

Holywell Primary Calculation Policy



Based on 2014 National Curriculum

Review date September 2021

About our calculation policy

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

Aims of the Mathematics curriculum

"The national curriculum for mathematics aims to ensure that all pupils:

- *become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.*
- ***reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language*
- *can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.*

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects."

(DfES, The national curriculum in England, 2013 p99)

Providing a context for calculation:

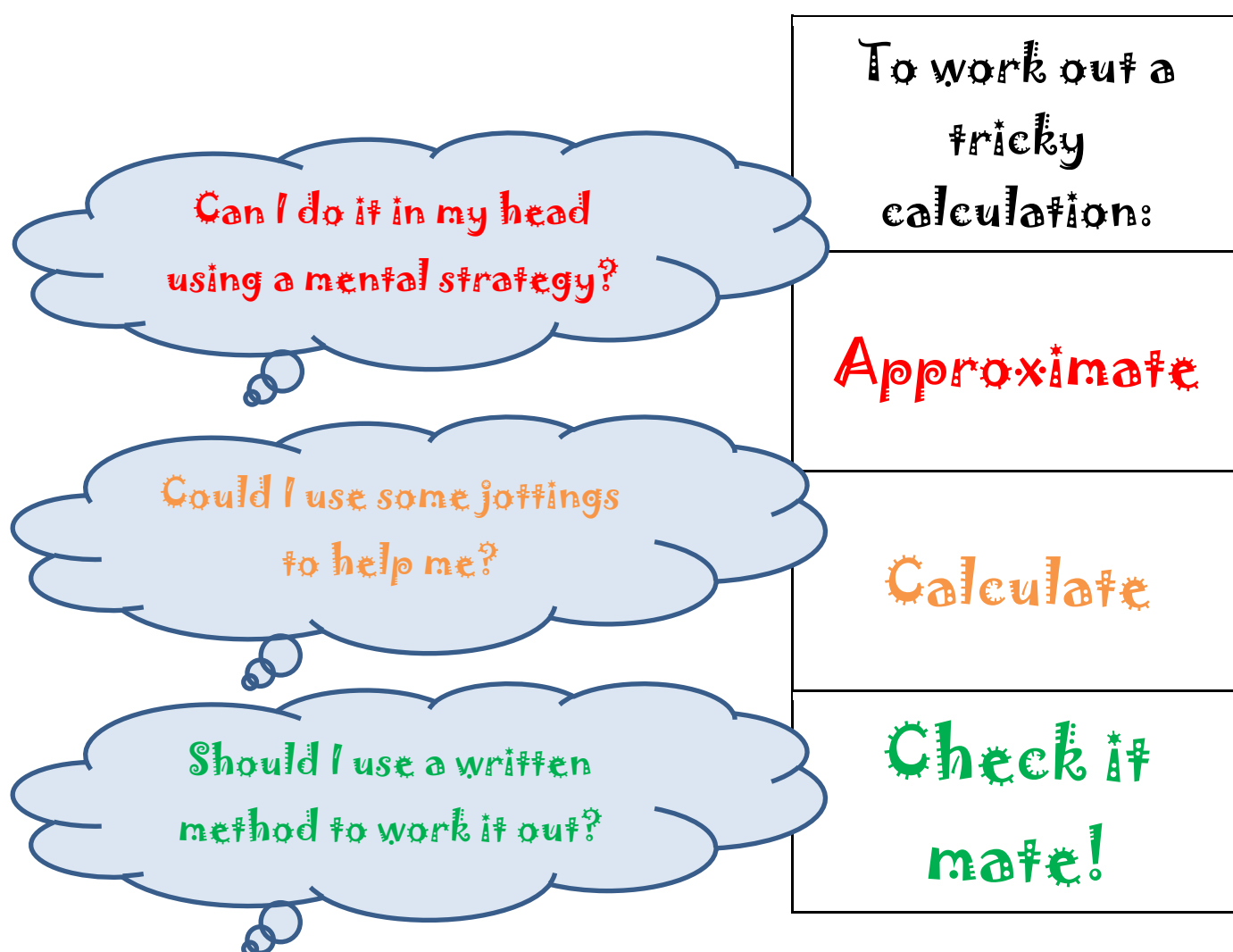
It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation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

Age stage expectations

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

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:



Number lines

Progression in number lines:

Number track - Has the numbers inside the sections, rather than on the divisions (Pre-national curriculum level)



Calibrated, numbered number line - Equal divisions marked on the number line and each division is numbered (Low Level 1)



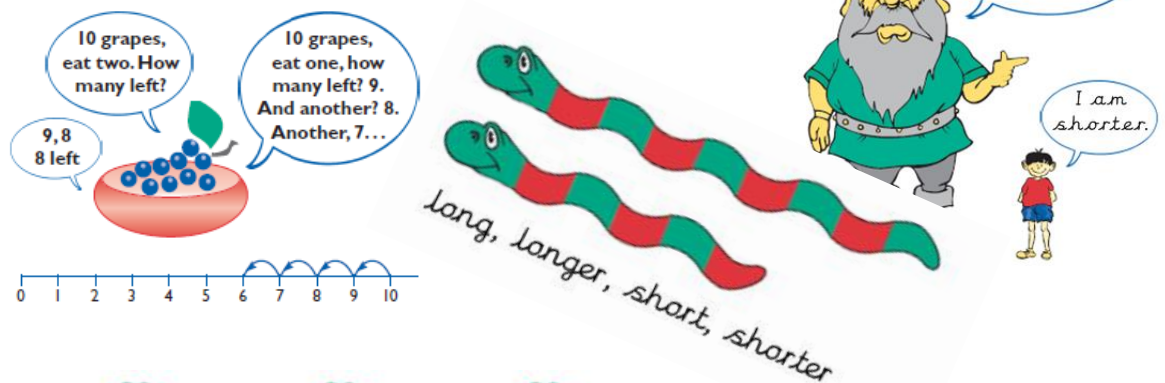
Calibrated, unnumbered number line - Equal divisions are marked, but left unnumbered for children to add relevant numbers to (Secure Level 1)



Blank (empty) number line - No divisions or numbers marked for the children (Level 2)



Foundation stage:



Imagine one more spot



Imagine one less spot



7 is 5 and 2 more
 $7 = 5 + 2$



By the end of foundation stage all children should be able to confidently:

- Count forwards to 100 in unison with other children.
- Count backwards from at least 20.
- Know the next number for any number up to 12, e.g. eight, _____.
- Match one-to-one in counting e.g. one counter, two counters ...
- Subitise numbers up to and including 6: do children recognise arrays, e.g. 6 dots on a dice, without counting?
- Match numbers to fingers, e.g. hold up 7 fingers (without counting each finger).
- Begin to compare numbers, e.g. knowing that 6 is bigger than 4.
- Know the story of 6 ($3 + 3$, $2 + 4$, $1 + 5$, $6 + 0$), and the stories of 5 and of 4 and of 3...
- Recognise some 2-digit numbers related to their own experiences. E.g. Daddy is 34, I live at number 56, etc.
- Recognise the difference between 'flat' and 'solid' shapes and describe shapes by mentioning a property, e.g. this one rolls, this one has corners...
- Spot and continue patterns
- Compare the size of things using mathematical language, e.g. Tom is taller than me.

Addition

Year 1 Add with numbers to 20

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

$$12 + 8 = 20$$



Children should:

- Have access to a wide range of resources for counting including everyday object, number tracks and number lines and experience numbers in different contexts
- Read and write the addition (+) and equals (=) signs in number sentences.

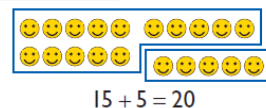
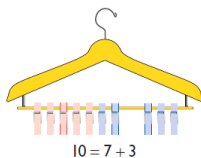
Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

Example

$$\begin{aligned} 2 &= 1 + 1 \\ 2 + 3 &= 4 + 1 \\ 3 &= 3 \\ 2 + 2 + 2 &= 4 + 2 \end{aligned}$$

- Interpret addition number sentences and solve missing number problems in different positions

$$\begin{aligned} 3 + 4 &= \square & \square &= 3 + 4 \\ 3 + \square &= 7 & 7 &= \square + 4 \\ \square + 4 &= 7 & 7 &= 3 + \square \end{aligned}$$



$$15 + 5 = 20$$

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

$$8 + 5 =$$



Use bead strings to illustrate addition including bridging 10, by counting on 2 and then counting on 3.



$$30p + 4p = 34p$$

Key vocabulary: put together, add, altogether, total, plus, more, equals, double, count on, number line, and, make

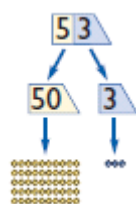
Key Skills for addition at Year 1:

- Recall number bonds to 10 and 20 and addition facts within 20
- Count to and just over 100
- Count in steps of 1, 2, 5 and 10
- Read and write numbers to 100 in numerals and 1 – 20 in words
- Solve simple one-step problems involving addition, using concrete objects, number lines and pictorial representations.
- Recognise the + and = sign, and use these to read and write simple additions
- Recognise doubles to double 6 and find related halves (half even numbers ≤ 12).

Addition

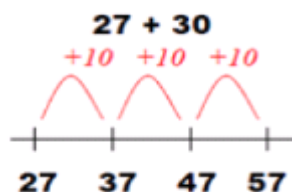
Year 2 Add with 2 digit numbers

Pupils develop confidence and mental fluency with whole work with a range of practical resources alongside



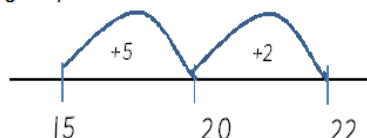
numbers, counting and place value. They introducing more formal methods.

Add 2 -digit numbers and tens:



Add 2-digit numbers and units:

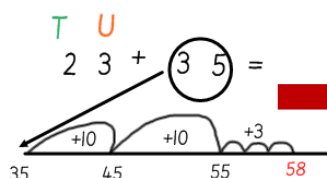
$$15 + 7$$



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

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

Largest number first. Partition and add the second number.



$$24 + 35 =$$

20	+	4	
30	+	5	
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 or 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 could move onto the expanded addition methods with 2 and 3 digit numbers (see Year 3).

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

Key Skills for addition at Year 2:

- Add a two digit number and ones (e.g. $27 + 4$)
- Add a two digit number and tens (e.g. $34 + 50$)
- Add two-2 digit numbers (e.g. $23 + 35$)
- Add three one-digit numbers (e.g. $5 + 6 + 8$)
- Understand that adding can be done in any order (commutative law)
- Derive and recall bonds to 100 (e.g. $40 + 60$) and number bonds to 20
- Count in steps of 2, 3 and 5 from 0 and in tens from any number forward and backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Read and write numbers to at least 100 in numerals and in 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

Children are introduced to the expanded column addition method:

	H	T	U				
	5	4	7				
+	3	8	2				
			9	(U 7 + 2)			
	1	2	0	(T 40 + 80)			
+	8	0	0	(H 500 + 300)			
	9	2	9				

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

In order to carry out this method of addition:

- Children need to recognise the value of the hundreds, tens and units and progress towards recording without the partitioning.
- Pupils need to be able to add in columns.



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

	H	T	U
	5	4	7
+	3	8	2
			9
	9	2	9
	1		

Children become confident with 3-digit expanded addition and move onto the compact column addition method with 'carrying' for the first time. Compare the compact column method to develop and reduce the number of steps.

There is 'four tens add eight units' which equals twelve tens.

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

Key Skills for addition at Year 3:

- 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 digit in 3-digit numbers (hundreds, tens, ones)
- Continue to practise a wide range of mental addition strategies i.e. number bonds, adding to the nearest multiple of 10, 100, 1000 and adjusting, using near doubles, partitioning and recombining

Addition

Year 4 Add numbers with up to 4 digits

Children move from expanded column addition to the compact column method, adding units first and 'carrying' numbers underneath the calculation. Also include money and measures contexts.

e.g.

$$3518 + 396 = 3913$$

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

value by reminding them
ls and 3 hundreds, **not 5**
add 3, for example

'Carry' numbers **underneath** the
bottom line.

Use and apply this method to money
and measurement values.

Stress the importance of lining
up the decimal points

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

	U	.	$\frac{1}{10}$	$\frac{1}{100}$
£	5	.	1	7
+	3	.	9	6
£	9	.	1	3
	1		1	

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

Key Skills for addition at Year 4:

- Select the 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.
- 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 or 100 and adjust, use near doubles, partitioning and recombining
- Add numbers with up to 4 digits using a formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.

Addition

Year 5 Add numbers with more than 4 digits

Including money and measures with different numbers of decimal places.

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.

Children should be taught to read, write and order numbers to at least 1,000,000 determining the value of each digit.

H	T	U			
T	h	T	h	T	U

14 digits.

Pupils should be able to add more than two values carefully aligning the place value columns. They should understand the place value of **tenths** and **hundredths** and use this to align numbers with different numbers of decimal places

T	U	.	$\frac{1}{10}$	$\frac{1}{100}$
1	9	.		
2	3	.	5	0

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.

more, and, make, altogether, total, equals, equal to, double, count on, number line, sum, tens, units, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, decimal places, decimal point, tenths, hundredths, thousandths

Year 5:

with increasingly large numbers, using and practising a range of mental strategies i.e. add 10, 100 and 1000 and adjust; use near doubles, inverse, partitioning and re-combining; using

answers and accuracy

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

compare numbers to at least 1 million and determine the value of each digit.

round 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 methods of columnar addition

Addition

Year 6 Add several numbers of increasing complexity

T	U	.	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$	th different numbers of money and measures):
2	3	.	3	6	1	
	9	.	0	8	0	and thousandths should
5	9	.	7	7	0	, with the decimal point
+	1	.	3	0	0	cluding in the answer
9	3	.	5	1	1	to empty decimal
2	1		2			value at add.

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

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

Adding several numbers with more than 4 digits

Key vocabulary: add, plus, more, and, make, altogether, total, equals, equal to, double, count on, number line, sum, tens, units, partition, recombine, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', 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 large numbers and calculations of increasing complexity

Subtraction

up to

on bead
contexts, and
number lines as

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

20

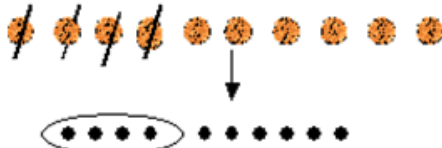
Year 1 Subtract from numbers

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

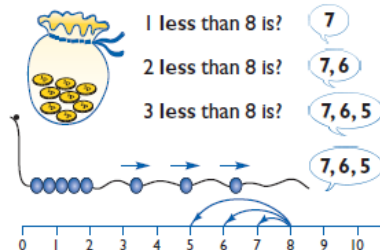
below:

Subtract using pictures and objects

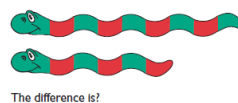
Sam spent 4p. What was his change from 10p?



1 less than 10 is 9
10 subtract 1 equals 9
 $10 - 1 = 9$



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



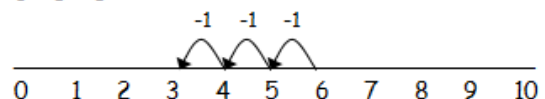
The difference is?

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

Subtract by taking away

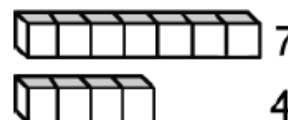
Count back in ones on a numbered number line to takeaway, with numbers up to 20.

$$6 - 3 = 3$$



Find the 'difference between'

Introduce practically with the language 'find the difference between' and 'how many more?' in a range of familiar contexts



'Seven is 3 more than 4'
'I am 2 years older than my sister'

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, difference 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 Year 1:

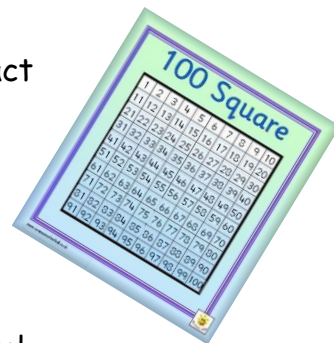
- Given a number, say one more or one less
- Count to and over 100, **forward and back**, from any number
- Represent and use **subtraction facts to 20 and within 20**
- Subtract with **one digit and two digit numbers to 20 and within 20**
- Solve one-step problems that involve addition and subtraction, using concrete objects (i.e. bead string, object, 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

Children move from counting on a numbered number line to counting forwards and **backwards on a hundred square** in steps of tens and ones.



Subtract on a number line by counting back, aiming to develop mental subtraction skills.

This strategy will be used for:

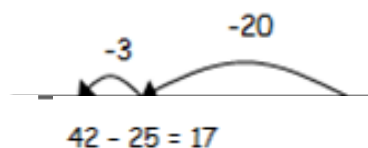
- **2-digit numbers subtract units** (by taking away / counting back) e.g. $36 - 7$
- **2-digit numbers subtract tens** (by taking away / counting back) e.g. $48 - 30$
- **Subtracting pairs of 2-digit numbers** (see below:)

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

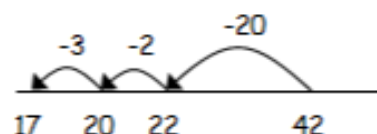
Partition the second number and subtract it in tens and units, as below:

Step 1: Partition the second number and subtract it in tens and units

Step 2: Move towards more efficient jumps back, as below:

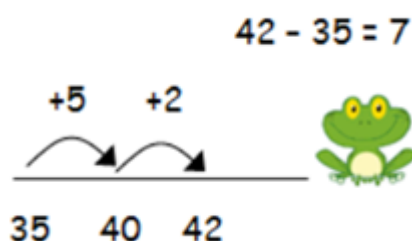


Step 3: Teaching children to **bridge through ten** can help them to become more efficient, for example, $42 - 25$



Mental strategy - subtract numbers close together by counting on:

Frog targets the next tens number, using number bonds and counts on to the largest.



Many mental strategies are taught including the 'frog' method for counting on. Children 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.

Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, difference 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**

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 equipment, pictorial representations, 100 squares and mentally.
- 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, applying their increased knowledge of mental and written methods

Subtraction

Year 3 Subtract with 2 and 3 digit numbers

Introduce **partitioned column subtraction** method.

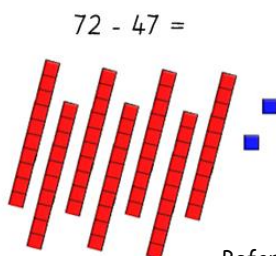
Step 1: Introduce this method with examples where no exchanging is required

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

When learning to exchange, explore 'partitioning' in different ways so that pupils understand that when you exchange, the **VALUE** is the same i.e. $72 = 70 + 2 = 60 + 12 = 50 + 22$ 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.



$$72 - 47 =$$

$$\begin{array}{r} 60 - 40 = 20 \\ 2 - 7 = \text{need to exchange} \\ 12 - 7 = 5 \\ \hline 20 + 5 = 25 \end{array}$$

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

Step 3: Once pupils are secure with the 'exchanging', they can use the partitioned column method to subtract any 2 and 3 digit numbers.

$$\begin{array}{r} 238 - 146 = \\ \hline 90 + 2 = 92 \end{array}$$

Subtracting money:
Partition into
e.g. £1 + 30p + 5p

Counting on as a mental strategy for subtraction:

Continue to reinforce **counting on** as a strategy for close-together numbers (e.g. 121- 98), and also for numbers that are nearly' multiples of 10, 100, 1000 or £s, which can make it easier to count on (e.g. 102- 89, 131-79)

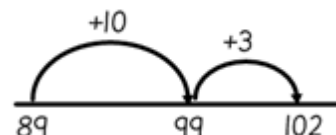


Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, difference between how many more, how many fewer / less than, most, least, count back, how many left, how much less is _?, difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit

Key Skills for subtraction at Year 3:

- 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 three-digit number
- Counting up differences as a mental strategy when numbers are close together or near-multiples of 10 (see above)
- 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. subtract 19 or 21) and selecting most appropriate methods to subtract, explaining why

Because counting on in tens is what we do on the 100sq!



Subtraction

Year 4 Subtract with up to 4-digit numbers

Partitioned column subtraction with 'exchanging' (decomposition):

$$\begin{array}{r}
 2754 - 1562 = 1192 \\
 \begin{array}{r}
 1000 \quad 600 \\
 2000 \rightarrow 700 \rightarrow 150 \rightarrow 4 \\
 -1000 \rightarrow 500 \rightarrow 60 \rightarrow 2 \\
 \hline
 1000 + 1000 + 900 + 2
 \end{array}
 \end{array}$$

Subtracting money:
Partition into e.g. £1 + 30p + 5p

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

Compact column subtraction (see video resources)

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

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

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

es to apply
asures

Mental strategies

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



Approximate
Calculate
Check it mate!

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

Key Skills for subtraction at Year 4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use 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

Compact column subtraction (with 'exchanging').

$$\begin{array}{r}
 \overset{2}{\cancel{3}} \overset{10}{\cancel{1}} \overset{10}{\cancel{0}} \overset{4}{\cancel{5}} \overset{6}{\cancel{6}} \\
 - \quad \quad 2 \quad 1 \quad 2 \quad 8 \\
 \hline
 2 \quad 8, \quad 9 \quad 2 \quad 8
 \end{array}$$

Subtracting with larger integers.

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.

$$\begin{array}{r}
 \overset{6}{\cancel{7}} \overset{10}{\cancel{1}} \overset{6}{\cancel{6}} \overset{8}{\cancel{9}} \cdot \overset{0}{\cancel{0}} \\
 - \quad \quad 3 \quad 7 \quad 2 \cdot 5 \\
 \hline
 6 \quad 8 \quad 8 \quad 5
 \end{array}$$

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

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

...ties for subtracting and finding differences with money and measures.

Approximate

Calculate

Check it mate!

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

$$\begin{array}{r} \cancel{9}^{\text{th}} \cancel{4}^{\text{th}} \cancel{5}^{\text{th}} \cancel{10}^{\text{th}} \text{'6} \text{ } 9 \text{ } 9 \\ - \quad \quad 8 \text{ } 9 \text{ } 9 \text{ } 4 \text{ } 9 \\ \hline \quad \quad \quad \quad \quad 5 \text{ } 0 \end{array}$$

Using the compact column method to subtract more complex integers

Approximate

Calculate

Check if safe!

$$\begin{array}{r} \cancel{9}^{\text{th}} \cancel{10}^{\text{th}} \text{'5} \cdot \cancel{4}^{\text{th}} \text{'1} \text{ } 9 \text{ kg} \\ - \quad \quad 3 \text{ } 6 \cdot \quad \quad 0 \text{ } 8 \text{ kg} \\ \hline \quad \quad 6 \text{ } 9 \cdot \quad \quad 3 \text{ } 3 \text{ } 9 \text{ kg} \end{array}$$

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

0

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

Pupils 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 method** to work out subtraction problems.

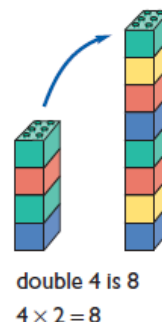
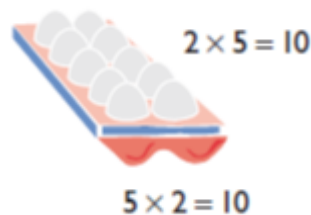
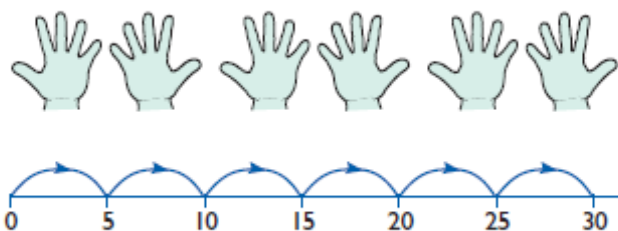
Key vocabulary: equal to, take, take away, less, minus, subtract, leaves, difference between how many more, how many fewer / less than, most, least, count back, how many left, how much less is $_?$, difference, count on, strategy, partition, tens, units, exchange, decrease, hundreds, value, digit, inverse, 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.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

Multiplication

Year 1 Multiply **with**



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



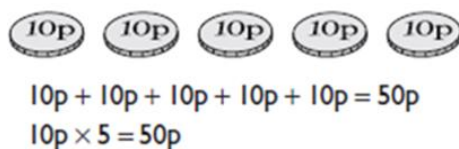
How many legs will 3 teddies have?



$$2 + 2 + 2 + 2 + 2 = 10$$

$$2 \times 5 = 10$$

**concrete
pictorial**



**objects, arrays and
representations.**

- 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.

Key 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.

~~X~~Multiplication

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

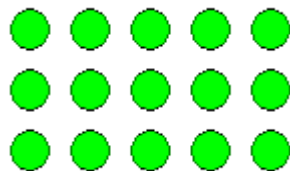
Use repeated addition on a number line:

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



$$4 \times 5 = 20$$

Use arrays:



$$5 \times 3 = 15$$

$$3 \times 5 = 15$$

$$3 \times 5 = 5 + 5 + 5 = \underline{15}$$

$$5 \times 3 = 3 + 3 + 3 + 3 = \underline{15}$$

- 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 begin to **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 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 \times and $=$ signs**.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition, mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

Multiplication

Year 3 Multiply 2-digits by a single digit number

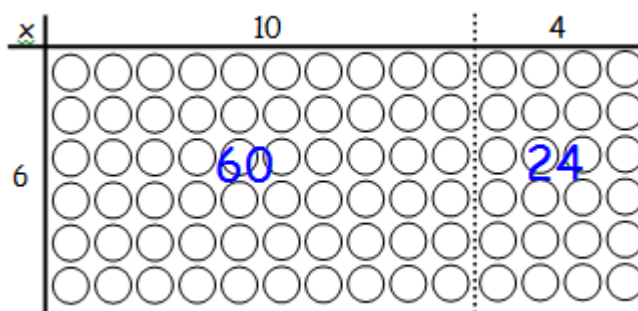
Introduce the **grid method** for multiplying 2-digit by single-digits:

Link the layout of the grid to an array initially.

E.g. $14 \times 6 = 84$

x	10	4
6	60	24

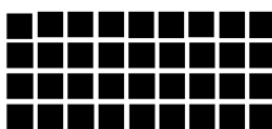
$$60 + 24 = 84$$



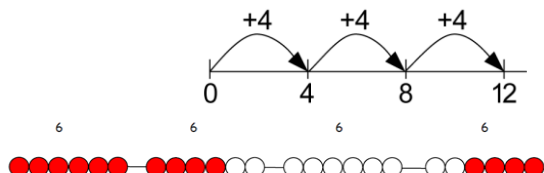
Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value equipment), then translate this to grid method format (see video clip & internet resources).

To do this, children must be able to:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit (e.g. 20×4) using their knowledge of multiplication facts and place value - understand the associative law
- Recall and work out multiplication facts in the **2, 3, 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:



$$9 \times 4 = 36$$



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, units, value

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.
- 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 ($4 \times 12 \times 5 = 4$

Multiplication

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

Developing the grid method:

Children will approximate first 346×9 is approximately $350 \times 10 = 3500$

x	300	40	6
9	2700	360	54

Encourage **column addition** to add accurately

$$\begin{array}{r} 3114 \\ 11 \end{array}$$

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

Approximate

Calculate

Check it mate!

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.:
- 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**

346×9 is
approximately
 $350 \times 10 = 3500$

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 Year 4:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for **all multiplication tables up to 12×12** .
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- 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.

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 (see video).
- Children need to be taught to approximate first, e.g. for 72×38 , they will use **rounding**: 72×38 is approximately $70 \times 40 = 2800$, and use the approximation to check the reasonableness of their answer against.

Approximate

Calculate

Check it mate!

Short multiplication for multiplying by a single digit:

\times	300	20	7
4	1200	80	28

	H	T	U
3	2	7	
$\times 4$			
	2	8	(4 \times 7)
	8	0	(4 \times 20)
1	2	0	0 (4 \times 300)
	1	3	0
	1	3	0

	H	T	U
3	2	7	
$\times 4$			
1	3	0	8
	1	2	

method used in Year 4
asked to work out a
the grid, and then
umn method. What are
ferences?

Introduce long multiplication for multiplying by 2 digits:

$13 \times 14 =$		
X	10	3
10	100	30
4	40	12

13×4 on the 1st row
($4 \times 3 = 12$, carrying the 1, for
ten, then 1×4)
 13×10 on the 2nd row. Put a
zero in the units first, then
say 3×1 , then 1×1

The grid could be used to introduce long-multiplication, as
the relationship can be seen in the answers in each row.

Step 3: Once children are happy with carrying underneath they can unpick the steps and show how short multiplication methods reduce the steps. Children confident in place value and 'carrying' could miss out step 2.

Moving towards more complex numbers:

E.g. extending to 4-digit \times single digit calculations using a short division method.

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, square, factor, integer, decimal, short/long multiplication, 'carry'

Key Skills for multiplication at Year 5:

- 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

Multiplication

Year 6 Short and long multiplication as in Yr 5, and multiply decimals with up to 2 d.p. by a single digit.

Remind children that the single digit belongs in the units' column.

		3	.	1	9
		x	8		
		<hr/>			
	2	5	.	5	2
		1		7	

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

This works well for money and measures.

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.

Approximate

Calculate

Check it mate!

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

Key Skills for multiplication at Year 6:

- Recall multiplication facts for all times tables up to 12×12 (as Y4 and Y5).
- Multiply multi-digit numbers, up to 4-digit \times 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



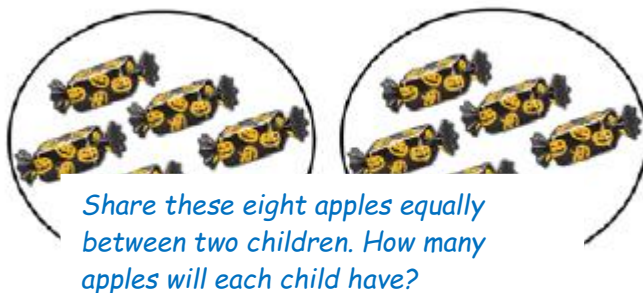
Year 1 Group and share small quantities

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

Sharing:

Children will start with practical sharing using a variety of resources. They will share objects into equal groups in a variety of situations. They will begin to use the vocabulary associated with division in practical contexts.

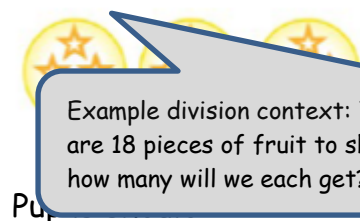
Share 10 sweets between two children.



Grouping:

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

12 children get into teams of 4 to play a game. How many teams are there?



Example division context: There are 6 pupils 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?

- 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 skills needed for division at Year 1:

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

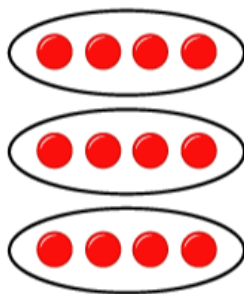
Division



Year 2 Group and share, using the ÷ and = sign

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

Arrays:



$$12 \div 4 = 3$$

This represents $12 \div 4$, posed as how many groups of 4 are in 12?

Pupils should also show that the same array can represent $12 \div 3 = 4$ if grouped vertically.

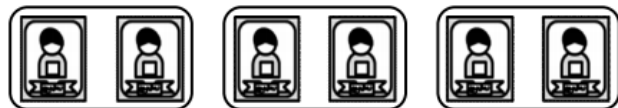
Know and understand sharing and grouping:

Grouping

6 football stickers are shared between 2 people. How many do they each get?



Sharing



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

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

Grouping using a number line:

Group from zero in equal jumps of the divisor to

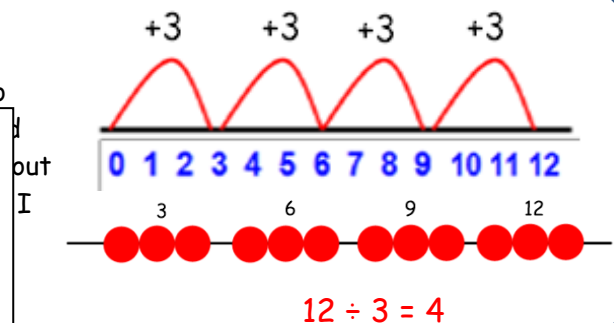
to each..., group, groups of, lots of, array,
number line, left, left over

for the 2, 5 and 10 multiplication tables, including recognising odd and

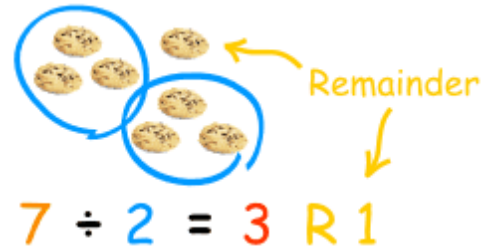
ication and division within the multiplication tables and write them

be done in any order (commutative) and division of one number by

ision, using materials, arrays, repeated addition, mental methods, and
blems in contexts.

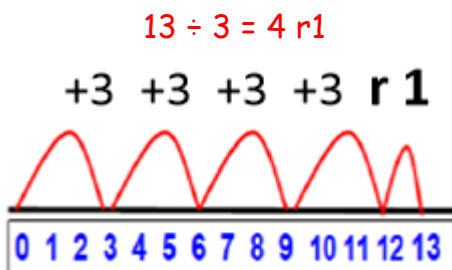


Division



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

Grouping on a number line:



STEP 1: Children continue to work out unknown division facts by grouping on a number line from zero. 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.

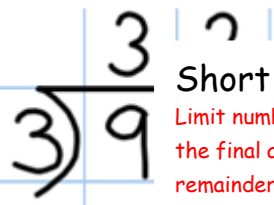
STEP 2: Once children are secure with division as grouping

Short division: Limit numbers to **NO** remainders in the answer **OR** carried (each digit must be a multiple of the divisor).

using number lines, arrays etc., **short** digit numbers should be introduced, selected examples requiring no remainders at all. Start by introducing short division by comparing it to an array.



Short division by comparing it to an array.



Short division:

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

place value, that 96 is on, pose: and record it above the and record it above the

STEP 3: Once children demonstrate a full understanding of remainders, and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. $96 \div 4$), 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.**

Step 3 Only taught when pupils can calculate 'remainders'.

Key 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 needed for division at Year 3:

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

Division

Year 4 Divide up to 3-d
(without remainders in

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

Continue to develop short di

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

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).

remainder at this stage. Children who exceed this expectation may progress to Y5 level.

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

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

Include money and measure contexts when confident.

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

Key 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, divisible by, factor

Key skills needed for division at Year 4:

- 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

Division



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

Short division, including remainder answers:

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

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

Include **money** and **measure** contexts.

Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division needs 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 or value, depending upon the context of the problem.

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 pupils who are ready to divide any number by a 2-digit number (e.g. $2678 \div 19$). This is a Year 6 expectation.

Approximate

Calculate

Check it mate!

Key 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, divisible by, factor, **quotient**, **prime number**, **prime factors**, **composite number (non-prime)**

Key skills needed for division at Year 5:

- 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.

Division



Year 6 Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

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

$$\begin{array}{r} 8 \overline{) 6497.000} \\ \underline{8} \\ 64 \\ \underline{64} \\ 97 \\ \underline{96} \\ 17 \\ \underline{16} \\ 10 \\ \underline{10} \\ 00 \\ \underline{00} \\ 00 \\ \underline{00} \\ 00 \\ \underline{00} \\ 00 \end{array}$$

Short division with remainders: Pupils 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 pupils have to consider the most appropriate way to express the remainder.

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.

Introduce **long division by chunking** for dividing by 2 digits.

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

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

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

Useful list:

1x = 36

10x = 360

100x = 3600

Introduce the method in a simple way by limiting the choice of chunks to 'Can we use 10 lots? Can use 100 lots? As children become confident with the process, encourage more efficient chunks to get to the answer more quickly (e.g. 20x, 5x), and expand on their 'useful' lists

Approximate

Calculate

Check it mate!

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

20x
 7x
 ↓
 27

Key vocabulary: As previously, & common factor

Key skills needed for division at Year 6:

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

websites for teaching support and interactive games

Addition:

Using a range of equipment and strategies to reinforce addition statements / bonds to 10

Video 1 -

<http://www.youtube.com/watch?v=OkW1Y11tGxw&list=PLQqF8sn28L9wjDm8uJEJcRCDDoY6raPE>

E

Demonstration of expanded 3 digit column addition

Video 2 - http://www.teachertube.com/viewVideo.php?video_id=24325

Expanded Addition -

<http://www.topmarks.co.uk/Flash.aspx?f=AddExpandv2>

Compact Addition method - To model when you will need to regroup for additions with carrying

<http://www.harcourtschool.com/activity/elab2004/gr3/3.html>

Subtraction:

Find change from a given amount - counting on method for subtraction

<http://www.doorwayonline.org.uk/tillwemeet-fullscreen.html>

Expanded column subtraction methods with and without borrowing and compact method with exchange can all be practised here:

http://mathsframe.co.uk/en/resources/resource/48/column_subtraction

Subtraction - Teaching children to consider the most appropriate method before calculating

Video clip 1 - <http://www.youtube.com/watch?v=RCCLseBLBSO>

Introducing partitioned column subtraction method, from practical to written

Video 2 - <http://www.youtube.com/watch?v=dP8NIFLZzOg>

Moving to column subtract method of subtraction

Video 3 - <http://www.youtube.com/watch?v=3ihxp2mqnhs>

Multiplication:

Teaching for understanding of multiplication facts

Video 1 -

<http://www.youtube.com/watch?v=YPWmOVt8vgw&list=PLQqF8sn28L9yj34NpXK7Yffze7ZoXTiix>

Practical multiplication and the commutative law

Video 2 -

<http://www.youtube.com/watch?v=VGkjjVfnGYI&list=PLQqF8sn28L9yj34NpXK7Yffze7ZoXTiix&index=2>

Teaching the grid method as an interim step

Video 3 -

<http://www.youtube.com/watch?v=qyTRtoqYi7Q&list=PLQqF8sn28L9yj34NpXK7Yffze7ZoXTiix>

Moving from grid to compact method for multiplication

Video 4 -

http://www.youtube.com/watch?v=5ppOF53x_q0&list=PLQqF8sn28L9yj34NpXK7Yffze7ZoXTiix

Reinforcing rapid times table recall

Video 5 -

<http://www.youtube.com/watch?v=BcIjRLZzMaw&list=PLQqF8sn28L9wjDm8uJEJcRCDDoY6raPE&index=2>

Demonstration of long multiplication

Video 6 - http://www.youtube.com/watch?v=t_bnlB2KRL4