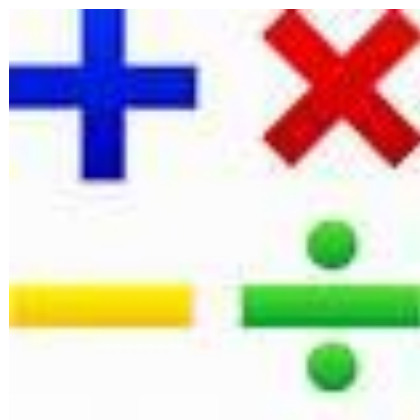




Calculation Policy



About our Calculation Policy:

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

Age related expectations:

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

Providing a context for calculation:

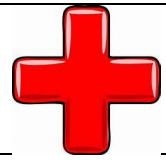
It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation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

Choosing a calculation method:

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

- *Can I do it in my head using a mental strategy?*
- *Could I use some jottings to help me?*
- *Should I use a written method to work it out?*

EYFS Add with numbers up to 10



Children are encouraged to gain a sense of the number system through the use of counting concrete objects. Children learn to subitise to 5.



They combine objects in practical ways and count all.



They understand addition as counting on and will count on in ones using objects, cubes and number lines.



One more than 4 is 5.

They use concrete and pictorial representation to record their calculations.

They begin to use + and = They are encouraged to develop a mental picture of the number system in their heads to use for calculations. Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

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. Using concrete materials children will create picture/addition stories

Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them.

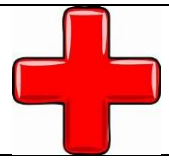
Key vocabulary: add, more, and make, sum, total altogether double one more, how many more to make ...? how many more is ... than ...? how much more is ...? equals

Key skills for addition at EYFS:

- subitising to 5
- combine objects in practical ways and count all.
- Number bonds to 5 and some to 10
- understand addition as counting on and will count on in ones using objects, cubes and number lines.
- use concrete and pictorial representation to record their calculations

ADDITION

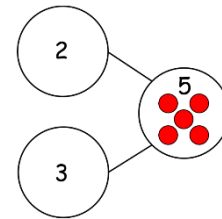
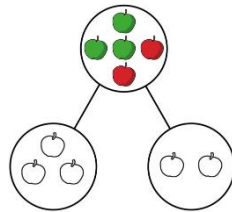
Year 1 Add with numbers up to 20



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



Learn to use a part whole model.



Children should:

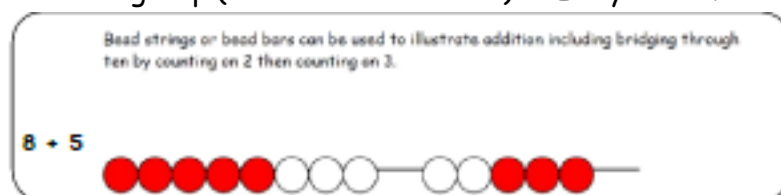
Have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different contexts. Children will also have access to rekenreks. Using concrete materials children will create picture/addition stories

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:

$$8 + 3 = \dots \quad 15 + 4 = \dots \quad 5 + 3 + 1 = \dots \quad \dots + \dots = 6$$

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.



ADDITION

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line number bonds, number line, sum, inverse,, near double, , is the same as (including equals sign),

Key skills for addition at Y1:

- Read and write numbers to 100 in numerals, incl. 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
- Using known facts

Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

Year 2

Add with 2-digit numbers

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



ADDITION

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

20	+	3	
+30	+	4	
<hr/>			
50	+	7	
		=	<u>57</u>

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	
<hr/>			
90	+	11	
		=	<u>101</u>

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

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. Children will also have access to rekenreks. Using concrete materials children will create picture/addition stories

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

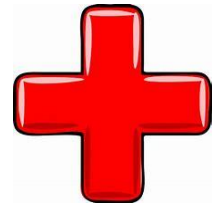
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, addition, column, tens boundary

Key skills for addition at Y2:

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

Year 3

Add numbers with up to 3 digits



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

ADDITION

Introduce the **expanded column addition** method:

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

Add the ones first in preparation for the compact method.

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



Move to the **compact column addition** method, with 'carrying':

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

Add ones first.

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

'Exchange' numbers underneath

Remind children the actual value is 'three tens add seven tens', not 'three add seven', which equals ten tens.

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

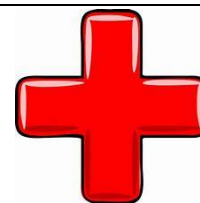
Key skills for addition at Y3:

- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- Add a three-digit number and ones mentally (175 + 8)
- Add a three-digit number and tens mentally (249 + 50)
- Add a three-digit number and hundreds mentally (381 + 400)
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones)

Continue to practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

ADDITION

Year 4 Add numbers with up to 4 digits



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Move from expanded addition to the compact column method, **adding ones first**, and 'exchange' numbers **underneath** the calculation. Also include money and measures contexts.

e.g. $3517 + 396 = 3913$

	Th	H	T	O
	3	5	1	7
+		3	9	6
	3	9	1	3

Add ones first.

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

Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hundreds, **not 5 add 3**, for example.

'Exchange' numbers underneath

Use this method to money and measurement values.

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

Key skills for addition at Y4:

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, ie. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.
- Estimate and use inverse operations to check answers to a calculation.

ADDITION

Year 5 Add numbers with more than 4 digits

Including money, measures and decimals with different numbers of decimal places. Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.



	T	O.	t	h
£	2	3	.	59
+	£	7	.	55
<hr/>				
£	3	1	.	14

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

	T	Th	H	T	O
	2	3	4	8	1
+		1	3	6	2
<hr/>					
	2	4	8	4	3

Numbers should exceed 4 digits.

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

	T	O.	t	h
	1	9	.	01
		3	.	65
+	0	.	7	
<hr/>				
	2	3	.	36

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

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

Children should:

Understand the place value of **tenths** and **hundredths** and use this to align numbers with different numbers of decimal places.

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

Key skills for addition at Y5:

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

Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

	T	O.	t	h	th
	2	3	.	3	6 1
		9	.	0	8 0
	5	9	.	7	7 0
+		1	.	3	0 0
	9	3	.	5	1 1
	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 measures):
- Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.
- Zeros could be added into any empty decimal places, to show there is no value to add.

	T	Th	Th	H	T	O
	8	1	,	0	5	9
			3	6	6	8
			1	5	3	0 1
+			2	0	5	5 1
	1	2	,	0	5	7 9

Adding several numbers with more than 4 digits.

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

Key skills for addition at Y6:

- 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.
- Children understand how to add mentally with larger numbers and calculations of increasing complexity.

SUBTRACTION

EYFS

Subtract from numbers within 10



Children are encouraged to gain a sense of the number system through the use of counting concrete objects.

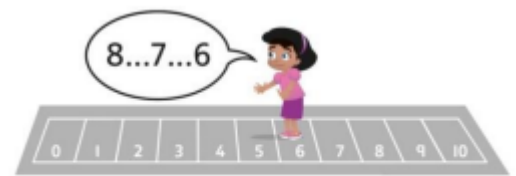


They understand subtraction as taking away/less than

They begin to count back in ones using objects, cubes and number line.



1 less than 6 is 5.
6 subtract 1 is 5.



$$9 - 3 = 6$$

They use concrete and pictorial representation to record their calculations.

They begin to use - and = They are encouraged to develop a mental picture of the number system in their heads to use for calculations.

Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

Key vocabulary: take away how many are left/left over? how many have gone? one less, two less, ten less ... how many fewer is ... than ...? how much less is ...? difference between

Key skills for subtraction at EYFS:

- understand subtraction as taking away/less than
- begin to count back in ones
- use concrete and pictorial representation to record their calculations

SUBTRACTION

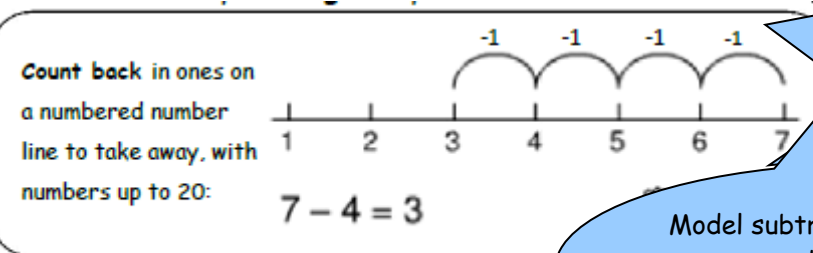
Year 1

Subtract from numbers up to 20



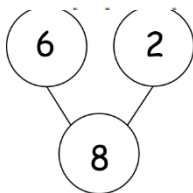
Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes, rekenreks etc. and in familiar contexts, and are introduced to more formal recording using number lines as below:

Subtract by taking away



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

Model subtraction using hundred squares and numbered number lines/tracks and practically.

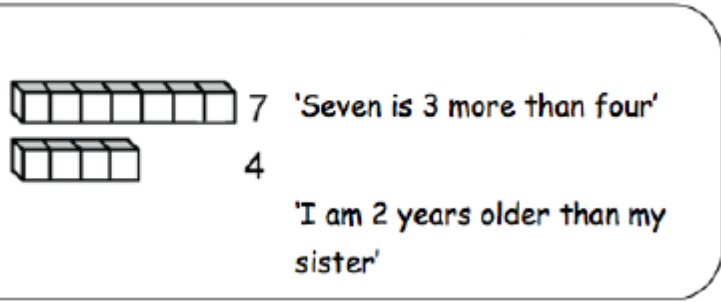


Find part of a part whole model

$$\boxed{8} - \boxed{2} = \boxed{6}$$

Find the 'difference between'

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



Mental subtraction

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

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_?

Key skills for subtraction at Y1:

- 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 (ie bead string, objects, cubes) and pictures, and missing number problems.
- Read and write numbers from 0 to 20 in numerals and words.

SUBTRACTION

Year 2

Subtract with 2-digit numbers



Subtract using the partitioned column method.

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)

Subtracting pairs of 2 digit numbers [see below]:

Step 1:

introduce this method with examples where no exchanging is required.

$$\begin{array}{r} 89 - 35 = 54 \\ 80 + 9 \\ - 30 + 5 \\ \hline 50 + 4 \end{array}$$

When learning to 'exchange', explore 'partitioning in different ways' so that children understand that when you exchange, the **VALUE** is the same ie $72 = 70+2 = 60+12 = 50+22$ etc. Emphasise that the **value hasn't changed**, we have just partitioned it in a different way.

Step 2:

introduce 'exchanging' through practical subtraction. Make the larger number with Base 10, then subtract 47 from it.

$$72 - 47$$



$$\begin{array}{r} 60 \\ 70 + 2 \\ - 40 + 7 \\ \hline 20 + 5 = 25 \end{array}$$

Before subtracting '7' from the 72 blocks, they will need to exchange a row of 10 for ten units. Then subtract 7, and subtract 4 tens.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer / less than, most, least, count back, how many left, how much less is_?

difference, count on, strategy, partition, tens, ones

Key skills for subtraction at Y2:

- 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 representations, 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 of one number from another cannot be done in any order.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.
- Solve simple addition and subtraction problems including measures, 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 2 and 3-digit numbers

Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Once secure with place value the compact column method is used.

Ensure children label columns HTO in order to help them understand the place value of each digit.

Ensure that children know that it's 4 ones take away 3 ones
7 tens or seventy take away 2 tens or twenty.

When modelling ask children, "Do we need to exchange?" "Where do we exchange from."

874 – 523 becomes

	H	T	O
	8	7	4
-	5	2	3
<hr/>			
	3	5	1
<hr/>			

	H	T	O
	3	³ 4	¹ 3
-	2	3	7
<hr/>			
	1	0	6

Always encourage children to consider the best method for the numbers involved—mental, counting on, counting back or written method

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

Key skills for subtraction at Y3:

- 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 (see examples above)
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction 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.

Year 4 Subtract with up to 4-digit numbers



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Compact method used to subtract integers of up to 4-digits.

	Th	H	T	O
	2	7	5	4
-	1	5	6	2
	1	1	9	2

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

Reinforce key questions from Y3

When modelling ask children, "Do we need to exchange?" "Where do we exchange from."

Mental subtraction

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.

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

Key skills for subtraction at Y4:

Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc. x_

Children select the most appropriate and efficient methods for given subtraction calculations.

Estimate and use inverse operations to check answers.

Solve addition and subtraction 2 -step problems, choosing which operations and methods to use and why. Solve simple measure and money problems involving fractions and decimals to two decimal places.

Find 1000 more or less than a given number.

Count backwards through zero, including negative numbers.

Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000 Solve number and practical problems that involve the above, with increasingly large positive numbers.

SUBTRACTION

Year 5 Subtract with at least 4-digit numbers



including money, measures, decimals.

Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Compact column subtraction

(with 'exchanging').

Subtracting with larger integers.

	TTh	Th	H	T	O
	2	3	0	8	6
-		2	1	2	8
		2	8	9	2

	Th	H	T	O	.	t
	7	6	9	0	.	0
-		3	7	2	.	5
	6	7	9	6	.	5

Continue to reinforce key concepts around exchanging as well as ensuring that children are secure with the place value of each digit.

Make the place value the same by using zero to hold the place in any empty decimal places to aid understanding of what to subtract

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

SUBTRACTION

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

Key skills for subtraction at Y5:

- 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 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 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.



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

	H	T	Th	Th	H	T	O
	7	8	10	6	9	9	
-		8	9	9	4	9	
		6	0	7	5	0	

Using the compact column method to subtract more complex integers

	H	T	O	.	t	h	th	
	7	10	5	.	4	1	9	kg
-		3	6	.	0	8	9	kg
		6	9	.	3	3	9	kg

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

Place value should be made the same by using a zero to hold the place in empty columns.

Children should be able to apply their knowledge of a range of mental strategies, mental recall skills, and informal and formal written methods when selecting **the most appropriate and efficient method** to work out subtraction problems.

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

Key skills for subtraction at Y6:

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.

Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.



MULTIPLICATION

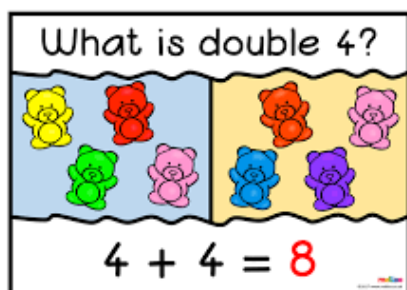
Children use concrete objects to make and count equal groups of objects.

They will count on using a number line.

$$3 + 5$$



They understand doubling as repeated addition. $2 + 2 = 4$



They use concrete and pictorial representation to record their calculations.

1.  $2 + 2 + 2 = \square$

2.  $4 + 4 = \square$

3.  $3 + 3 = \square$

Children also practise these as fast mental recall facts

Higher attaining children may be able to represent their calculations using symbols and numbers within a written calculation.

Key vocabulary: doubling, repeated addition

Key skills for multiplication at EYFS:

- understand doubling and the concept of repeated addition
- count on using a number line

MULTIPLICATION

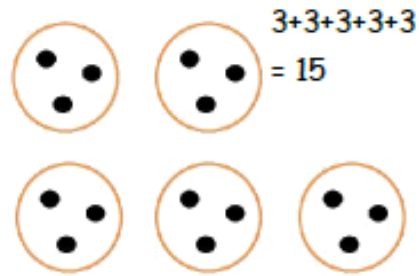
Year 1 Multiply with concrete objects, arrays and pictorial representations



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 group of objects in 2s, 5s and 10s.

Present practical problem solving activities involving counting equal sets or groups, as above.

Group objects and pictures of objects

Connect doubling as $\times 2$

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count

Key skills for multiplication at Y1:

- Fluently out 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.

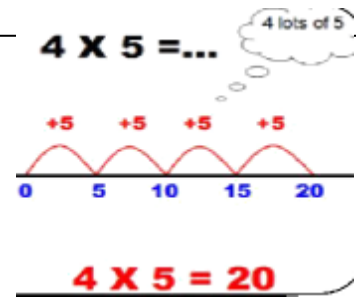
MULTIPLICATION

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

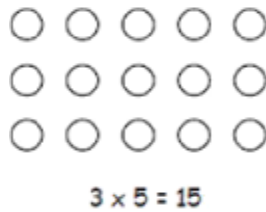


Use repeated addition on a number line:

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



Use arrays:



$$5 \times 3 = 15$$

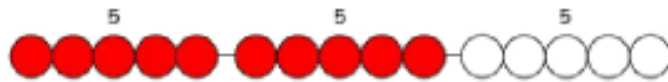
$$5 \times 3 = 3 + 3 + 3 + 3 = 15$$

$$3 \times 5 = 5 + 5 + 5 = 15$$

Use arrays to help teach children to understand the commutative law of multiplication, and give examples such as $3 \times \underline{\quad} = 6$.

Use practical apparatus:

$$5 \times 3 = 5 + 5 + 5$$



Use mental recall:

Children should **fluently recall multiplication facts for 2, 5 and 10** times tables through practice in counting and understanding of the operation.

Key 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, once, twice, three times...

Key skills for multiplication at Y2:

Fluently count in steps of 2, 3 and 5 from zero, and in 10s from any number.

Fluently recall and use multiplication facts from the **0, 1, 2, 5 and 10** multiplication tables, including recognising odds and evens.

Write and calculate number statements **using the \times and $=$ signs**. \times 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.

Children use a variety of language to discuss and describe multiplication.

MULTIPLICATION

Year 3 Multiply 2-digits by a single digit number



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Expanded column multiplication is introduced. As with addition and subtraction ensure the columns are labelled with the correct place value.

$$\begin{array}{r}
 67 \times 8 = 536 \quad \text{T O} \\
 \begin{array}{r}
 67 \\
 \times 8 \\
 \hline
 536
 \end{array}
 \end{array}$$

7×8
 60×8 ($6 \times 8 = 48$)
 So $67 \times 8 = 536$

Once secure the compact column method is introduced.

24 × 6 becomes

$$\begin{array}{r}
 \text{T O} \\
 24 \\
 \times \quad 6 \\
 \hline
 144 \\
 \hline
 2
 \end{array}$$

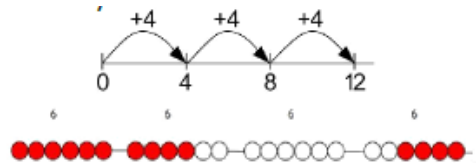
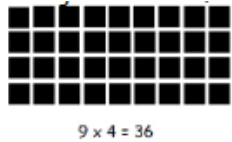
Answer: 144

To do this, children must be able to:

Partition numbers into tens and ones

Multiply multiples of ten by a single digit (e.g. 20×4) using their knowledge of multiplication facts and place value

Recall and work out multiplication facts in the **2, 4, 5, 8 and 10** times tables. Work out multiplication facts not known by repeated addition or other taught mental strategies (e.g. by 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:



Use mental recall:

Children should **fluently recall multiplication facts for 2, 3, 4, 5, 8 and 10** times tables through practice in counting and understanding of the operation.

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

Key skills for multiplication at Y3:

Fluently 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 (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 $\times 5 = 20$, $3 \times = 18$, $\times = 32$

MULTIPLICATION

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



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

Column multiplication is expanded to multiplying a 3-digit number by a 1-digit number. Again, the values of each place should be labelled and emphasised to the children.

342 x 7 becomes

	H	T	O	
	3	4	2	
x			7	
2	3	9	4	
	2	1		

Encourage column addition to add accurately

Answer: 2394

Children should be able to:

Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer. e.g: 346×9 is approximately $350 \times 10 = 3500$

Record an approximation to check the final answer against.

Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.

Recall all times tables up to 12×12

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

Key skills for multiplication at Y4:

Fluently count in multiples of 6, 7, 9, 25 and 1000

Fluently recall multiplication facts for **all multiplication tables up to 12×12** .

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.

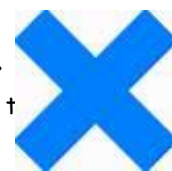
Use commutativity and other strategies mentally $3 \times 6 = 6 \times 3$, $2 \times 6 \times 5 = 10 \times 6$, $39 \times 7 = 30 \times 7 + 9 \times 7$.

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)

Year 5 Multiply up to 4-digits by 1 or 2 digits.



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

MULTIPLICATION

Introducing column multiplication

Children to continue to secure short multiplication from Y4 before moving on to long multiplication with numbers up to 3-digit numbers by 2-digit numbers and 4-digit numbers by 2-digit numbers. SHORT METHOD

342×7 becomes

	H	T	O	
	3	4	2	
x			7	
	2	3	9	4
	2	1		

Answer: 2394

Introduce long multiplication for multiplying by 2 digits

Children need to be taught to approximate first, e.g. for 18×13 , they will use rounding:

18×13 is approximately $20 \times 10 = 200$, and use the approximation to check the reasonableness of their answer against

		T	O	
		1	8	
x		1	3	
		5	4	
		2		
1	8	0		
2	3	4		

18×3 on the 1st row

($8 \times 3 = 24$, exchanging the 2 for twenty, then 1×3).

18×10 on the 2nd row. Put a zero in ones first, then say 8×1 , and 1×1 . When teaching this continue to ensure that children are secure with the place value of each digit and understand it's 8×10 and 10×10 etc

Children to be encouraged to use most EFFICIENT method for different calculations - may be the same method or may choose different methods depending on complexity of calculation.

Key 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, once, twice, three times..., partition, grid method, total, multiple, product, inverse, square, factor, integer, decimal, short/long multi-plication, 'exchange'

Key skills for multiplication at Y5:

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

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 2d.p by a single digit.



Note place value columns should be clearly labelled when modelling examples to support children in their understanding of the value of each digit.

LONG MULTIPLICATION.

Recap and secure previous learning on 3-digit by 2-digit numbers and 4-digit by 2-digit numbers.

$$\begin{array}{r}
 \text{Th H T O} \\
 1274 \\
 \times \quad \quad 32 \\
 \hline
 2548 \\
 38220 \\
 \hline
 40768
 \end{array}$$

$$\begin{array}{r}
 \text{HTO} \\
 124 \\
 \times 26 \\
 \hline
 744 \\
 +2480 \\
 \hline
 3224
 \end{array}$$

DECIMAL MULTIPLICATION

$$\begin{array}{r}
 \text{O . t h} \\
 3 . 19 \\
 \times 8 \\
 \hline
 25 . 52
 \end{array}$$

Remind children that the single digit belongs in the ones column.

Line up the decimal points in the question and the answer.

Children to be encouraged to use most EFFICIENT method for different calculations - may be the same method or may choose different methods depending on complexity of calculation.

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 2d.p. by a single digit**.

Use **long multiplication** (see Y5) to multiply numbers with **at least 4 digits** by a **2-digit number**.

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

Key skills for multiplication at Y6:

Fluently recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5)**.

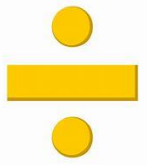
Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.

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 round and approximation and determine levels of accuracy.

Round any integer to a required degree of accuracy.



DIVISION

Children use concrete objects to count and share equally into 2 groups.

6 cakes shared between 2 people each person gets 3 cakes. $6 \div 2 = 3$



They count a set of objects and halve them by making two equal groups. They understand sharing and halving as dividing into equal groups. This is linked to odd and even numbers.

They will begin to use objects to make groups of 2 from a given amount.



*There are 10 children altogether.
There are 2 in each group.
There are 5 groups.*

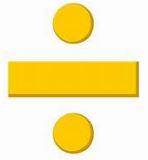
They use concrete and pictorial representation to record their calculations.

Key Vocabulary: grouping, sharing

Key number skills needed for division at EYFS:

- to understand sharing equally into different groups.

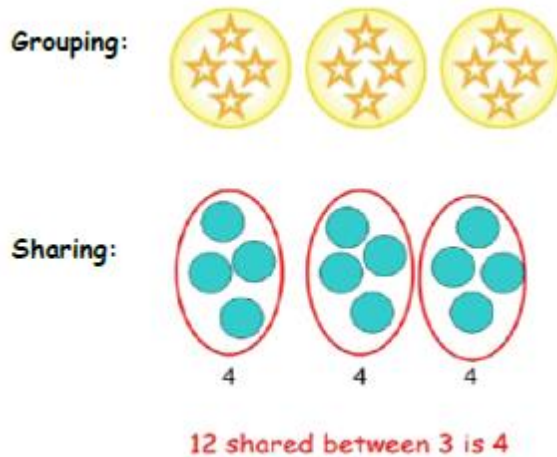
Year 1 Group and share small quantities



DIVISION

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

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



Example division problem in a familiar context:

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 each get?

Can they work it out and give a division statement? "18 shared between 6 people, gives you 3 each."

Children 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.

Key Vocabulary: share, share equally, one each, two each..., group, groups of, lots of, array

Key number skills needed for division at Y1:

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, children 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.

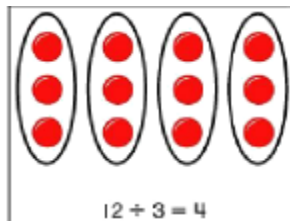
Year 2 Group and share, using the \div and $=$ sign



DIVISION

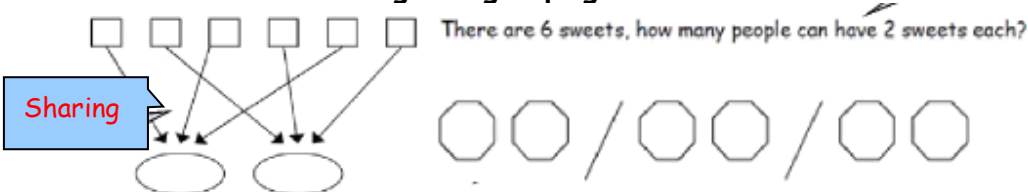
Use objects, arrays, diagrams and pictorial representations and grouping on a number line.

Arrays:



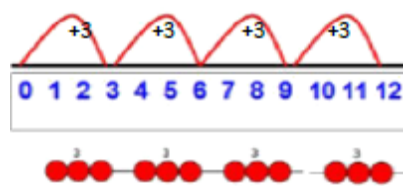
This represents $12 \div 3$, posed as how many groups of 3 are in 12? Children should also show that the same array can represent $12 \div 4 = 3$ if grouped horizontally.

Know and understand sharing and grouping:



Children should be taught to recognise whether problems require sharing or grouping

Group from zero in equal jumps of the divisor to find out 'how many groups of $_$ in $_$?' Children could use a bead string or practical apparatus to work out problems like 'A CD costs £3. How many CDs can I buy with £12?' This is an important method to develop understanding of division as grouping.



$$12 \div 3 = 4$$

Pose $12 \div 3$ as 'How many groups of 3 are in 12?'

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

Key number skills needed for division at Y2:

Count in steps of 2, 3, and 5 from 0

Fluently recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the \times , \div and $=$ signs.

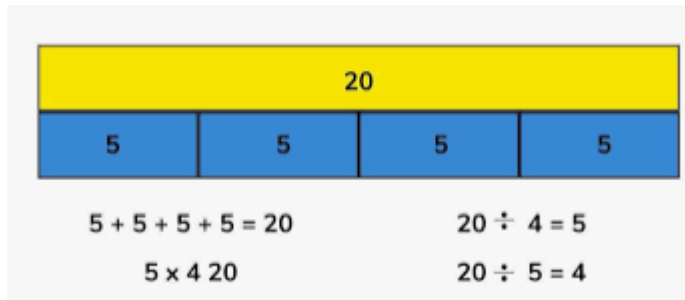
Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.

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

DIVISION

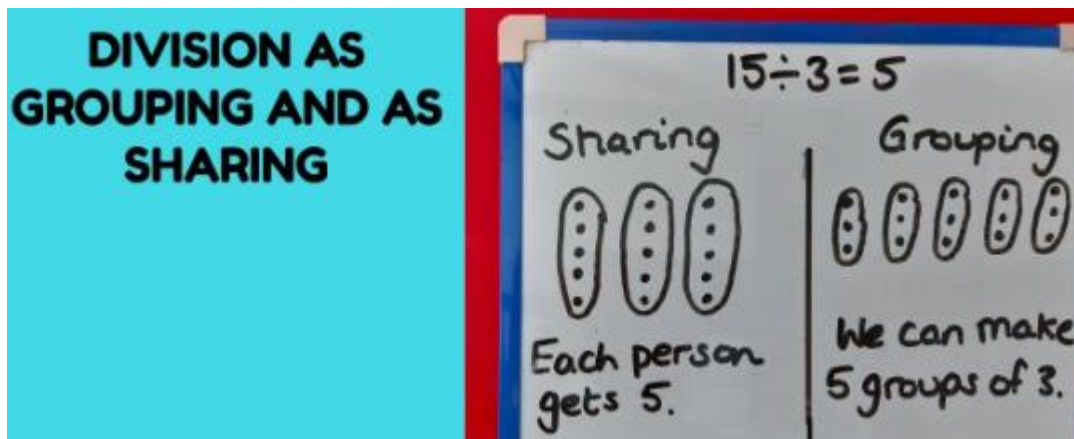
Year 3 Divide 2-digit numbers by a single digit (where there is no remainder in the final answer)

Moving on from methods taught in Year 2 division using a bar model is introduced. Children are also encouraged to use known multiplication facts for the inverse operation.



Children should be encouraged to count in multiples to assist with this.

Division through sharing and grouping is also used.



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

Key number skills needed for division at Y3:

Fluently 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.

Children 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 $20 = 60 \div 3$).

Children 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..

Year 4 Divide up to 3-digit numbers by a single digit (without remainders initially)



DIVISION

Continue to develop short division:

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

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

STEP 1: Children 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) but must understand how to calculate remainders, using this to 'exchange' remainders within the calculation process (see example).

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

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

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

When the answer for the **first column** is zero ($1 \div 5$, as in example), children could initially write a zero above to acknowledge its place, and must always 'exchange' the number (1) over to the next digit as a remainder. Children should at this point be encouraged to write the multiplication tables to support them.

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

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

Key number skills needed for division at Y4:

Fluently recall multiplication and division facts for all numbers up to 12×12 .

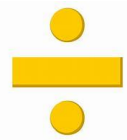
Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.

Children practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number

Children practise mental methods and extend this to three-digit numbers to derive facts, for example $200 \times 3 = 600$ so $600 \div 3 = 200$

Children 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.

Year 5 Divide up to 4 digits by a single digit, including those with remainders.



DIVISION

Short division, including remainder answers:

$$\begin{array}{r} 0663 \text{ r } 5 \\ 8 \overline{) 5309} \end{array}$$

Short division with remainders: Now that children are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where **children consider the meaning of the remainder and how to express it**, ie. as a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.

The answer to $5309 \div 8$ could be expressed as 663 and five eighths, $663 \text{ r } 5$, as a decimal, or rounded as appropriate to the problem involved

Include money and measure contexts when

See Y6 for how to continue the short division to give a decimal answer for children who are confident.

If children are confident and accurate:

Introduce **long division** for children who are ready to divide any number by a 2-digit number (e.g. $2678 \div 19$). This is a Year 6 expectation

Key Vocabulary: share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'exchange', remainder, multiple, divisible by, factor, inverse, **quotient, prime number, prime factors, composite number (non-prime)**

Key number skills needed for division at Y5:

Fluently recall multiplication and division facts for all numbers up to 12×12 (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 number.

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

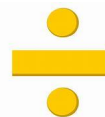
Use multiplication and division as inverses.

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.

Year 6

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



DIVISION

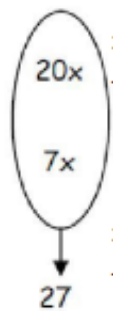
Short division, for dividing by a single digit: e.g. $6497 \div 8$

Short division with remainders: Children should continue to use this method, but with numbers to at least 4 digits, and understand how to express remainders as fractions, decimals, whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where children have to consider the most appropriate way to express the remainder.

$$\begin{array}{r} 0812.125 \\ 8 \overline{)6497.000} \end{array}$$

Calculating a decimal remainder: In this example, rather than expressing the remainder as r 1, a decimal point is added after the units because there is still a remainder, and the one remainder is carried onto zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved.

$$\begin{array}{r} 27 \\ 36 \overline{)972} \\ \underline{-720} \\ 252 \\ \underline{-252} \\ 0 \end{array}$$



Answer :

Find out 'How many 36s are in 972?' by subtracting multiples of 36, until zero is reached (or until there is a remainder).

Teach children to write a 'useful list' first at the side that will help them decide what chunks to use, e.g.:

Useful' list:

$1x = 36$

$2x = 72$

$5x = 180$

$10x = 360$

$100x = 3600$

Introduce the method in a simple way by limiting the choice of multiples to 'Can we use 100 lots? As children become confident with the process, encourage more efficient multiples to get to the answer more quickly (e.g. 20x, 5x), and expand on their 'useful' lists.

Must be aligned in place value for subtracting.

Where **remainders** occur, children should express them as fractions, decimals or use rounding, depending upon the problem.

Key Vocabulary: As previously, & common factor

Key number skills needed for division at Y6:

Fluently recall and use multiplication and division facts for all numbers to 12×12 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.