Newby and Scalby Primary School

Mathematics Calculation Guidance

Working to learn together

Key Notes:

To master calculations it is important that the correct language is used by all teachers, support staff and parents / carers from an early age to reduce the misconceptions that can develop throughout a young person's development of mathematical skills. This document contains key vocabulary to use from EYFS all the way through to the end of year 6.

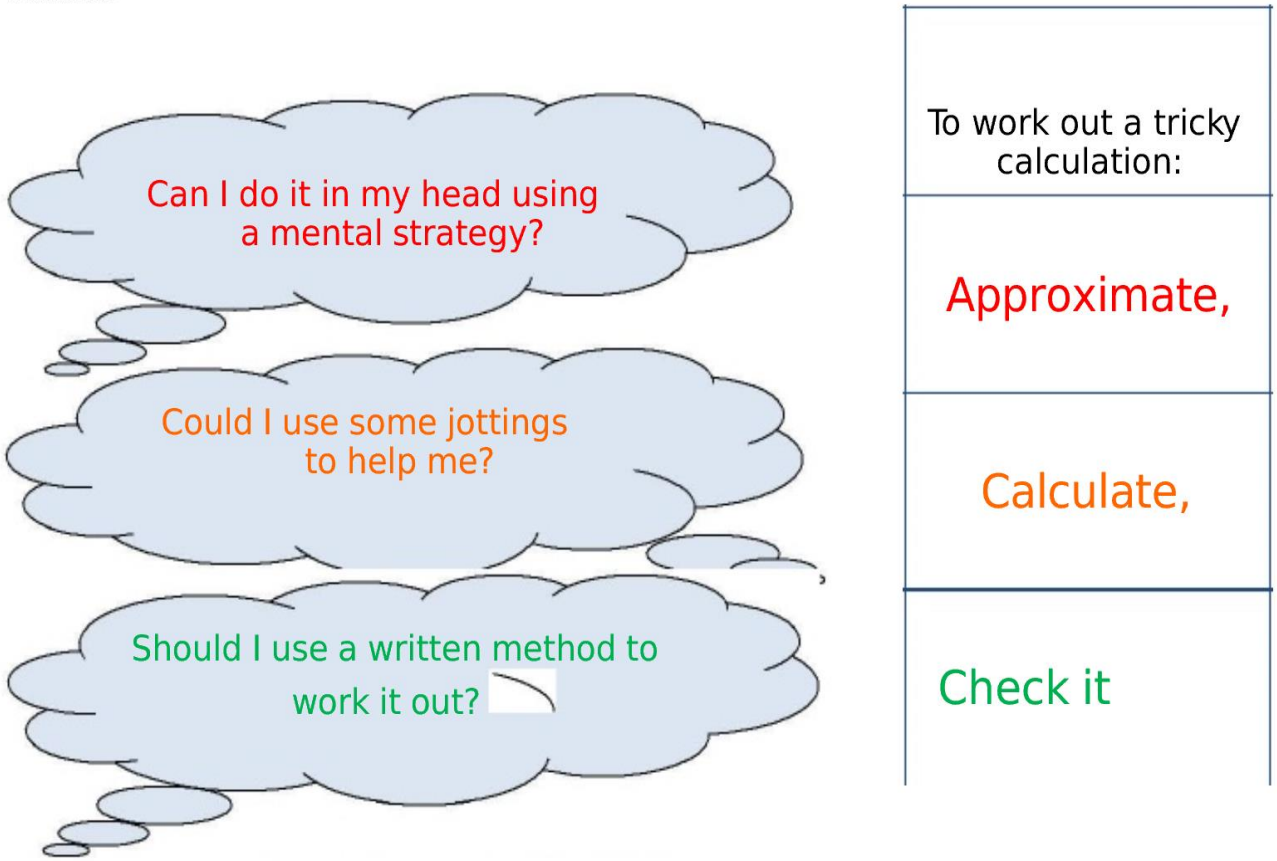
The following are considered to be key points to consider too:

Using the word **"Ones"** instead of "units" when discussing number and partitioning

The word **minus** has not been included in the vocabulary lists throughout to avoid its link with temperatures leading to potential problems with the use of negative numbers in directed number work.

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:



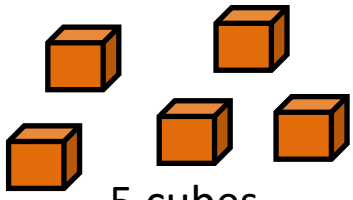
Disclaimer: The guidance is just that, it is not an exhaustive document and adults will have to be adaptable to help young people who struggle with calculations to be shown alternative methods too.

Addition

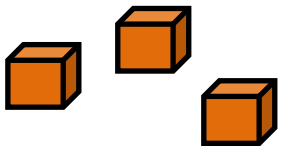
Foundation Stage

Add two single-digit numbers

Combine two sets of objects into one group.



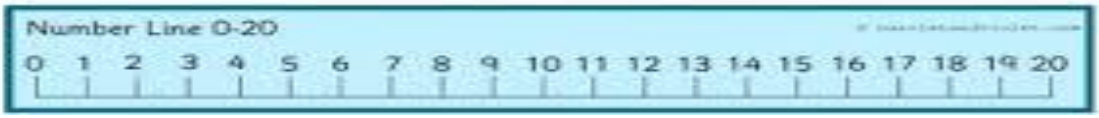
5 cubes **and**



3 cubes

8+4= Put the number 8 in our heads and count on 4 more.

The use of a number line can be used to help visually imagine 4 more steps.



Use real life number stories to solve problems, i.e. 5 children in a line, 4 more joined them.

Vocabulary

add, more, plus, and, make, group, altogether, total, equals, double, most, count on

Key skills for addition at Foundation Stage

Count aloud reliably with numbers from 1 to 20.

Say which is one more than a given number.

Solve simple problems, including doubling.

Counting on from different starting numbers.

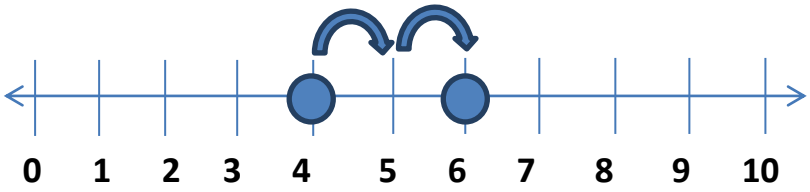
Addition

Year 1

Add with numbers up to 20.

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

4 + 2 = 6



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.
- Read and write the addition (+) and equals (=) signs within number sentences.
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them:
  8 + 3 = ◯ 15 + ◯ = 19 5 + 3 + 1 = ◯ ◯ + ◯ = 6

Vocabulary

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

Key skills for addition at Year 1

Read and write numbers to 100 in numerals, including 1-20 in 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 representation.

Addition

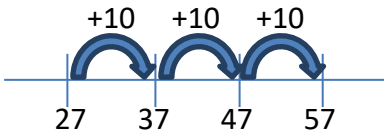
Year 2

Addition with two-digit numbers

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

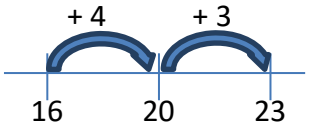
Add 2-digit numbers and tens:

27 + 30 =



Add 2-digit numbers and ones:

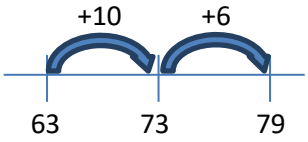
16 + 7 =



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

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

63 + 16 =



23 + 34

20 + 3

30 + 4 +

50 + 7 = 57

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).

58 + 43

50 + 8

40 + 3 +

90 + 11 = 101

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

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

Vocabulary

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

Key skills for addition at Year 2

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 bonds to 20 and bonds of tens to 100 (30 + 70 etc.)
Count in steps of 2, 3 and 5 and count in tens from any number.
Understand the place value of two-digit numbers (tens and ones)
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.

Addition

Year 3

Add numbers with up to 3-digits

Introduce the **expanded column addition** method

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

Add the **ones** first, in preparation for compact method.

In order to carry out this method of addition:
-Children need to recognise the value of hundreds, tens and ones without recording the partitioning.
-Pupils need to be able to add in columns.

This expanded stage is vital for children's understanding and need to be secure.

Move to the compact **column addition** method, with regrouping.

Add ones first.

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

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

Regroup numbers underneath.

Remind pupils the actual value is, **three tens** add **seven tens**, not three add seven, which equals **ten tens**.

Vocabulary

add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, regrouping, expanded, compact.

Key skills for addition at Year 3

Instant recall and use of 1 digit + 1 digit facts.
Read and write numbers to 1000 in numerals and words.
Add 2-digit numbers mentally, including those exceeding 100.
Add a three-digit number and ones mentally (175 + 8).
Add a three-digit number and tens mentally (250 + 50).
Add a three-digit number and hundreds mentally (381 + 400).
Estimate answers to calculations, using inverse to check answers.
Solve problems, including missing number problems, using number facts, place value, and more complex addition.
Recognise place value for each digit in three-digit numbers (hundreds, tens and ones)
Continue to practise a wide range of mental addition strategies i.e. number bonds, adding the nearest multiple of 10, 100 and adjusting, using near doubles, partitioning and recombining.

Addition

Year 4

Add numbers with up to 4-digits

Move from expanded addition to the compact column method, adding ones first and regrouping numbers underneath the calculation. Also include money and measures context.

e.g. 3517 + 396 = 3913

Add ones first.

```
 3 5 1 7
   3 9 6 +
 -------
 3 9 1 3
 -------
   1 1
```

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 year 3). Teacher models the compact method with regrouping, asking children to discuss similarities and differences and establish how it is carried out.

Regroup numbers underneath.

Remind pupils the actual value is, **one ten** add **nine tens**, not one add nine, which equals **ten tens**.

Use and apply this method to money and measurement values.

Vocabulary

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

Key skills for addition at Year 4

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 two-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, 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 two-step problems in contexts, deciding which operations and methods to use and why.
Estimate and use inverse operations to check answers to a calculation.

Addition

Year 5

Add numbers with more than 4-digits

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

```
  £2 3 . 5 9
    £7 . 5 5 +
  ----------
  £3 1 . 1 4
    1 1   1
```

```
  2 3 4 8 1
    1 3 6 2
  ---------
  2 4 8 4 3
      1
```

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

```
  1 9 . 0 1
    3 . 6 5
    0 . 7 0 +
  ---------
  2 3 . 3 6
    1 1
```

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

Say 6 tenths add 7 tenths to reinforce place value.

Empty decimal places can be filled with zero to show the place value in each column.

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

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

Key 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, 1000 and adjust; use near doubles, inverse, partitioning and recombining; using number bonds.
Use rounding to check answers and accuracy.
Solve multi-step problems in context, deciding which operations and method 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 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.

Addition

Year 6

Add several numbers of increasing complexity

```
 23.361
  9.080
 59.770
  1.300 +
 ------
 93.511
 ------
  2 1  2
```

Empty decimal places can be filled with zero to show the place value in each column.

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

Tenths, hundredths and thousandths should be correctly aligned, with 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.

```
 81 059
  3 668
 15 301
 20 551 +
 ------
120 579
 ------
  1  1  1  1
```

Adding several numbers with more than 4-digits

No comma used to show thousands upwards!

Vocabulary

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

Key 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.

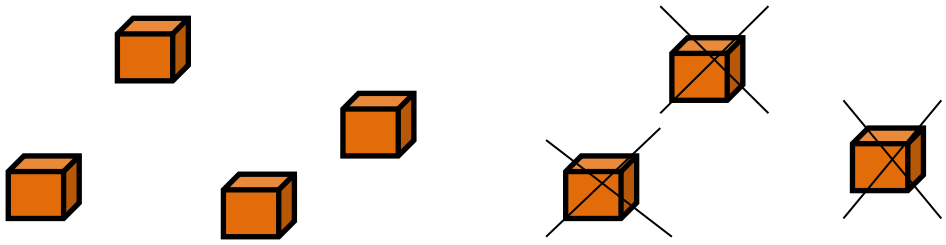
Subtraction

Foundation

Subtract two single-digit numbers

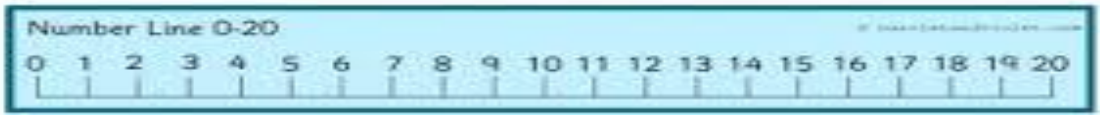
Take away from one set of objects. How many are left?

7 – 3 =



7 – 4 =

The use of a number line can be used to help visually imagine 4 less steps.



Use real life number stories to solve problems, i.e. 5 children in a line, 3 walked away, how many now?

Vocabulary

Take away, less, subtract, less than, count back, how many left?

Key skills for subtraction at Foundation

Count aloud reliably with numbers up to 20.
Say which is one less than a given number.
Solving simple problems, including halving.
Counting back from given number.

Subtraction

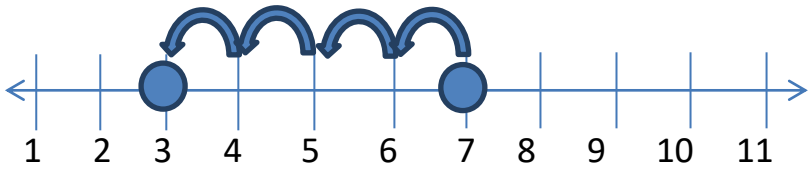
Year 1

Subtract from numbers up to 20

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

Count back in ones on numbered/unnumbered number line to take away, with number up to 20.

7 - 4 = 3

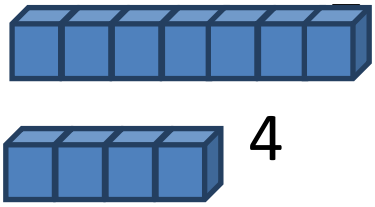


Read, write and interpret number sentences with – and = signs.

Model subtractions using hundred squares and number lines/tracks and practically.

Find the distance/difference between

This will introduce practically with language '**find the distance/difference between'** and '**how many more?**' in a range of familiar contexts.



Seven is 3 more than four.

I am 4 years older than my sister.

Mental subtraction – children should start recalling subtraction facts up to and within 10 and 20, and should be able to subtract zero.

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?

Key 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 subtraction, using concrete objects (i.e. bead string, objects, cubes, counters) and pictures, and missing number problems, 7=_ - 9.
Read and write numbers from 0 to 20 in numerals and words.

Subtraction

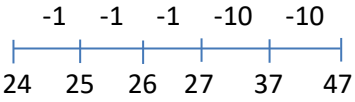
Year 2

Subtract with 2-digit numbers

Subtract on a number line by **counting back**, aiming to develop mental subtraction skills.
This strategy will be used for:
2-digit numbers subtract ones (by taking away/counting back) e.g. 36 – 7 =
2-digit numbers subtract tens (by taking away/counting back) e.g. 48 – 30 =
Subtracting pairs of 2-digit numbers

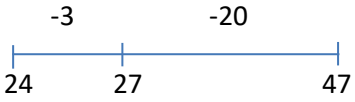
Subtracting pairs of 2-digit numbers on a number line:
47 – 23 = 24

Partition the second number and subtract it in tens and ones, as below:

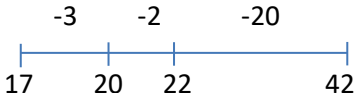


Subtract tens first then ones.

Move towards more efficient jumps back, as below:



Teaching children to bridge through ten can help them become more efficient, for example 42 – 25



Mental subtraction – subtract numbers close together by counting on, for example 42 – 38 = 4. Start with the smaller number and count onto the largest.

Many mental strategies are taught. Children are taught to recognise that when numbers are close together, it is more efficient to count on the difference. They need to be clear about the relationship between addition and subtraction.

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?, count on, partition, tens, ones

Key skills for subtraction at Year 2

Recognise the place value of each digit in a two-digit number.
Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
Subtract using concrete objects, pictorial representation, 100 squares and mentally, including: a two-digit number and ones, a two-digit number and tens, and two two-digit numbers.
Show that subtraction is one number from another and **cannot** be done in any order.
Recognise and use the inverse relationship between addition and subtraction, using this to check calculations and missing number problems.
Solve simple addition and subtraction problems including measure, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods.
Read and write numbers to at least 100 in numerals and in words.

Subtraction

Year 3

Subtract with up to 3-digit numbers

Partitioned column subtraction with "exchanging"

344 – 152 = 192

200 1

~~300~~ + 40 + 4

100 + 50 + 2 -

100 + 90 + 2

Introduce exchanging through practical subtraction. Make the larger number with 10p coins and 1p coins and then subtract the smaller number from e.g. 72 – 47; before subtracting 7 from the 2, they will need to exchange one 10p for ten 1p's acting as ones. Could use coloured counters e.g. 1 blue counter represents a ten and could be exchanged for 10 yellow counters each yellow counter representing a one.

Compact column subtraction

$$\begin{array}{r} {}^{1}\not{3}\,4\,4 \\ -\;1\,5\,2 \\ \hline 1\,9\,2 \end{array}$$

Establish column method without exchanging. Then apply exchanging demonstrating a visual model (e.g. using counters and giving children opportunities to use the counters themselves). Children will need a secure understanding of place value. Remind children of the actual value of each digit as it moves from column to column.

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

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.

Compare mental methods with written methods.

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?, count on, partition, tens, ones, exchange, decrease, hundreds, value, digit.

Key skills for subtraction at Year 3

Recall and use subtraction facts calculated from known 1 digit + 1 digit addition facts.
Subtract mentally a 3-digit number and ones, 3-digit number and tens, 3-digit number 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.
Counting up differences as a mental strategy when numbers are close together or near multiples of 10.
Read and write numbers up to 1000 in numerals and words.
Practise mental strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or 21) and select most appropriate methods to subtract, explaining why.

Subtraction

Year 4

Subtract with up to 4-digit numbers

Partitioned column subtraction with 'exchanging' (decomposition):

2754 – 1562 = 1192

2000 + ~~700~~ (600) + 150 + 4

1000 + 500 + 60 + 2 -

1000 + 100 + 90 + 2

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

2 ~~7~~ (6) 15 4

1 5 6 2 -

1 1 9 2

To introduce the compact method, ask the 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.

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

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.

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?, count on, partition, borrow, tens, ones, exchange, decrease, hundreds, value, digit, inverse.

Key skills for subtraction at Year 4

Subtract by counting on where numbers are close together or they are near 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 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 for 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.

Subtraction

Year 5

Subtract with at least 4-digit numbers including money, measures and decimals.

Compact column subtraction (with exchanging)

$$\begin{array}{r} {}^{2}\cancel{3}\,{}^{10}\cancel{1}\,{}^{1}4\,{}^{1}\cancel{0}\,{}^{1}\cancel{5}6 \\ 2128 - \\ \hline 28928 \end{array}$$

Children who are still not secure with number facts and place value will need to remain on the partitioned column method until ready for the compact method.

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

$$\begin{array}{r} {}^{6}\cancel{7}\,{}^{10}1\,{}^{8}\cancel{6}\,{}^{1}\cancel{9}.0 \\ 372.5 - \\ \hline 6796.5 \end{array}$$

Use a zero in any empty decimal places to aid understanding of what to subtract in that column.

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

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?, count on, partition, carry, tens, ones, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key 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 and why.

Read, write, order and compare numbers to at least 1 million and determine the value of each digit.

Count forwards and 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 through 0.

Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

Subtraction

Year 6

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

$$\begin{array}{r} {}^{0}\cancel{1}\,{}^{14}\cancel{5}\,{}^{9}\cancel{1}\,{}^{1}\cancel{0}\;699 \\ 89\;949\;- \\ \hline 60\;750 \\ \hline \end{array}$$

Use compact column method to subtract more complex integers.

$$\begin{array}{r} {}^{0}\cancel{1}\,{}^{9}\cancel{1}\,{}^{3}\cancel{1}\,{}^{1}\cancel{0}5.{}^{1}\cancel{4}19\text{ kg} \\ 36.080\text{ kg} \\ \hline 69.339\text{ kg} \\ \hline \end{array}$$

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

Empty decimal places can be filled with zero to show the place value in each column.

Pupils should be able to apply their knowledge of a range of mental strategies, mental recall skills, and informal written methods when selecting **the most appropriate method** to work out subtraction problems. Important to encourage pupils to not use the column method for calculations such as 2003 – 5!

Vocabulary

Equal to, take, take away, less, subtract, leaves, distance between, difference between, how many more, how many less, most, least, count back, how many left, how much less is _?, count on, partition, borrow, tens, ones, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Year 6

Solve addition and subtraction 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.

Round any whole number to a required degree of accuracy.

Use negative numbers in context and calculate intervals across zero.

Perform mental calculations, including with mixed operations and large numbers of increasing complexity, using and practising a range of mental strategies.

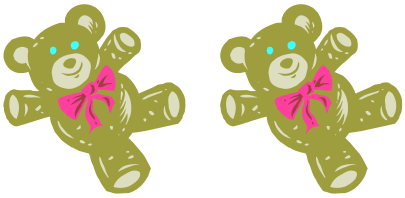
Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Multiplication

Foundation

Multiply with concrete objects (doubling)

How many legs will 2 teddies have?



2 + 2 = 4

There are three children in a group. How many children in two groups?

3 + 3 = 6

Give children experience of counting two equal groups of objects.

If 3 children wanted to play outside, how many wellies would they need?

Children to count in 2's to solve the problem.

Vocabulary

groups of, lots of, times, altogether, count

Key skills for multiplication at Foundation

Count aloud reliably with numbers from 1 to 20.

Solve problems, including doubling.

Counting in 2's and 10's

Multiplication

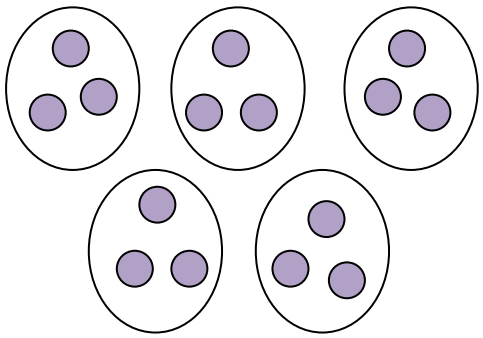
Year 1

Multiply with concrete objects, arrays and pictorial representations.

How many legs will 3 teddies have?

2 + 2 + 2 = 6

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



3 + 3 + 3 + 3 + 3 = 15

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.

Vocabulary
groups of, lots of, times, array, altogether, multiply, count

Key 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.

Multiplication

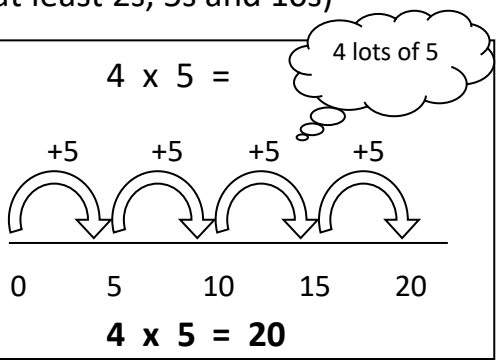
Year 2

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

Use repeated addition on a number line:

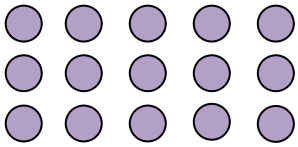
Starting from zero, make equal jumps up on a number line to work out multiplication facts and write multiplication statements using x and = signs

4 x 5 =



4 x 5 = 20

Use arrays



3 x 5 = 15

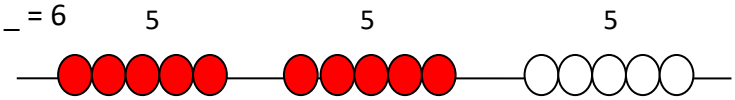
5 x 3 = 15

5 x 3 = 3 + 3 + 3 + 3 + 3 = 15

3 x 5 = 5 + 5 + 5 = 15

Use arrays to help teach children to understand the commutative law of multiplication, and give examples such as 3 x _ = 6

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.

Vocabulary

groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, twice, three times...

Key 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 statements 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 the describe multiplication.

Multiplication

Year 3

Multiply 2 digits by a single digit, using 2, 3, 4, 5, 8 and 10 times tables.

Develop the grid method

23 x 5 = 115

x	20	3
5	100	15

100 + 15 = 115

$$\begin{array}{r} 2\,3 \\ \times\ 5 \\ \hline 1\,1\,5 \\ {\scriptstyle 1} \end{array}$$

Encourage column addition to add accurately.

Move onto **short multiplication**, if and when children are confident and accurately multiplying 2 digit numbers by a single digit this way, and are already confident in carrying for written addition.

Note: Calculate ones first

Children should be able to:

Partition numbers into ten and ones.

Multiply multiples of 10 by a single digit e.g. 50 x 4

Recall and work our multiplication facts in the 2, 3, 4, 5, 8 and 10 times tables.

Work out multiplication facts not known by using repeated addition and other taught mental strategies (e.g. commutative law, working out near multiples and adjusting, using doubling etc.). Strategies to support this are repeated addition using a number line, bead bars and arrays.

Vocabulary

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

Key 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.

Recognise place value of digits in up to 3-digit numbers.

Write and calculate number statements using multiplication tables they know, drawing on mental methods and progressing to reliable written methods.

Solve multiplication problems, including missing number problems.

Use commutativity and other strategies mentally 3 x 6 = 6 x 3, 2 x 6 x 5 = 10 x 6, 39 x 7 = (30 x 7) + (9 x 7).

Solve problems in contexts, deciding on which methods and operations to use.

Multiplication

Year 4

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

Develop the grid method

136 x 5 = 680

x	100	30	6
5	500	150	30

5 0 0
1 5 0
3 0 +
6 8 0

Encourage column addition to add accurately.

Move onto **short multiplication** if and when children are confident and accurately multiplying 2 and 3-digit numbers by a single digit this way, and are already confident in 'regrouping' for written addition.

342
X 7
2394
2 1

Children should be able to:

Approximate before they calculate, and make this a regular part of their calculating, going back to check the reasonableness of their answer e.g.

346 x 9 is approximately 350 x 10 =3500

Record an approximation to check the final answer against.

Vocabulary

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

Key skills for multiplication at Year 4

Count in multiples of 6, 7, 9, 25 and 1000.
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 by 3 numbers.
Use commutativity and other strategies mentally 3 x 6 = 6 x 3, 2 x 6 x 5 = 10 x 6, 39 x 7 = (30 x 7) + (9 x 7).
Solve problems with increasingly complex multiplication in a range of contexts.

Multiplication

Year 5

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

Introducing column multiplication

Introduce by comparing a grid method calculation to a short multiplication method, to see how the steps are related, but notice how there are less steps involved in the column method.

Children need to be taught to approximate first, e.g. for 72 x 38, they will use rounding: 72 x 38 is approximately 70 x 40 = 2800, and use approximation to check the reasonableness of their answer.

Short multiplication for multiplying by a single digit

x	300	20	7
4	1200	80	28

1200
80
28
1308

```
  327
X   4
1308
 1 2
```

Pupils could be asked to work out a given calculation using grid, and then compare it to column method. What are the similarities and differences?

Introduce long multiplication for multiplying by 2 digits

x	10	8
10	100	80
3	30	24

100
80
30
24 +
234

```
  18
X 13
  54
 2
 180
 234
```

18 x 3 on the first row
(8 x 3 = 24, regrouping the 2 for twenty, then 10 x 3 = 30 + 20 = 50)

18 x 10 on the second row.
(8 x 10 = 80 and 10 x 10 =100)

Moving towards more complex numbers:

```
  1234
X   16
  7404
 122
 12340
 19744
```

```
  3652
x    8
 29216
 541
```

Vocabulary

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

Key skills for multiplication at Year 5

Identify multiples and factors, using knowledge of multiplication tables to 12 x 12.

Solve problems where larger numbers are decomposed into their factors.

Multiply and divide integers and decimals by 10, 100 and 1000.

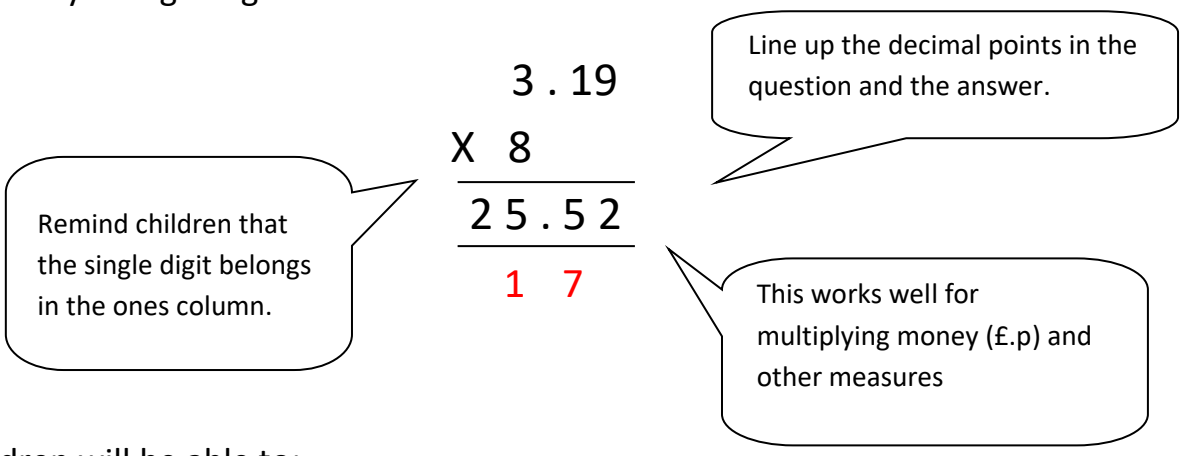
Recognise and use square and cube numbers and their notation.

Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

Multiplication

Year 6

Short and long multiplication as in Y5, and multiply decimals with 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 (see Y5) 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 decimal places by a single digit.
Use long multiplication (see Y5) to multiply numbers with at least 4-digits by a 2-digit numbers.

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

Key skills for multiplication at Year 6

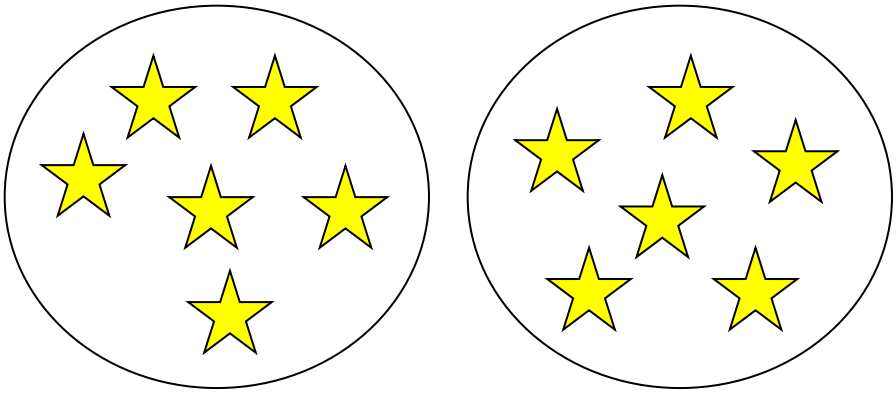
Use rounding and place value to make approximations before calculating and use these to check answers.
Multiply numbers with up to 4-digits by a 1-digit using short multiplication.
Multiply numbers with up to 4-digits by a 2-digit using long multiplication.
Use formal written methods to multiply money and measures, and to multiply decimals with up to 2 decimal places by a single digit.
Perform mental calculations with mixed operations and large numbers.
Solve multi-step problems in a range on contexts, choosing appropriate operations and methods.
Utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

Division

Foundation

Share small quantities into equal groups.

12 stars into two groups



Pupils should use lots of practical apparatus.

Find half of a group of objects by sharing into 2 equal groups.

“How can you make it fair between you and your friend?”

Vocabulary

Share, share equally, one each, halving, fair

Key skills for division for Foundation

Count aloud reliably with numbers from 1-20.
Solve problems including halving
Sharing between 2 groups to make it fair.

Division

Year 1

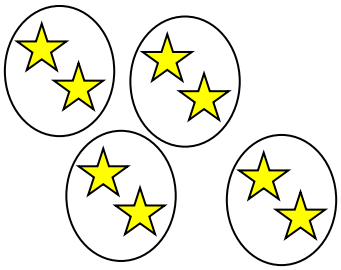
Group and share small quantities

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

8 stars ÷ 2 = 4

Grouping

Sharing



Example division problem in a familiar context:

There are 10 pupils on this table and there are 30 pieces of fruit to share between us. If we share them equally, how many will we get each?

30 shared between 10 people gives you 3 each.

Pupils should:

Use lots of practical apparatus, arrays and picture representations.

Be taught to understand the difference between '**grouping**' objects (How many groups of 2 can you make?) and '**sharing**' (Share these sweets between 2 people)

Be able to count in multiples of 2s, 5s and 10s.

Find half of a group of objects by sharing into 2 equal groups.

Vocabulary

Share, share equally, one each, two each..., group, groups of, lots of, array

Key skills for division for Year 1

Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with support from 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.

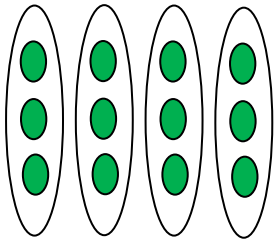
Division

Year 2

Group and share, using the ÷ and = sign (Children should be taught to recognise whether problems require sharing or grouping)

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

Arrays

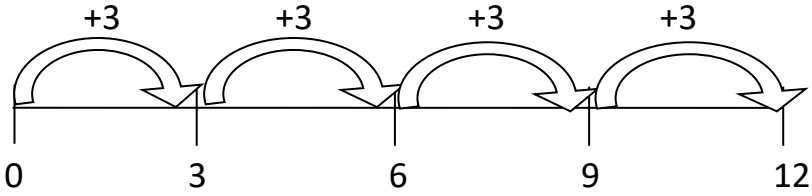


This represents 12 ÷ 3, posed as how many groups of 3 are in 12.

Pupils should also show that the same array can represent 12 ÷ 4 = 12 if grouped horizontally.

Grouping using a number line

Group from zero in equal jumps of the divisor to find out 'how many groups of _ in _?'. Pupils could use a bead string or practical apparatus to work out problems e.g. A CD costs £3. How many CDs can I buy? This is an important method to develop understanding of division by grouping.



Vocabulary

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

Key skills for division for 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 statements using multiplication and division within the multiplication tables and write these using x, ÷ and = signs.

Show the multiplication can be done in any order (commutative) and division of one number by another cannot.

Solve problems involving multiplication and division, using objects, arrays, repeated addition, mental methods and facts, including problems in context.

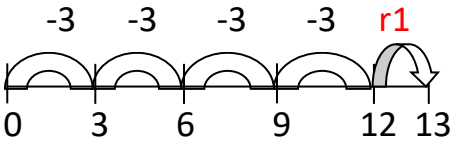
Division

Year 3

Divide 2-digit numbers by a single digit

Step 1 Grouping on a number line

13 ÷ 3 = 4 r 1



Children continue to work out unknown division facts by grouping on a number line from the nearest multiple. They are also now taught the concept of remainders, as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s, ready for carrying remainders across within the short division method.

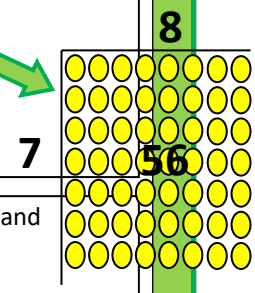
Step 2 Short division

NO remainders in the answer.
Place value counters to represent tens and ones.

Once children are secure with Step 1, short division for larger 2-digit numbers can be introduced, examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array and by using place value counters.

```
  3 2
3 | 9 6
```

Remind children of correct place value that 96 is equal to 90 and 6, but in short division, pose:
How many 3s in 9 tens? 30, and record it above the 9 tens.
How many 3s in 6? 2, and record it above the 6 ones.



Step 3 Short Division

Limit numbers to **NO** remainders in the final answer, but with remainders occurring within the calculation.

```
  1 8
4 | 7 2
    3
```

Once children demonstrate a full understanding of Step 1 and Step 2, they can be taught how to use the method when remainders occur within the calculations (e.g. 96 ÷ 4), and be taught to 'carry' the remainder onto the next digit.

If needed, children should use the number line to work out individual division facts that occur which they are not yet able to recall mentally.

Vocabulary

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

Key skills for division for 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, using mental and progressing to formal written methods.
Solve problems, in context, 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 x 2 = 6, 6 ÷ 3 = 2 and 6 ÷ 2 = 3) to derive related facts (30 x 2 = 60, so 60 ÷ 30 = 2 and 60 ÷ 2 = 30).
Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit number and progressing to the formal written method of short division.

Division

Year 4

Divide up to 3-digit numbers by a single digit (without remainders initially)

Continue to develop short division:

$\begin{array}{r} 18 \\ 4\overline{)\,7^{3}2} \end{array}$	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)
$\begin{array}{r} 218 \\ 4\overline{)\,8\,7^{3}2} \end{array}$	Step 2: Pupils move onto dividing numbers with up to 3-digit 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.
$\begin{array}{r} 037 \\ 5\overline{)\,1^{1}8^{3}5} \end{array}$	When the answer for the first column is zero (1 ÷ 5, as in example), children should initially write a zero above to acknowledge its place, and must always 'carry' the number (1) over to the next digit as a remainder.

Vocabulary

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

Key skills for division for Year 4

Recall multiplication and division facts for all number up to 12 x 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 1-digit number.

Pupils practise mental methods and extend this to 3-digit numbers to derive facts, e.g. 200 x 3 = 600 so 600 ÷ 3 = 200.

Pupils solve two-step problems in context, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Division

Year 5

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

Short division including remainder answers:

```
  0 6 6 3 r 5
    5 5 2
8 | 5 3 0 9
```

The answer to 5309 ÷ 8 could be expressed as 663 and five eighths, 663 r 5, 663.625 or rounded as appropriate to the problem.

Short division with remainders: Now pupils are introduced to examples that give rise to remainder answers, division need to have a real life problem solving 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 value, depending upon the context of the problem

Include money and measure contexts.

If children are confident and accurate:

Introduce long division for pupils who are ready to divide any number by a 2-digit number (e.g. 2678 ÷ 19).

Vocabulary

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

Key skills for division for Year 5

Recall multiplication and division facts for all numbers up to 12 x 12.
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 problem 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.
Work out weather a number up to 100 is prime, and recall prime numbers to 19.
Divide numbers up to 4-digits by a 1-digit number using the formal written method of short division and interpret remainders appropriately for the context.
Use multiplication and division as inverse.
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.
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.

Division

Year 6

Divide at least 4-digits by both 1-digit and 2-digit numbers (including decimal numbers and quantities)

Short division – for dividing by a 1-digit e.g. 6497 ÷ 8

```
  0812.125
8 6497.000
  6 1 1 2 4
```

When given examples that give rise to remainders, children should consider the meaning of the remainder within the context of the problem and decide how to express it, i.e. As a fraction, a decimal, or as a rounded number or value.

Long division – for dividing by a 2-digit

What do we already know? **14, 28, 42, 56, 70, 84, 98, 112, 126, 140**

e.g. 2978 ÷ 14 = 212 r 10

```
  212 r 10
14 2978
```

Decimal answer (such as when using money)

```
  212.214
14 2971.3020600
```

Only go to 3 decimal places then round it to the nearest 2 decimal places.

Showing a fraction answer.

```
  0212
14 2978
```

$\frac{10}{14}$

Simplified as:

$212\ \frac{5}{7}$

Vocabulary

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

Key skills for division for 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 1-digit number using the formal written method of short division and interpret remainders appropriately for the context.

Divide numbers up to 4-digits by a 2-digit whole number using the formal written method for long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.

Perform mental calculations, including mixed operations and large numbers.

Use rounding and place value to make approximations before calculating and use these to check answers.

Use formal written methods to divide money and measures, and to divide numbers with up to 2 decimal places by a single digit.