

ABBEY LANE PRIMARY SCHOOL



Maths Calculation Booklet

This document has been written in line with the National Curriculum for mathematics (September 2014). The purpose of the policy is twofold. Firstly, it contains the key written methods that will be taught within our school and has been written in order to ensure consistency and progression throughout the school. Secondly, it supports teachers when trying to identify appropriate pictorial and concrete representations to help develop understanding.

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

We believe that it is fundamental that pupils can move from conceptual learning to abstract learning in order to be able to apply their mathematical skills to reasoning and problem solving. To reflect this ideology, the calculation strategies used will focus on moving from concrete to pictorial and then to abstract recording (CPA). Pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. Mental methods and strategies will also work alongside these methods.

Mathematical Language

The 2014 National Curriculum reflects the importance of pupils using the correct mathematical language as a central part of their learning. 'The quality and variety of language that pupils hear and speak are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof' (National Curriculum for Mathematics, 2014)'. It is therefore essential that teaching is accompanied by the use of correct vocabulary and that new vocabulary is introduced in a suitable context.

Definition of terminology

Concrete – Children use practical apparatus such as base 10, place value counters, Cuisenaire rods, Numicon and plastic coins to complete calculations. The main focus is to investigate new concepts and ideas, develop an understanding of the place value of numbers and recognise links to prior learning.

Pictorial – Children draw images of practical apparatus to encourage them to begin developing mental pictures of calculations and visualise the calculation. Children make links between concrete and abstract representations.

Abstract – Children represent prior learning using mathematical symbols. They consolidate the understanding formed through concrete and pictorial investigation and use digits and symbols to represent calculations.

How does concrete, pictorial and abstract impact children's learning?


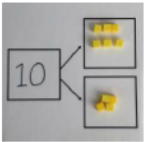

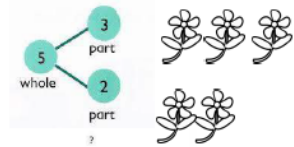
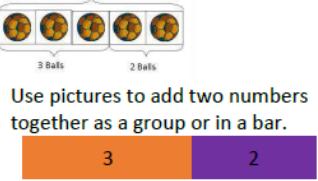
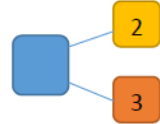

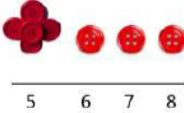




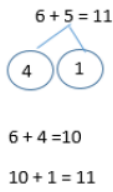
Addition – Year 1

Add with numbers up to 20

Key number skills for addition at Year 1:

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

Some examples of methods used in class are :

	Objective	Concrete	Pictorial	Abstract
Year 1	Number bonds of 5, 6, 7, 8, 9 and 10	  <p>Use cubes to add two numbers together as a group or in a bar.</p> 	  <p>Use pictures to add two numbers together as a group or in a bar.</p>	$2 + 3 = 5$ $3 + 2 = 5$ $5 = 3 + 2$ $5 = 2 + 3$  <p>Use the part-part-whole diagram as shown above to move into the abstract.</p>
	Counting	 <p>Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.</p> 	<p>Use a number line to count on in ones.</p> 	$5 + 3 = 8$
Year 1	Regrouping to make 10	  <p>$6 + 5 = 11$</p> <p>Start with the bigger number and use the smaller number to make 10.</p>	  <p>$6 + 5 = 11$</p> <p>$6 + 4 = 10$</p> <p>$10 + 1 = 11$</p>	$6 + 5 = 11$

Note:

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.



Children Should:

- Have access to a wide range of counting equipment, everyday objects, number tracks, whole, part, part models, ten frames and number lines
- Understand that addition can be done in any order
- Read and write the addition (+) and equals (=) signs within number sentences
- Strengthen their understanding of the = sign
- Interpret addition number sentences and solve missing box problems, using concrete objects and number lines


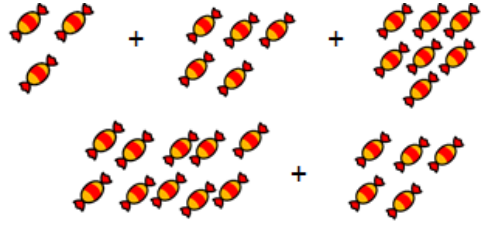
Addition – Year 2

Add numbers with up to 2-digits

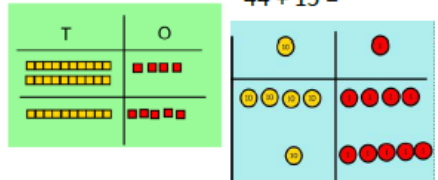
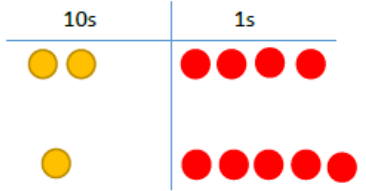
Key number skills for addition at Year 2:

- Add a 2-digit number and ones (e.g. $27 + 6$).
- Add a 2-digit number and tens (e.g. $23 + 40$).
- Add pairs of 2-digit numbers which bridge ten (e.g. $35 + 47$).
- Add three single digit numbers ($5 + 9 + 7$).
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100.
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures and applying mental and written methods.

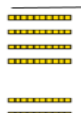
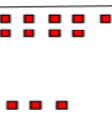


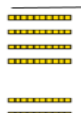
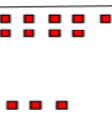


















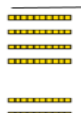
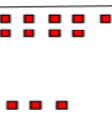










Adding 3 single digits

Concrete	Pictorial	Abstract
<p>$4 + 7 + 6 = 17$ Put 4 and 6 together to make 10. Add on 7.</p>  <p>Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit</p>	 <p>Add together three groups of objects. Draw a picture to recombine the groups to make 10.</p>	<div style="text-align: center;"> $\begin{array}{r} 4 + 7 + 6 = 10 + 7 \\ \quad \quad \quad \downarrow \\ \quad \quad \quad 10 \\ \quad \quad \quad \quad \downarrow \\ \quad \quad \quad \quad \quad \quad \downarrow \\ \quad \quad \quad \quad \quad \quad \quad \quad 17 \end{array}$ </div> <p style="text-align: right;">Combine the two numbers that make 10 and then add on the remainder.</p>

Column method without re-grouping

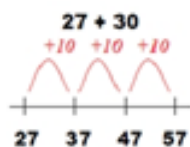
Concrete	Pictorial	Abstract
<p>Add together the ones first, then add the tens. Use the Base 10 blocks first before moving onto place value counters.</p> <p>$24 + 15 =$</p> 	<p>After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.</p> 	<p>$24 + 15 = 39$</p> $\begin{array}{r} 24 \\ + 15 \\ \hline 39 \end{array}$

Column method with regrouping

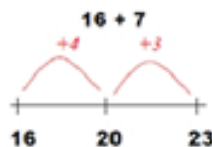
Concrete	Pictorial	Abstract																				
<p>Make both numbers on a place value grid.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">10s</td> <td style="text-align: center;">1s</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table> <p>Add up the units and exchange 10 ones for 1 ten.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">10s</td> <td style="text-align: center;">1s</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	10s	1s			10s	1s			<p>Using place value counters, children can draw the counters to help them to solve additions.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">10s</td> <td style="text-align: center;">1s</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">10s</td> <td style="text-align: center;">1s</td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> <tr> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> </table>	10s	1s					10s	1s					$40 + 9$ $20 + 3$ $60 + 12 = 72$
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Adding a 2-digit number and tens or ones

Add 2-digit numbers and tens



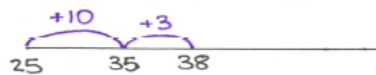
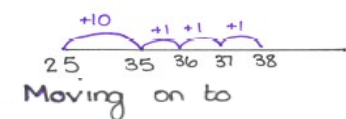
Add 2-digit numbers and units



Add pairs of 2-digit numbers that bridge ten

Step 1

$$\begin{array}{r} 25 + 13 \\ \hline 10 \quad 3 \end{array}$$



Use a number line to demonstrate visually

Step 2

$$\begin{array}{r} \text{T O} \quad \text{T O} \\ 25 + 24 \\ \hline \text{20} \quad 5 \quad \text{20} \quad 4 \\ \hline 40 \quad 9 \\ 40 + 9 = 49 \end{array}$$

Move to partition when children ready but do not bridge the tens

Addition – Year 3

Add numbers with up to 3-digits

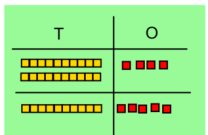
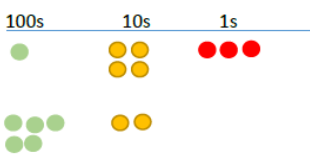
Key number skills for addition at Year 3:

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

Step 1



Introduce expanded column addition without carrying (same as Y2 but with 3-digits)

Note that the addition symbol goes on the left hand side.

Concrete	Pictoral
<p>$24 + 15 =$</p> <p>Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters.</p> <div style="text-align: center;">  </div>	<div style="text-align: center;">  </div> <p>Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.</p>

Step 2

Introduce expanded column addition with carrying (same as Y2 but with 3-digits)

Concrete	Pictoral
<p>Make both numbers on a value grid.</p> <p>Add up the ones and 10 ones for one 10.</p> <p>Add up the rest of the columns, exchanging the 10 counters from one column for the value column until every column has been added.</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">  </div> <div style="margin-right: 10px;"> $\begin{array}{r} 146 \\ + 527 \\ \hline \end{array}$ </div> <div> <p>place</p> <p>exchange</p> <p>next place column has</p> </div> </div>	<div style="text-align: center;">  </div> <p>Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.</p> <p>NB Addition of money needs to have £ and p added separately.</p>

Step 3 – Compact column addition

Children who are very secure and confident with 3-digit expanded column addition with concrete resources should be moved onto the **compact column addition** method, being introduced to 'regrouping' and 'exchanging' for the first time, this maybe with 2-digits to begin with.

$$\begin{array}{r} 236 \\ + 73 \\ \hline 309 \\ \hline \end{array}$$

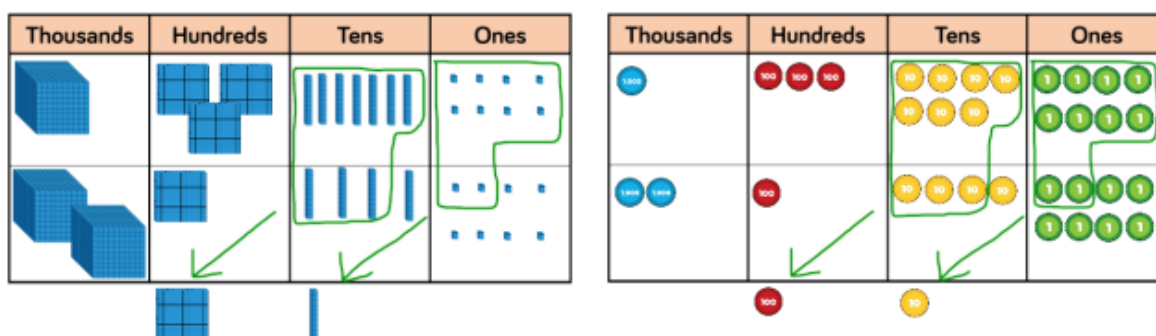
Addition – Year 4

Add numbers with up to 4-digits

Key number skills for addition at Year 4:

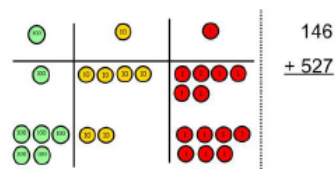
- Select most appropriate method and explain why.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies i.e. Number bonds, add the nearest multiple of 10, 100 and 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4-digits using the formal written method of column addition.
- Count in multiples of 6,7,9, 25 and 1000.
- Count backwards through zero to include negative numbers.
- Order and compare numbers beyond 1000.
- Read Roman numerals to 100.

This can be done in various ways

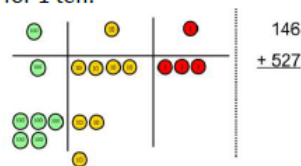


Concrete	Pictorial	Abstract
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Make both numbers on a place value grid.

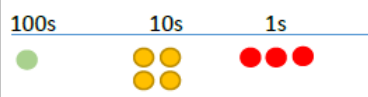
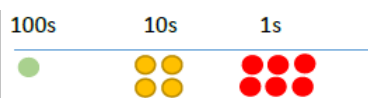


Add up the units and exchange 10 ones for 1 ten.



As children move on to decimals, money and decimal place value counters can be used to support learning.

NB By Year 4 children will progress on to adding four digit numbers.



Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.

NB Addition of money needs to have £ and p added separately.

$$100 + 40 + 6$$

$$\underline{500 + 20 + 7}$$

$$600 + 70 + 3 = 673$$

As the children progress, they will move from the expanded to the compacted method.

$$146$$

$$+ \underline{527}$$

$$673$$

$$1$$

As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.

Add numbers with up to 4-digits using the formal written method of column addition

Some children will know the compact column addition method from year 3. All children in year 4 should be using column addition in line with the national curriculum for year 4. However, children will still be using concrete equipment to deepen understanding.

Note that the carried numbers sit under the column

Note that the addition symbol goes on the left hand side.

$$\begin{array}{r} 3517 \\ + \quad 396 \\ \hline 3913 \\ \hline 1 \end{array}$$

This method should also be used and applied to money and measurement.

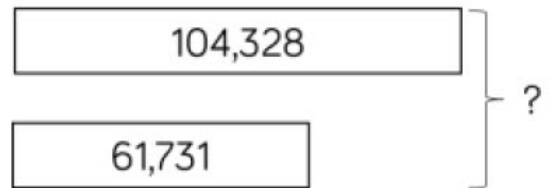
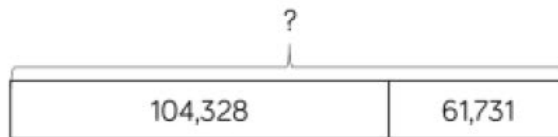
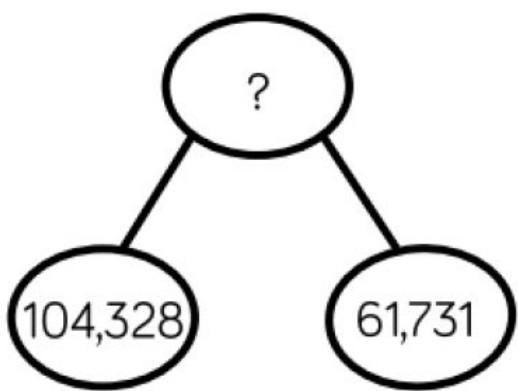
Addition – Year 5

Add numbers with more than 4-digits

Key number skills for addition at Year 5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies I.e. add the nearest multiple of 10, 100, 100 and adjust, use near doubles, inverse, partitioning and recombining, use 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.

Still using concrete equipment from Year 4 but moving onto larger digits

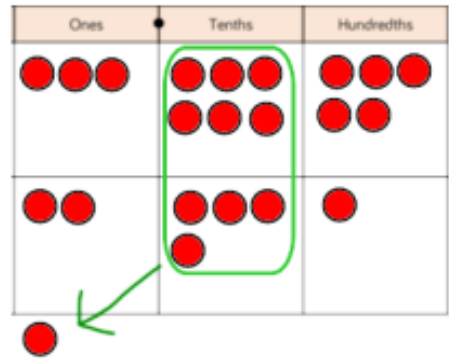
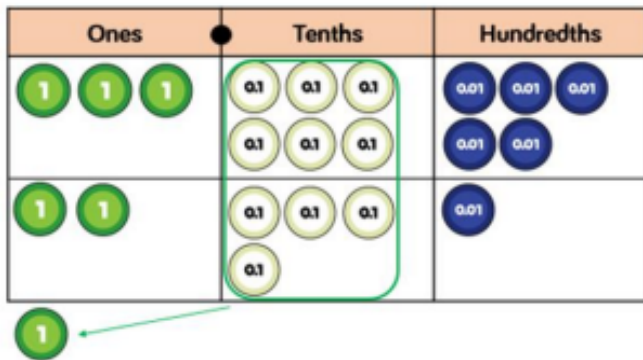


$$104,328 + 61,731 = 166,059$$

HTh	TTh	Th	H	T	O
100,000		1,000 1,000 1,000 1,000	100 100 100	10 10	1 1 1 1 1 1 1 1
	10,000 10,000 10,000 10,000 10,000 10,000	1,000	100 100 100 100 100 100 100	10 10 10	1

1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
					1

$$3.65 + 2.41 = 6.06$$

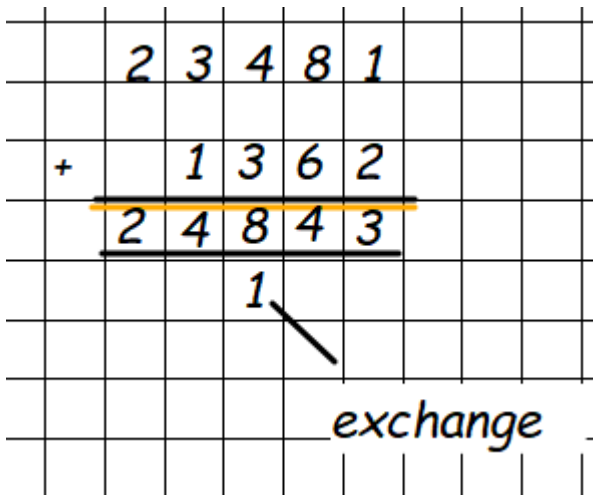


Add numbers with more than 4-digits using the formal written method of column addition

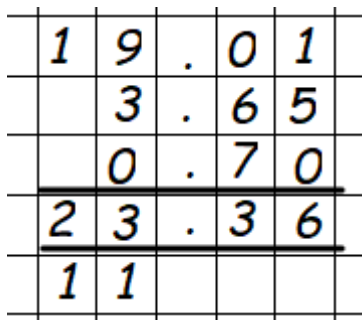
This method should also be used and applied to money, measurement and decimals with different numbers of decimal places.

Note that the carried numbers sit on top of the line.

Note that the addition symbol goes on the left hand side.



Numbers should exceed 4-digits



The decimal point should be aligned in the same way.

Addition – Year 6

Add several numbers of increasing complexity

Key number skills for addition at Year 6:

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

Add several numbers with increasing complexity

Adding several numbers with different numbers of decimal places (including money and measures). Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically.

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

Note that the carried numbers sit at the bottom of the line.

Note that the addition symbol goes on the left hand side.

Please note that all of the ideas shown above can be used and should be encourage if the children's understanding needs moving on.

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		

Adding several numbers with different numbers of decimal places. Zeros can be added to show there is no value.

	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
	1	1	1	1	

Adding several numbers with more than 4-digits.

Subtraction – Year 1

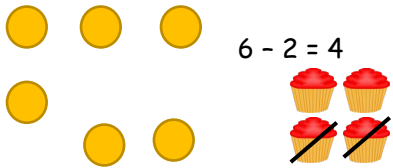
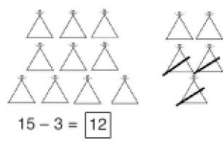
Subtract from numbers up to 20

Key number skills for subtraction at Year 1:


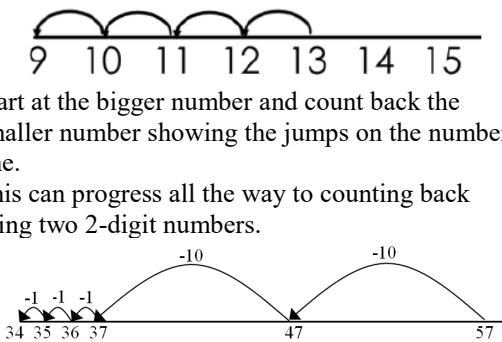
- Given a number, say one more or one less.
- Count to and over 100, forward and back, from any number.
- Represent and use subtraction facts to 20 and within 20.
- Subtract with one-digit and two-digit numbers to 20 including zero.
- Solve one-step problems that involve addition and subtraction, using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

We are looking to use the ten frames, counting beads, single bar models and whole-part models
We will also throughout KS1 look to use the Number Sense programme to re-inforce these simple concepts.

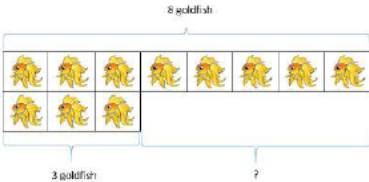
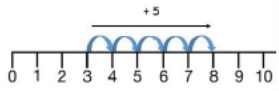
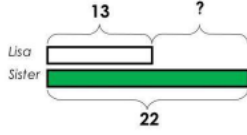
Subtracting by taking away ones

Concrete	Pictorial	Abstract
<p>Use physical objects, counters, cubes etc to show how objects can be taken away.</p>  <p style="text-align: center;">$6 - 2 = 4$</p>	<p>Cross out drawn objects to show what has been taken away.</p>  <p style="text-align: center;">$15 - 3 = 12$</p>	<p>$18 - 3 = 15$</p> <p>$8 - 2 = 6$</p>

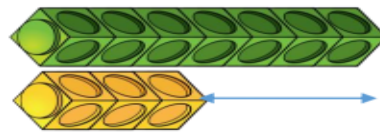
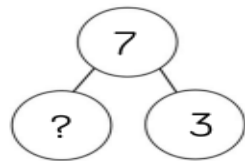
Subtracting by counting back

Concrete	Pictorial	Abstract
<p>Make the number in subtraction.  larger your Move along the beads as you count backwards in ones.</p> <p>Use counters and move them away from the group as you take them away counting backwards as you go.</p>	<p>Count back on a number line or number track</p>  <p>Start at the bigger number and count back the smaller number showing the jumps on the number line.</p> <p>This can progress all the way to counting back using two 2-digit numbers.</p>	<p>Put 13 in your head, count back 4. What number are you at? Use your fingers to help.</p>

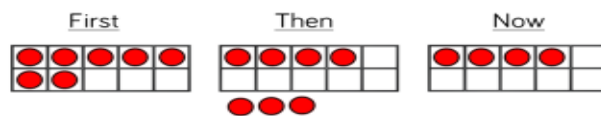
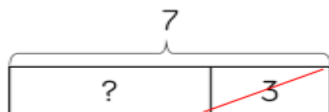
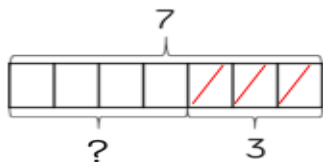
Finding the difference

Concrete	Pictorial	Abstract
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Find the difference</p> <p>Compare amounts and objects to find the difference.</p>  <p>Use cubes to build towers or make bars to find the difference. Use basic bar models with items to find the difference.</p>	<p>Count on to find the difference.</p>  <p>Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.</p>  <p>Draw bars to find the difference between 2 numbers.</p>	<p>Hannah has 8 goldfish. Helen has 3 goldfish. Find the difference between the number of goldfish the girls have.</p>

Here are some of the other methods of working



$$7 - 3 = 4$$



Subtraction – Year 2

Subtract with 2-digit numbers

Key number skills for subtraction Year 2:

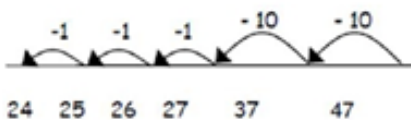
- Recognise the place value of each digit in a 2-digit number.
- Recall and use subtraction facts to 20 fluently and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, including a 2-digit number and ones, a 2-digit number and tens and two 2-digit numbers.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

We are looking to use the ten frames, counting beads, single bar models and whole-part models
We will also throughout KS1 look to use the Number Sense programme to re-inforce these simple concepts.

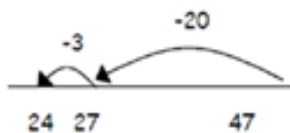
Subtract on a number line by counting back: aiming to develop mental subtraction skills

This strategy will be used for:

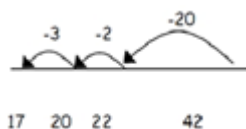
1. 2-digit numbers subtract ones (e.g. $36 - 7$)
2. 2-digit numbers subtract tens (e.g. $48 - 30$)
3. Subtracting pairs of 2-digit numbers $47 - 23 = 24$ Partition the second number and subtract it in tens then ones.



Subtract tens first then subtract ones

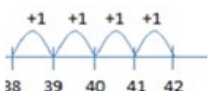


Move towards more efficient jumps back.



Teaching children to bridge through the ten can help

Mentally subtracting numbers close together by counting on



We can

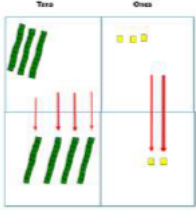
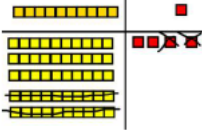
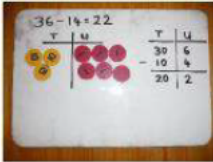
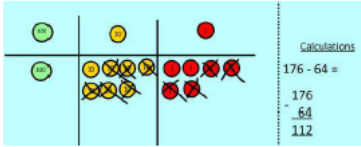
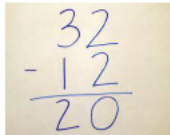
E.g. $42 - 4 = 38$

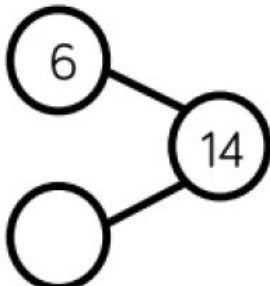
Children are taught to recognise that when numbers are close together it is more efficient to count on the difference.


subtract in

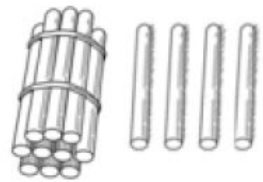
different ways

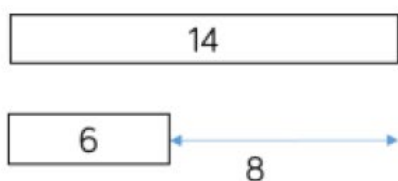
Here are some of the strategies


Column method without regrouping	<p>$75 - 42 = 33$</p>  <p>Use Base 10 to make the bigger number then take the smaller number away.</p>	 <p>Draw the Base 10 or place value counters alongside the written calculation to help to show working.</p>	<p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$ <p>$47 - 24 = 23$</p> $\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$ <p>This will lead to a clear written column subtraction.</p>
	<p>Show how you partition numbers to subtract.</p> <p>Again make the larger number first.</p> 	 <p>Calculations</p> $\begin{array}{r} 176 \\ - 64 \\ \hline 112 \end{array}$	

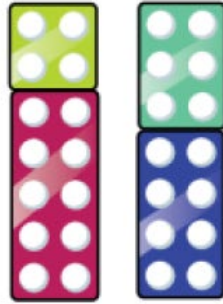





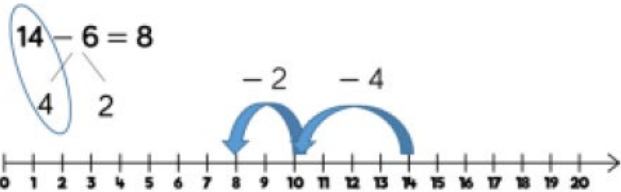


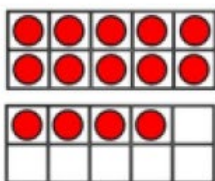


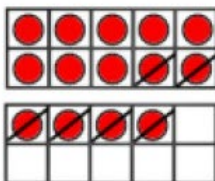


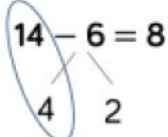












Subtraction – Year 3

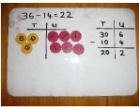

Subtract with 2 and 3-digit numbers

Key number skills at Year 3:



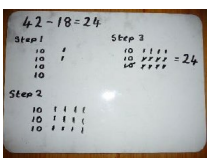
- Subtract mentally a 3-digit number and ones, tens and hundreds.
- Estimate answers and use inverse operations to check.
- Solve problems including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place-value of each digit in a 3-digit number.
- Read and write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

Step 1: Introduce partitioned column method where no exchanging is required

Note that the subtraction symbol goes on the left hand side.

Concrete	Pictorial
<p>Use Base 10 to make the take the smaller number</p>  <p>36 - 14 = 22</p> <p>Show how numbers to subtract. Again make the larger number first.</p>	<p>Draw the Base 10 or place value counters alongside the written calculation to help to show working.</p>  <p>Calculations</p> $\begin{array}{r} 54 \\ - 22 \\ \hline 32 \end{array}$

Step 2: Introduce exchanging through practical subtraction

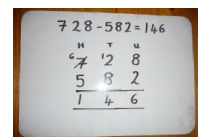
Concrete	Pictorial
<p>Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.</p> <p>Make the larger number with the place value counters</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$ <p>Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones.</p>  <p>Calculations</p> $\begin{array}{r} 234 \\ - 88 \\ \hline \end{array}$	<p>When confident, children can find their own way to record the exchange/regrouping.</p> <p>Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.</p>  <p>42 - 18 = 24</p> <p>Step 1: 10 + 10 + 10 = 30</p> <p>Step 2: 10 + 10 + 10 = 30</p> <p>Step 3: 10 + 10 + 10 = 30</p>

Step 3 – Compact column subtraction

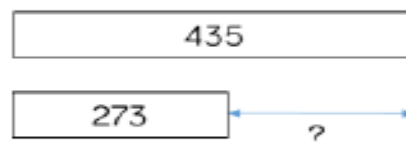
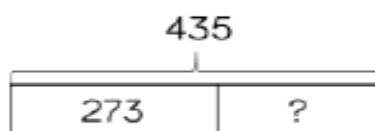
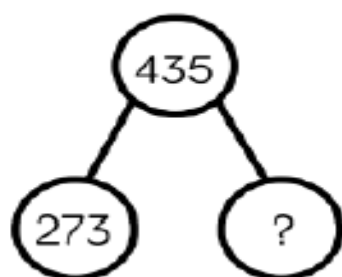
Children who are very secure and confident with 3-digit expanded column subtraction should be moved onto the **compact column subtraction** method. This is using exchanging and regrouping.

Note subtraction symbol goes on the left.

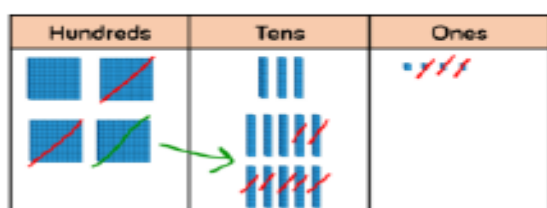
Here are more of the methods used in class



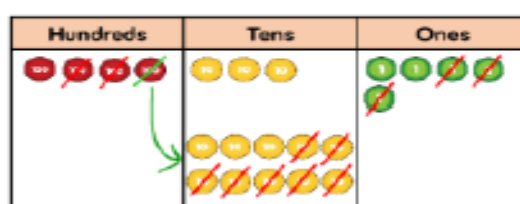
Skill: Subtract numbers with up to 3 digits



$$435 - 273 = 262$$



$$\begin{array}{r} \overset{3}{4} \overset{1}{3} 5 \\ - 273 \\ \hline 262 \end{array}$$



Subtraction – Year 4

Subtract with 4-digit *numbers*

Key number skills for subtraction at Year 4:

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

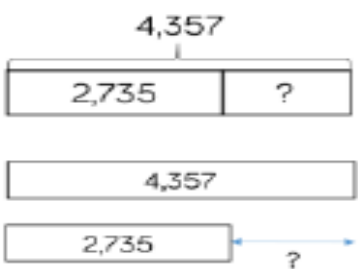
$4,357 - 2,735 = 1,622$

Thousands	Hundreds	Tens	Ones

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.

often method of column

year 3. All children in year 4 for year 4.



$$\begin{array}{r}
 3 \ 1 \\
 4357 \\
 - 2735 \\
 \hline
 1622
 \end{array}$$

$$4,357 - 2,735 = 1,622$$

Thousands	Hundreds	Tens	Ones

Thousands	Hundreds	Tens	Ones

Subtraction – Year 5

Subtract numbers with more than 4-digits

Key number skills for subtraction at Year 5:

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

Subtract numbers with more than 4-digits using the formal written method of column subtraction

This method should also be used and applied to money, measurement and decimals with different numbers of decimal places.

Note that the subtraction symbol goes on the left hand side.

$$\begin{array}{r} \overset{2}{2} \overset{10}{3} 1 0 \overset{4}{5} 6 \\ - \quad \quad 2 1 2 8 \\ \hline 2 0 2 0 7 8 \end{array}$$

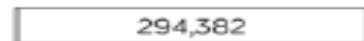
Compact column subtraction with exchanging.
Subtract with larger integers.

$$\begin{array}{r} \overset{6}{3} \overset{10}{7} 2 . 5 \\ - \quad \quad 6 7 9 6 . 5 \\ \hline 3 0 4 6 . 0 \end{array}$$

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

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

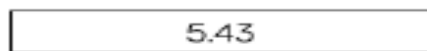
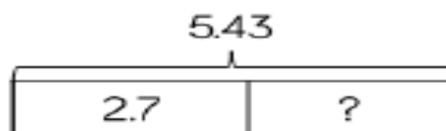
Here are some of concrete examples :



$$294,382 - 182,501 = 111,881$$

HTh	TTh	Th	H	T	O
100,000	10,000 10,000 10,000 10,000	1,000 1,000 1,000	100,000 100,000 100,000 100,000 100,000 100,000 100,000 100,000	10,000 10,000 10,000 10,000 10,000	10,000 10,000

	2	9	3	¹ 3	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1



$$\begin{array}{r} 4 \quad 1 \\ 5.43 \\ - 2.7 \\ \hline 2.73 \end{array}$$

$$5.43 - 2.7 = 2.73$$

Ones	Tenths	Hundredths
1 1 1 1 1	0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1	0.01 0.01 0.01

Ones	Tenths	Hundredths
1 1 1 1	1 1 1 1 1 1 1 1	1 1 1

Subtraction – Year 6

Subtracting with increasingly large and more complex numbers and decimal values

Key number skills for subtraction at Year 6:

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

Subtracting with increasingly large numbers

Note that the subtraction symbol goes on the left hand side.

$$\begin{array}{r} \cancel{9}^1 \cancel{8}^9 \cancel{0}^6 9 9 \\ - \quad 8 9 9 4 9 \\ \hline 6 0 7 5 0 \end{array}$$

$$\begin{array}{r} \cancel{0}^1 \cancel{5}^3 \cancel{4}^1 9 \\ - \quad 3 6 . 0 8 0 \\ \hline 0 6 9 . 3 3 9 \end{array}$$

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

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.

Children will use all methods in previous years and will choose the most appropriate .

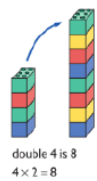

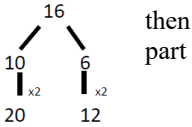
Multiplication – Year 1

Multiply with concrete objects, arrays and pictorial representations


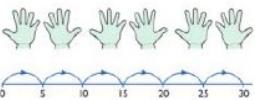
Key number skills for multiplication at Year 1:

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




Doubling

Concrete	Pictorial	Abstract
<p>Use practical activities to show how to double a number.</p> 	<p>Draw pictures to show how to double a number.</p> <p>Double 4 is 8</p> 	<p>Partition a number and double each before</p>  <p>recombining it back together.</p>

Counting in multiples

Concrete	Pictorial	Abstract
<p>Count in multiples supported by concrete objects in equal groups.</p> 	<p>Use a number line or pictures to continue support in counting in multiples.</p> 	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers.</p> <p>2, 4, 6, 8, 10</p> <p>5, 10, 15, 20, 25, 30</p>

Repeated Addition

Concrete	Pictorial	Abstract
<p>Use different objects to add equal groups.</p> 	<p>There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there?</p>  <p>2 add 2 add 2 equals 6</p>	<p>Write addition sentences to describe objects and pictures.</p>  <p>2 + 2 + 2 + 2 + 2 = 10</p>


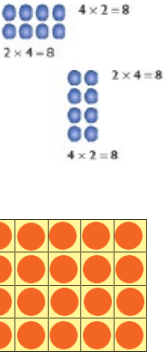

Multiplication – Year 2

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

Key number skills for multiplication at Year 2:

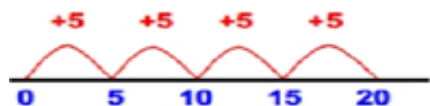
- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the 2, 5 and 10 multiplication tables, including recognising odds and evens.
- Write and calculate calculation using the x and = signs.
- Show that multiplication can be done in any order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

Arrays showing commutative multiplication (gives the same result whatever the order of the digits)

Concrete	Pictorial	Abstract
<p>Create arrays using counters/ cubes to show multiplication sentences.</p> 	<p>Draw arrays different rotations to commutative multiplication sentences.</p>  <p>in find</p> <p>Link arrays of rectangles. to area</p>	<p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p> $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ same as $3 \times 5 = 15$ $5 \times 3 = 15$ </p>

Use repeated addition on a number line

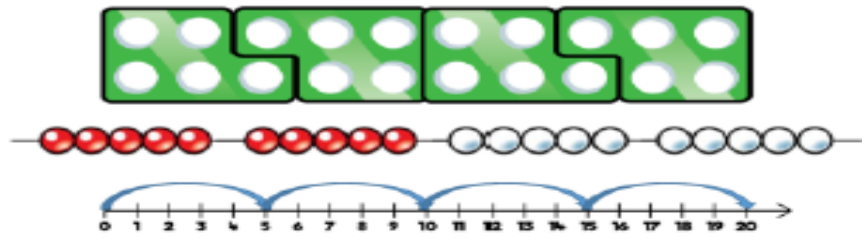
Starting from zero, make equal jumps up on a number line to work out multiplication facts and write multiplication statements using x and = signs.



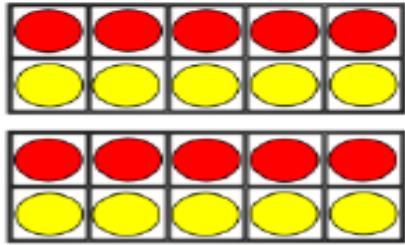
Use mental recall

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

Other methods below show how the concrete can be used to support the learning



One bag holds 5 apples.
How many apples do 4 bags hold?



$$5 + 5 + 5 + 5 = 20$$
$$4 \times 5 = 20$$
$$5 \times 4 = 20$$

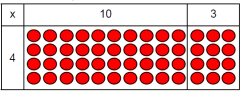
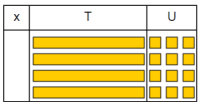


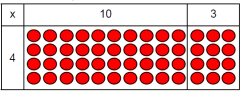
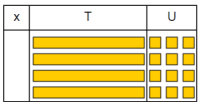
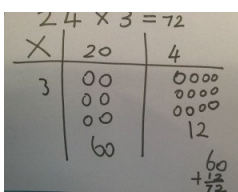
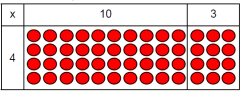
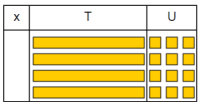
Multiplication – Year 3

Multiply 2-digits by a single digit number

Key number skills for multiplication at Year 3:

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

Grid Method

Concrete	Pictorial	Abstract																								
<p>Show the link with arrays to first introduce the grid method.</p> <div style="display: flex; align-items: center;"> <table border="1" style="border-collapse: collapse; margin-right: 10px;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 10px;">10</td><td style="padding: 2px 5px;">3</td></tr> <tr><td style="padding: 2px 5px;">4</td><td colspan="2" style="text-align: center;">  </td></tr> </table> <div style="margin-left: 10px;"> <p>4 rows of 10 4 rows of 3</p> </div> </div> <div style="display: flex; align-items: center;"> <table border="1" style="border-collapse: collapse; margin-right: 10px;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 10px;">T</td><td style="padding: 2px 5px;">U</td></tr> <tr><td style="padding: 2px 5px;">4</td><td colspan="2" style="text-align: center;">  </td></tr> </table> <div style="margin-left: 10px;"> <p>Move on to using Base 10 to move towards a more compact method. 4 rows of 13.</p> </div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;">  </div> <div> <p>Calculations 4×126</p> <p>Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.</p> </div> </div> <div style="display: flex; align-items: center;"> <div style="margin-right: 10px;"> <p>Fill each row with 126</p>  </div> <div> <p>Calculations 4×126</p> <p>Add each column.</p> </div> </div>	x	10	3	4			x	T	U	4			<p>Children can represent the work they have done with place value counters in a way that they understand.</p> <p>They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below</p> <div style="text-align: center;">  </div>	<p>Multiplying using the grid method showing clear addition alongside the grid</p> <div style="text-align: center; margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 10px;">30</td><td style="padding: 2px 5px;">5</td></tr> <tr><td style="padding: 2px 5px;">7</td><td style="padding: 2px 10px;">210</td><td style="padding: 2px 5px;">35</td></tr> </table> <p>$210 + 35 = 245$</p> </div> <p>Eg. $23 \times 8 = 184$</p> <div style="text-align: center;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="padding: 2px 5px;">x</td><td style="padding: 2px 10px;">20</td><td style="padding: 2px 5px;">3</td></tr> <tr><td style="padding: 2px 5px;">8</td><td style="padding: 2px 10px;">160</td><td style="padding: 2px 5px;">24</td></tr> </table> <p>$160 + 24 = 184$</p> </div>	x	30	5	7	210	35	x	20	3	8	160	24
x	10	3																								
4																										
x	T	U																								
4																										
x	30	5																								
7	210	35																								
x	20	3																								
8	160	24																								

Multiplication – Year 4

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

Key skills for multiplication at Year 4:

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

Short multiplication

Move on to short multiplication when children are confident and successful when multiplying 2 and 3-digit numbers by a single digit through the grid method.

Note numbers are carried under the total line

Note multiplication symbol goes on the left

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

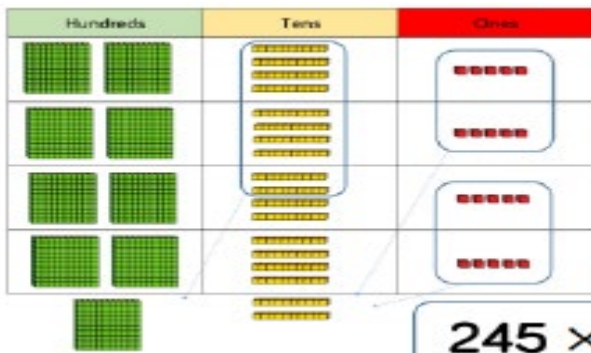
Plus these methods



	H	T	O	
		3	4	
x			5	
		2	0	(5 x 4)
+	1	5	0	(5 x 30)
	1	7	0	

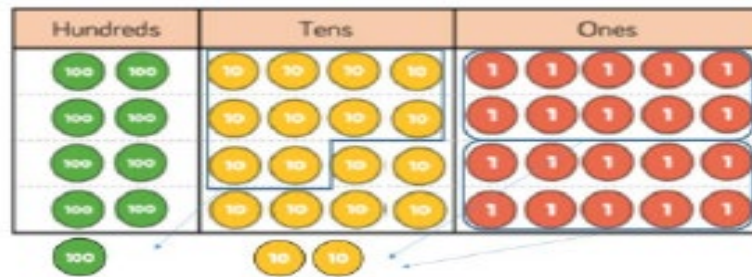
	H	T	O
		3	4
x			5
	1	7	0
	1	2	





	H	T	O
	2	4	5
×			4
<hr/>			
	9	8	0
	1	2	

$$245 \times 4 = 980$$



Multiplication – Year 5

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

Key number skills for multiplication at Year 5:

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

Short Multiplication

Children need to be taught to approximate first e.g. they would round 72×38 to $70 \times 40 = 2800$ to check the reasonableness of their answer. Recap short multiplication from year 4.

Note numbers are carried after the total line

Note multiplication symbol goes on the left

$$\begin{array}{r} 3274 \\ \times \quad 6 \\ \hline 19644 \\ \hline \end{array}$$

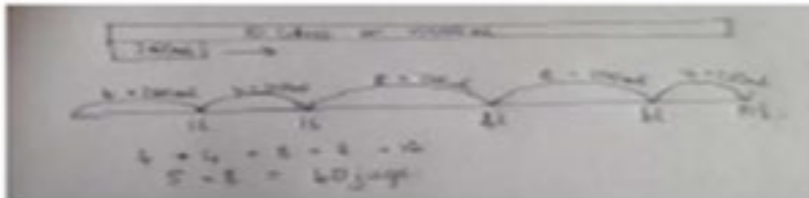
Long Multiplication

Move onto long multiplication to show 2, 3 and 4- digit numbers multiplied by a 2-digit number.

$$\begin{array}{r} 1234 \\ \times \quad 86 \\ \hline 7404 \\ 98720 \\ \hline 106124 \\ \hline \end{array}$$

Insert a placeholder when multiplying by the tens column.

Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.



Multiplication – Year 6

Multiply decimals up to 2 decimal places by a single digit

Key number skills for multiplication at Year 6:

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

Short Multiplication

Use short multiplication to multiply numbers with more than 4-digits by a single digit; to multiply money and measures, and to multiply decimals with up to 2 d.p. by a single digit.

Note numbers are carried on top of the total line

Note multiplication symbol goes on the left

$$3.19 \times 8 = 25.52$$

1. Take decimal out ($\times 100$)

$$\begin{array}{r} 319 \\ \times \quad 8 \\ \hline 2552 \\ \hline 217 \end{array}$$

2. Count decimal back in ($\div 100$)

$$= 25.52$$

Long Multiplication

Use long multiplication to multiply numbers with at least 4 digits by a 2 digit number.

$$\begin{array}{r} 1234 \\ \times \quad 86 \\ \hline 7404 \\ \hline 98720 \\ \hline 106124 \\ \hline 111 \end{array}$$

Insert a placeholder when multiplying by the tens column.


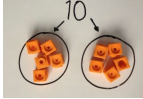
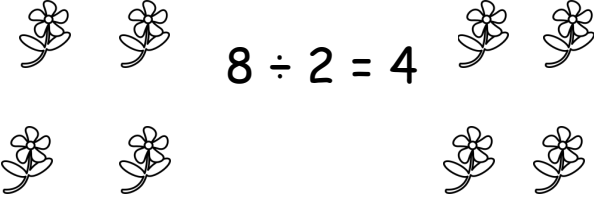
Division Year 1

Group and share small quantities

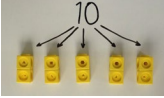

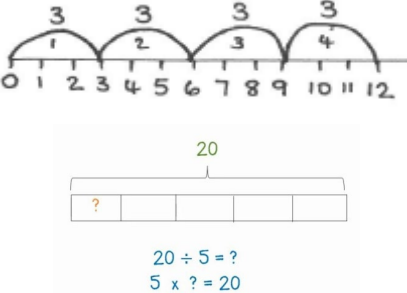
Key number skills needed for division at Year 1:

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

Sharing objects

Concrete	Pictorial	Abstract
 <p>I have 10 cubes, can you share them equally in 2 groups?</p> 	<p>Children use pictures or shapes to share quantities.</p>  <p style="text-align: center;">$8 \div 2 = 4$</p>	<p>Share 9 buns between three people.</p> <p style="color: red;">Note: Year 1 are not expected to know the divide sign</p>

Division as grouping

Concrete	Pictorial	Abstract
<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p>  	<p>Use a number line to show jumps in groups. The number of jumps equals the number of groups.</p>  <p style="text-align: center;">$20 \div 5 = ?$ $5 \times ? = 20$</p>	<p>Share 28 people into 2 groups. How many are in each group?</p> <p style="color: red;">Note: Year 1 are not expected to know the divide sign</p>


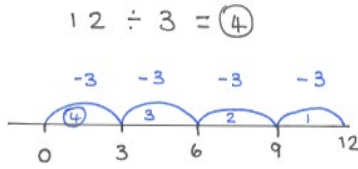
Division Year 2

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

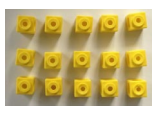
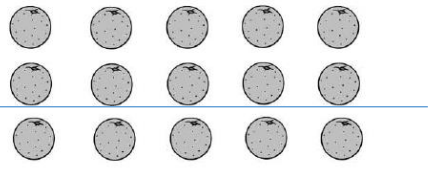
Key number skills needed for division at Year 2:

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

Division as grouping and sharing

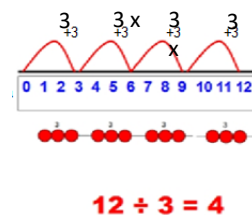
Concrete	Pictorial	Abstract
<p>Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.</p> 	<p>Division as grouping and sharing.</p> $12 \div 3 = 4$  <p style="text-align: center;">Repeated subtraction</p>	<p>Divide 28 into 2 groups. How many are in each group?</p> $28 \div 2 =$ <p style="color: red;">Note: Year 2 are expected to know the divide and multiply sign</p> <p style="color: red;">$(\div \times)$</p>

Division within arrays

Concrete	Pictorial	Abstract
 <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <p>Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$</p>	 <p style="text-align: center;">Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p>	<p>Find the inverse of multiplication and division sentences by creating four linking number sentences.</p> $7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$

Grouping using a number line

Group from zero in equal jumps of the divisor to find out how many groups of $_$ in $_$? Also use practical apparatus to reinforce understanding.



Division Year 3

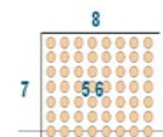
Divide 2-digit numbers by a single digit

Key number skills needed for division at Year 3:

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

Short Division for 2-digit numbers

Short division for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array.



$$\begin{array}{r} 32 \\ 3 \overline{) 96} \end{array}$$

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

Step 1: Start by introducing the

Step 2: Limit numbers to no remainders in the

Step 2: Limit answers to no remainders in the

Division Year 4

Divide up to 3-digit numbers by a single digit

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

We will use methods shown above and then consolidate and move onto 3 digits numbers

Step 1: Short Division 2-digit

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

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). However they must be able to calculate remainders within the question.

Step 2: Short Division 3-digit

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

Step 2

Pupils move onto dividing numbers with up to 3-digits by a single digit however problems and calculations provided should not result in a final remainder.

Note: Emphasise the point of the zero as the place value holder when something cannot be divided.

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


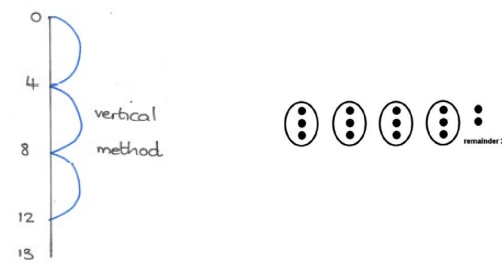
Division Year 5

Divide up to 4-digits by a single digit

Key number skills for division at Year 5:

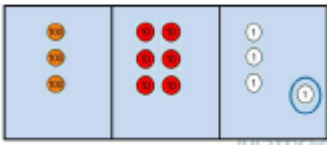
- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Solve problems involving multiplication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

Introducing remainders

Concrete	Pictorial	Abstract
<p>$14 \div 3 =$ Divide objects between groups and see how much is left over</p> 	<p>Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder. Draw dots and group them to divide an amount and clearly show a remainder.</p> 	<p>Complete written divisions and show the remainder using r. e.g. $14 \div 3 =$</p>

$$364 \div 3 =$$

$$\begin{array}{r} 121 \text{ rem } 1 \\ 3 \overline{) 364} \end{array}$$



Move onto divisions with a remainder. Once children understand remainders, begin to express as a fraction or decimal

$$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \end{array}$$

according to the context.

$$186 \frac{1}{5}$$

$$\begin{array}{r} 14.6 \\ 35 \overline{) 511.0} \end{array}$$

Short Division Including Remainder Answer

$$\begin{array}{r} 066 \text{ r } 2 \\ 8 \overline{) 530} \end{array}$$

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

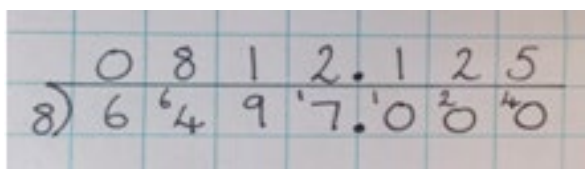
Division Year 6

Divide up to 4-digits by a single digit

Key number skills for division at Year 6:

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

Short division for dividing by a single digit



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

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

Long division for dividing by 2-digits

$$\begin{array}{r} 027 \\ 36 \overline{) 972} \\ \underline{- 72} \\ 252 \\ \underline{- 252} \\ 0 \end{array}$$

$$\begin{array}{r} 44.444 \\ 18 \overline{) 800.000} \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \\ \underline{72} \\ 80 \end{array} = 44.44 \text{ (2 d.p.)}$$

or $44 \text{ r } 8$
or $44 \frac{8}{18} = 44 \frac{4}{9}$

Pupils should continue to use this method up to 2 decimal places, however this can be expressed as remainders or fractions in the lowest form.