweets shared between 2 people, how many do they each get?

There are 6 sweets, how many people can have 2 sweets each?

### Grouping using a number line:

Group from zero in equal jumps of the divisor to find out how many groups of  $\_$  in  $\_$ ?

Also use practical apparatus to reinforce understanding.



$$12 \div 3 = 4$$

### Key number skills needed for division at Year 2:

- Count in steps of 2, 3, and 5 from 0.
- Recall and use multiplication and division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers.
- Calculate mathematical sentences for multiplication and division within the multiplication tables and write them using the  $\times$ ,  $\div$  and  $=$  signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

### Key vocabulary:

Share, share equally, one each, two each..., group, groups of, array, divide, divided by, divided into, division, grouping, number line, left, left over.

# Multiplication – Year 3

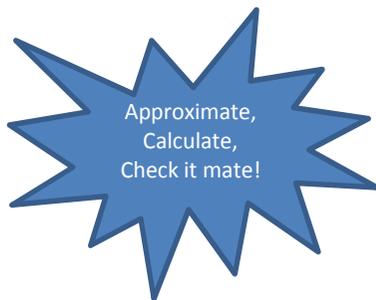
## Multiply 2-digits by a single digit number.

Introduce the grid method:

Eg.  $23 \times 8 = 184$

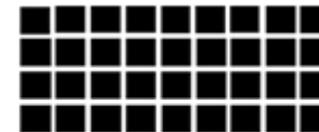
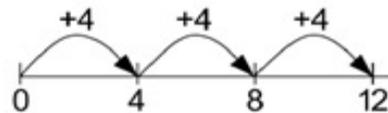
X	20	3
8	160	24

$160 + 24 = 184$



To do this children must be able to:

- Partition numbers into tens and units.
- Multiply multiples of ten by a single digit (e.g.  $20 \times 4$ ) using their knowledge of multiplication facts and place value.
- Recall and work out multiplication facts in the 2, 3, 4, 5, 8 and 10 times table.
- Work out multiplication facts using other mental strategies (e.g. commutative law, near multiples, doubling etc.) use repeated addition and arrays to support the children's understanding.



$9 \times 4 = 36$

### Key number skills for multiplication at Year 3:

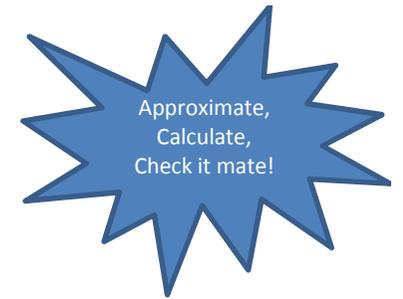
- Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including **2-digit x single-digit**, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity and associativity law (e.g.  $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ )
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g. using commutativity ( $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and for missing number problems  $\_ \times 5 = 20$ ,  $3 \times \_ = 18$ ,  $8 \times \_ = 32$ .

#### Key vocabulary:

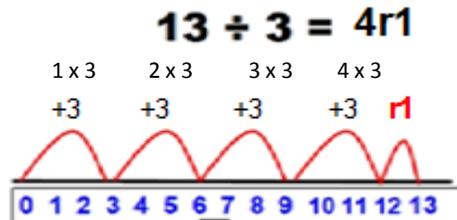
groups of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value.

# Division – Year 3

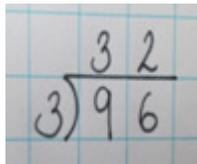
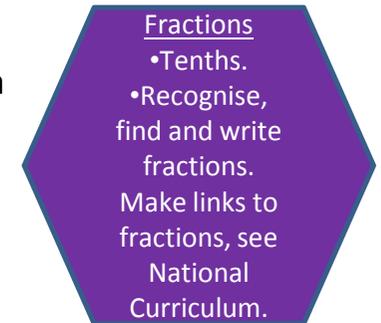
## Divide 2 digit numbers by a single digit.



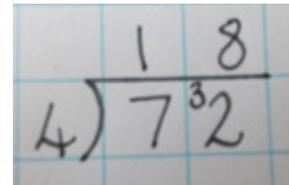
Grouping on a number line:



Children continue to work out unknown division facts by grouping on a number line from zero. They are also now taught remainders.

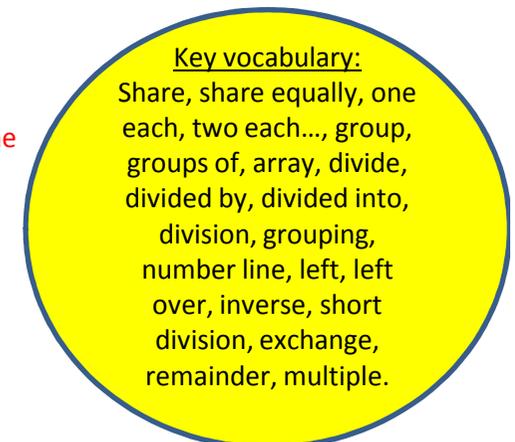


Once children are secure with division by grouping on a number line short division for larger 2-digit numbers should be introduced. Remind children of correct place value.



Once children demonstrate a full understanding of remainders and the short division method, they can then be taught how to carry the remainder onto the next digit.

- **Key number skills needed for division at Year 3:**
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using  $3 \times 2 = 6$ ,  $6 \div 3 = 2$  and  $2 = 6 \div 3$ ) to derive related facts ( $30 \times 2 = 60$ , so  $60 \div 3 = 20$  and  $20 = 60 \div 3$ ).
- Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.



# Multiplication – Year 4

## Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12 x 12.

Eg.  $136 \times 5 = 680$

X	100	30	6
5	500	150	30

	500	
	150	
+	30	
	680	

Encourage column Addition to add accurately.

Approximate, Calculate, Check it mate!

Introduce the expanded column multiplication method:  
When introducing the column method make comparisons to the grid method.

Step 1:

	H	T	U
		14	
x			4
		16	
		40	
		56	

Step 2:

	H	T	U
	3	2	1
x			3
			3
		6	0
	9	0	0
	9	6	3

### Key skills for multiplication at Year 4:

- Recall multiplication facts for **all multiplication tables up to 12 x 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.
- 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).

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

# Division – Year 4

## Divide up to 3-digit numbers by a single digit.

Fractions

- Hundredths.
- Solve problems.
- Write decimal equivalents.

Make links to fractions, see National Curriculum.

Continue to develop short division and reactivate learning from Year 3 looking at the short division methods.

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

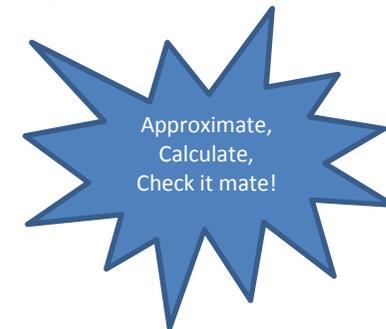
Pupils need to be secure with the process of short division and must understand how to calculate remainders.

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

Pupils move onto dividing numbers with up to 3-digits by a single digit.

$$\begin{array}{r} 037 \\ 5 \overline{) 1835} \end{array}$$

When the answer for the first column is zero children could initially write a zero above to acknowledge its place.



**Real life contexts need to be used routinely to recognise the place of division and how to apply it to problems.**

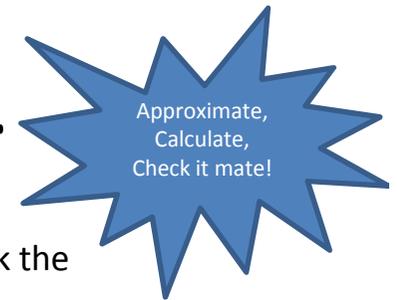
### Key number skills needed for division at Year 4:

- 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.

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

# Multiplication – Year 5

## Multiply up to 4-digits by 1 or 2-digits.



Short multiplication for multiplying by a single digit

Children need to be taught to approximate first e.g. they would round  $72 \times 38$  to  $70 \times 40 = 2800$  to check the reasonableness of their answer.

x	300	20	7
4	1200	80	28

$$\begin{array}{r}
 1200 \\
 80 \\
 + 28 \\
 \hline
 1308
 \end{array}$$

Make comparisons between the grid method and the short column multiplication method to see how the steps are related.

$$\begin{array}{r}
 327 \\
 \times 4 \\
 \hline
 1308
 \end{array}$$

Introduce long multiplication for multiplying by 2-digits

	10	8
10	100	80
3	30	24

$$\begin{array}{r}
 100 \\
 80 \\
 30 \\
 + 24 \\
 \hline
 234
 \end{array}$$



$$\begin{array}{r}
 18 \\
 \times 13 \\
 \hline
 54 \\
 180 \\
 \hline
 234
 \end{array}$$

Move to more complex numbers:

$$\begin{array}{r}
 3652 \\
 \times 8 \\
 \hline
 29216
 \end{array}$$

$$\begin{array}{r}
 1234 \\
 \times 16 \\
 \hline
 7404 \\
 12340 \\
 \hline
 19744
 \end{array}$$

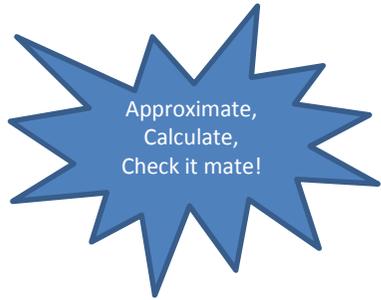
### Key number skills for multiplication at Year 5:

- Identify multiples and factors, using knowledge of **multiplication tables to 12x12**.
- Solve problems where larger numbers are decomposed into their factors.
- Multiply and divide integers and decimals by 10, 100 and 1000.
- Recognise and use square and cube numbers and their notation.
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

### Key vocabulary:

groups of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, carry.

# Division – Year 5

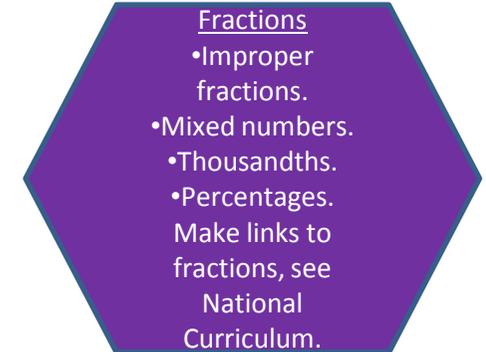


Divide up to 4 digits by a single digit, including those with remainders.

Short division, including remainder answers:

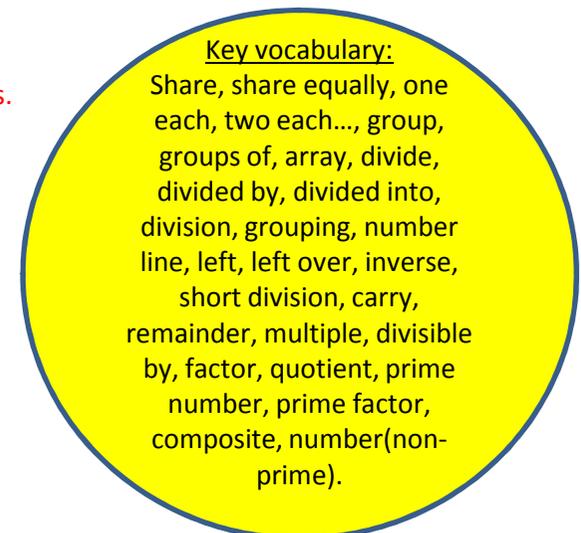
$$\begin{array}{r} 0628 \text{ r } 5 \\ 8 \overline{) 5030} \\ \underline{40} \phantom{0} \\ 103 \phantom{0} \\ \underline{96} \phantom{0} \\ 470 \\ \underline{40} \\ 70 \\ \underline{56} \\ 140 \\ \underline{128} \\ 120 \\ \underline{112} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 8 \end{array}$$

Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life meaning context, where pupils consider the meaning of the remainder and how to express it, i.e. as a fraction, a decimal, or as a rounded number or value depending on the context of the problem.



## Key number skills for division at Year 5:

- Recall multiplication and division facts for all numbers up to  $12 \times 12$  (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- Use multiplication and division as inverses.
- Interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (e.g.  $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$ ).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

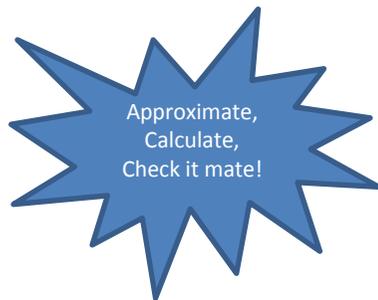


# Multiplication – Year 6

## Multiply decimals up to 2 decimal places by a single digit.

Children will be able to:

- Use rounding and place value to make approximations before calculating and use these to check answers against.
- Use short multiplication to multiply numbers with more than 4-digits by a single digit; to multiply money and measures, and to multiply decimals with up to 2 d.p. by a single digit.
- Use long multiplication to multiply numbers with at least 4 digits by a 2 digit number.



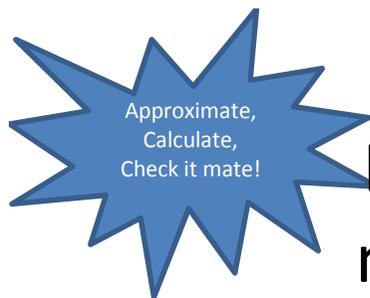
$$\begin{array}{r} 3.19 \\ \times \quad 8 \\ \hline 25.52 \\ \hline \end{array}$$

This works well for multiplying money (£.p) and other measures.

### Key number skills for multiplication at Year 6:

- Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5)**.
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.
- Estimate answers using rounding and approximation and determine levels of accuracy.
- Round any integer to a required degree of accuracy.

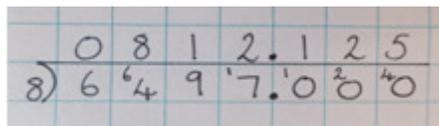
Key vocabulary:  
groups of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, carry, tenths, hundredths.



# Division – Year 6

## Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities).

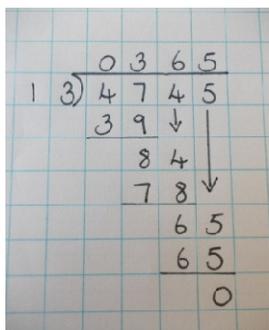
### Short division for dividing by a single digit



Pupils should continue to use this method and consider the most appropriate way to express the remainder.

In this example rather than expressing the remainder as r 1, a decimal point is added.

### Long division for dividing by 2-digits



*If dividing by a 2-digit number use either long division or consider short division using single digit factors e.g. when dividing by 21 divide by 3 and then by 7.*

Pupils should be introduced to this method once they are secure with the above method using decimals.

Support pupils by writing down the multiples of the numbers you are dividing by (pupils can then refer to this throughout the calculation).

#### Fractions

- Simplify fractions.
  - Order fractions.
  - Associate division with fractions.
- Make links to fractions, see National Curriculum.

### Key number skills for division at Year 6:

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations.
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.

#### Key vocabulary:

Share, share equally, one each, two each..., group, groups of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, exchange, remainder, multiple, divisible by, factor, quotient, prime number, prime factor, composite, number(non-prime).