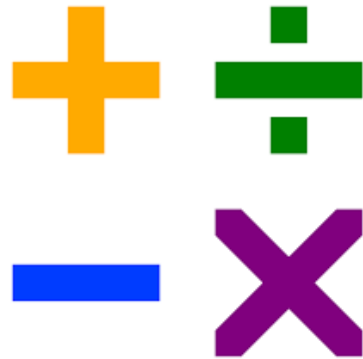




Uplands Primary School. Written Calculation Policy.



Calculation Policy



Principles of Calculation at Uplands Primary School

This calculation policy has been produced to ensure consistency and progression in teaching throughout our school in line with the National Curriculum. The policy aims to identify the progression in each of the four operations that children will typically follow from **early years through to year 6**.

Each stage builds upon previous experience. We recognise that children will develop their mathematical skills at different rates and that it is important for them to develop conceptual understanding on a practical level before moving on to more formal written methods. They will develop calculation skills through a combination of *concrete, pictorial and abstract* learning resources to support their thinking.

Informal written recording will take place regularly and is an important part of learning and understanding. More formal written methods follow only when the child is able to use a wide range of mental calculation strategies and has secure conceptual understanding. The curriculum suggests when more formal calculations should be taught but **the emphasis of our teaching will always be to facilitate understanding and not simply to arrive at a correct answer.**



- Children should be encouraged to ask, "Can I do this in my head?" before attempting a calculation. If they can, then we will encourage them to use mental methods to calculate (See mental strategies document).
- Calculations should always be taught and applied in real life contexts.
- Models, images and concrete resources should be used to support conceptual understanding.
- Children must be given opportunities to reason about methods and understanding.
- Misconceptions and errors will be identified quickly and used as valuable learning points.
- Pupils will be taught to self-check using a range of strategies and apparatus.
- Children will be challenged at an appropriate level. For example, working with 2-step problems, using more than one operation at a time or working with more than two numbers at one time.
- Children will be taught and will become confident in recalling multiplication facts.
- We aspire to develop confident individuals who love to challenge and discuss their learning.

Early Years Foundation Stage - Year R



Calculating in early years involves providing children with opportunities to develop and improve their understanding of, *number and numerical patterns* simple addition and subtraction problems as well as developing their subitising.

Number

- Add and subtract number bonds to 5
- Add and subtract number bonds to 10
- Use objects/physical resources to add and subtract two single-digit numbers together.
- Recall number bonds to 5
- Know number bonds to 10 confidently
- Understand the composition of 10 in a variety of ways
- Subitise up to 5 (Recognise visually how 5 can look in a pattern e.g dice)

Numerical Patters

- Use a range of manipulatives to develop deep understanding.
- Know doubles to 10
- Give one more or less than a given number less than 10
- Compare quantities up to 10 recognising greater than and less than
- Recognise 'half' as a concept and be able to share equally.
- Double, halve and share numbers up to and within 10.
- Count reliable beyond 20
- Order numbers up to 20
- Identify patterns of the counting system



Key Stage 1 - Year 1

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including the use of CPA (Concrete, Pictorial and Abstract).

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

Number and place value

- Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- Count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- Given a number, identify one more and one less
- Identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- Read and write numbers from 1 to 20 in numerals and words.

Addition and Subtraction

- Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs
- Represent and use number bonds and related subtraction facts within 20
- Add and subtract one-digit and two-digit numbers to 20, including zero
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Multiplication and Division

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



Key Stage 1 - Year 2

By the end of year 2, pupils should know the number bonds to recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Number and place value

- Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Identify, represent and estimate numbers using different representations, including the number line
- Compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- Read and write numbers to at least 100 in numerals and in words
- Use place value and number facts to solve problems.

Addition and Subtraction

- Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures
- Applying their increasing knowledge of mental and written methods
- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, a two-digit number and tens, two two-digit numbers, adding three one-digit numbers
- Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems

Multiplication and Division

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



Lower Key Stage 2 - Year 3

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems working up towards the use of decimals using a formal method.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word reading knowledge and their knowledge of spelling.

Number and place value

- Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Compare and order numbers up to 1000
- Identify, represent and estimate numbers using different representations
- Read and write numbers up to 1000 in numerals and in words
- Solve number problems and practical problems involving these ideas.

Addition and Subtraction

- Add and subtract numbers mentally, including:
 - A three-digit number and ones
 - A three-digit number and tens
 - A three-digit number and hundreds
- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- Estimate the answer to a calculation and use inverse operations to check answers
- Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Multiplication and Division

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- 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, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects.



Lower Key Stage 2 - Year 4

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Number and place value

- Count in multiples of 6, 7, 9, 25 and 1000
- Find 1000 more or less than a given number
- Count backwards through zero to include negative numbers
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- Order and compare numbers beyond 1000
- Identify, represent and estimate numbers using different representations
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve all of the above and with increasingly large positive numbers
- Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.

Addition and Subtraction

- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Multiplication and Division

- Recall multiplication and division facts for multiplication tables up to 12×12
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.



Upper key stage 2 - Year 5

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

Number and place value

- Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Solve number problems and practical problems that involve all of the above
- Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Addition and Subtraction

- Add and subtract whole numbers with more than 4 digits,
- Including using formal written methods (columnar addition and subtraction)
- Add and subtract numbers mentally with increasingly large numbers
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.



Upper key stage 2 - Year 5

Multiplication and Division

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.
- Know and use the vocabulary of
- Prime numbers, prime factors and composite (non-prime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Multiply and divide numbers mentally drawing upon known facts
- 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
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- Solve problems involving, addition, subtraction, multiplication and division including using their knowledge of factors and multiples, squares and cubes
- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Measurement

- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- Calculate and compare the area of rectangles (including squares) and including using standard units
- Use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling.



Upper key stage 2 - Year 6

By the end of Year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages. Pupils should read, spell and pronounce mathematical vocabulary correctly.

Addition, Subtraction, Multiplication, division and algebra

- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- 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
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers
- Use their knowledge of the order of operations to carry out calculations involving the four operations
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- Solve problems involving addition, subtraction, multiplication and division
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Algebra

- Use simple formulae
- Generate and describe linear number sequences
- Express missing number problems algebraically
- Find pairs of numbers that satisfy number sentences involving two unknowns
- Enumerate all possibilities of combinations of two variables.

Measurement

- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate
- Recognise when it is possible to use formulae for area and volume of shapes
- Calculate the area of parallelograms and triangles
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units such as mm^3 and km^3 .



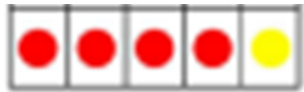
Addition Calculation Progression

EYFS

Use physical objects to add up to 5



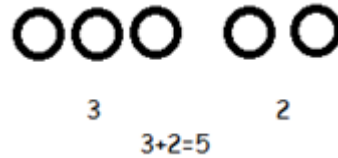
$$3 + 2 = 5$$



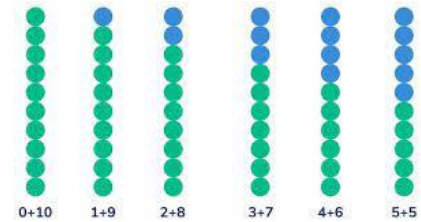
Subitise numbers up to 5 in different ways.



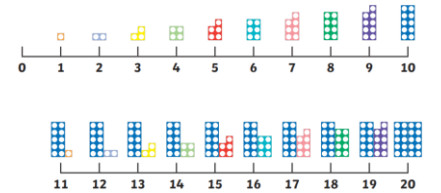
Draw pictures to help record a calculation.



Know number bonds to 10.



Count reliably beyond 20.



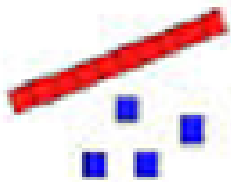
As the year progresses

Year 1

Use concrete resources to add numbers within 20



$$5 + 4 = 9$$



$$10 + 4 = 14$$

Use pictorial resources to add numbers within 20.



$$= \square$$

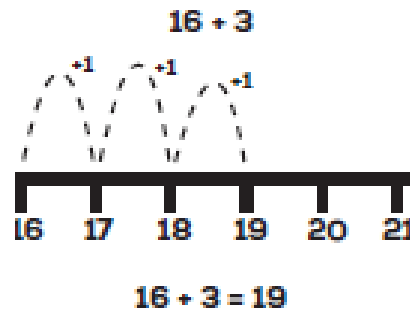


$$= \square$$



$$= \square$$

Use a number line to add in jumps of 1 within 20.



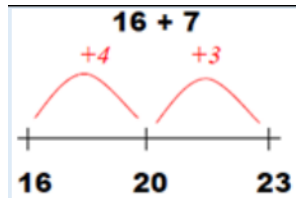
Use a number line to solve missing number problems.



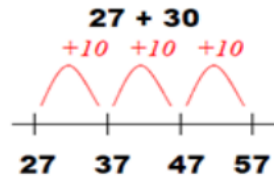
As the year progresses

Year 2

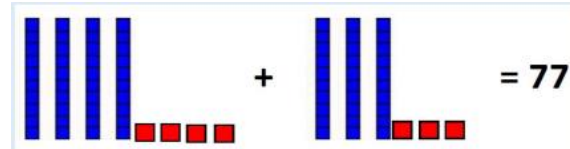
Adding 2 digit numbers and ones through partitioning on a number line.



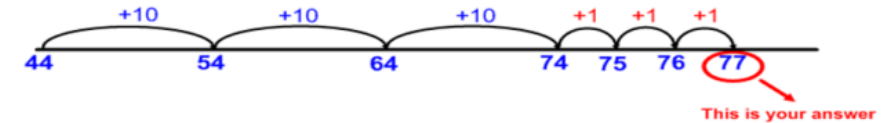
Adding two 2 digit numbers in a number line



Using resources to add two 2 digit numbers with ones using concrete and pictorial resources.



Adding two 2 digit numbers on a number line using partitioning the tens and ones into separate jumps.



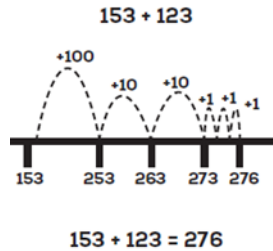
Progressing to, tens and ones portioned with larger jumps.



As the year progresses

Year 3

Use a number line to add 3 digit numbers and 1s, 10s, 100s



Use an expanded form of a formal method to add two 2 digit numbers

$$\begin{array}{r} 45 + 23 \\ 40 + 6 \\ + 20 + 3 \\ \hline 60 + 9 = 69 \end{array}$$

Use an expanded form of a formal method to add two 2 digit numbers with carrying.

$$\begin{array}{r} 40 + 7 \\ \underline{30 + 6} \\ 80 + 3 \\ 10 \end{array} \rightarrow \begin{array}{r} 47 \\ \underline{+36} \\ 83 \\ 1 \end{array}$$

Use a formal method to add two 3 digit numbers without carrying.

$$\begin{array}{r} 713 + 252 \\ 7 \ 1 \ 3 \\ 2 \ 5 \ 2 \ + \\ \hline 9 \ 6 \ 5 \end{array}$$

$$713 + 252 = 965$$

Use expanded to support with carrying into a formal method

$$\begin{array}{r} 300 + 60 + 7 \\ \underline{100 + 80 + 5} \\ 500 + 50 + 2 \\ 100 \ 10 \end{array} \rightarrow \begin{array}{r} 367 \\ \underline{+185} \\ 552 \\ 11 \end{array}$$

Use a formal method to add two 3 digit numbers where carrying is required.

$$\begin{array}{r} 625 + 248 \\ 6 \ 2 \ 5 \\ 2 \ 4 \ 8 \ + \\ \hline 8 \ 7 \ 3 \\ \hline 1 \\ 625 + 248 = 873 \end{array}$$

As the year progresses

Year 4

Use a formal method to add two 4 digit numbers without carrying.

	4	2	8	3
+	5	1	1	2
<hr/>				
<hr/>				

Use a formal method to add two 4 digit numbers with 1 set of carrying.

$$\begin{array}{r} 5271 \\ + 2357 \\ \hline 7628 \\ 1 \end{array}$$

Use a formal method to add two 4 digit numbers with multiple carrying.

	2	4	6	3
+	1	9	4	2
<hr/>				
	4	4	0	5
<hr/>				
	1	1		

Use a formal method to add two or more 2 digit/3 digit numbers using a formal method.

$$\begin{array}{r} 88 \\ 64 \\ + 47 \\ \hline 199 \\ 11 \end{array}$$

Solve missing number problems using a formal method with up to 4 digit numbers.

$$\begin{array}{r} 37_ \\ + 7_3 \\ \hline _ _ 36 \end{array}$$

Use a formal method to add using decimals.

$$\begin{array}{r} 5.60 \\ + 3.30 \\ \hline 8.90 \end{array}$$

$$\begin{array}{r} 16.40 \\ 7.68 \\ \hline 24.08 \\ \hline \end{array}$$

As the year progresses

Year 5 (Revised in Year 6)

Use a formal method to solve two 5 digit numbers with carrying.

$$\begin{array}{r} \text{L} \quad 56833 \\ + 44105 \\ \hline \end{array}$$

Use a formal method solve missing number problems with two 5 digit numbers.

$$\begin{array}{r} 1) \quad 6 \ 69 \\ + \quad \overline{74} \\ \hline 124 _ 0 \end{array}$$

Use knowledge of decimals to add multiple numbers together.

$$\begin{array}{r} \text{£}23.75 \\ + \text{£} 5.82 \\ + \text{£}30.57 \\ \hline \\ \hline \end{array}$$

Use formal method to add 6 and 7 digit numbers together progressing to missing number calculations.

$$\begin{array}{r} 284476 \\ + 558294 \\ \hline \end{array}$$

$$\begin{array}{r} \boxed{} \boxed{} 6 \boxed{} 4 \ 8 \\ + \quad 2 \boxed{} 6 \boxed{} \boxed{} \\ \hline 6 \ 4 \ 6 \ 8 \ 0 \ 5 \end{array}$$

As the year progresses



Subtraction Calculation Progression

EYFS

Use physical objects to subtract from 5



Subitise numbers up to 5 in different ways.



Draw pictures to help record subtraction calculation.



Count backwards from 10 using rhymes and stories.



10 Green Bottles sitting on the wall ...

Count backwards reliably from 20.



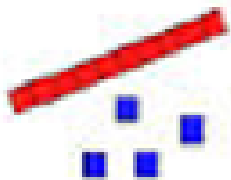
As the year progresses

Year 1

Use concrete resources to subtract numbers within 20



$$5 + 4 = 9$$

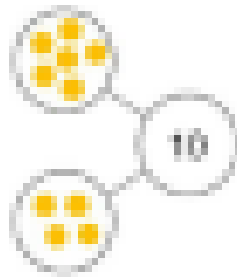


$$10 + 4 = 14$$

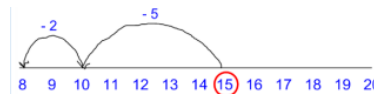
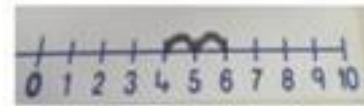
Use pictorial resources to subtract numbers within 20.



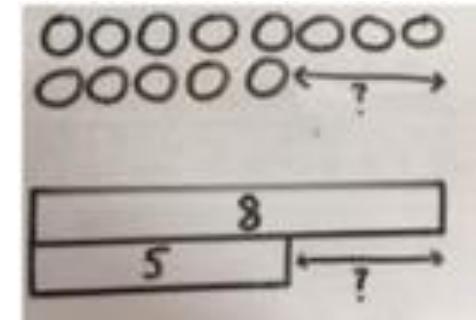
$$10 - 4 = 6$$



Use a number line to subtract in jumps of 1 within 20.



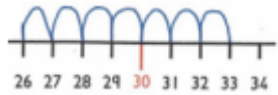
Solve missing number problems.



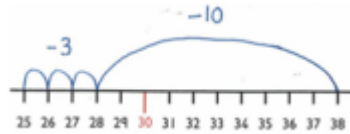
As the year progresses

Year 2

Subtracting 2 digit numbers and ones through on a number line.



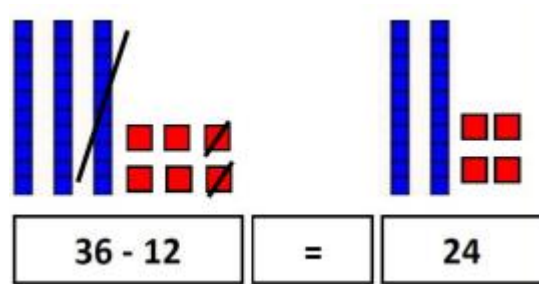
Subtracting two 2 digit numbers in a number line



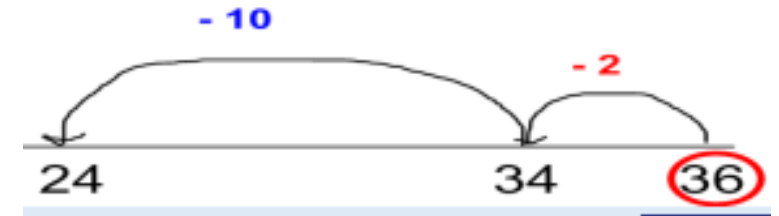
Using resources to subtracting two 2 digit numbers with ones using concrete and pictorial resources.

$$36 - 12 = 24$$

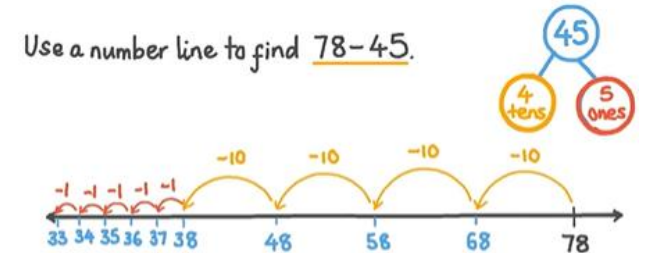
A diagram showing the number 12 being decomposed into 10 and 2. A blue arrow points from the 1 in 12 down to the 10 below it. A red arrow points from the 2 in 12 down to the 2 below it.



Subtract two 2 digit numbers on a number line using partitioning the tens and ones into separate jumps.



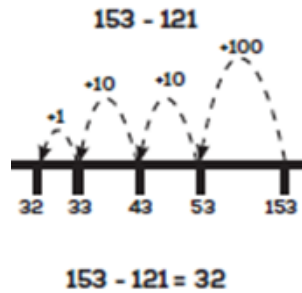
Progressing to, tens and ones portioned with larger jumps.



As the year progresses

Year 3

Use a number line to subtract 3 digit numbers and 1s, 10s, 100s



Use an expanded form of a formal method to subtract two 2 digit numbers

$$78 - 35$$

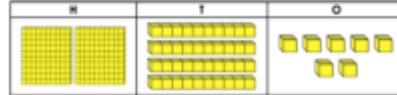
$$70 + 8$$

$$- 30 + 5$$

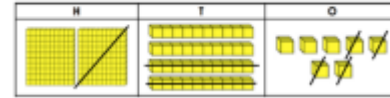
$$40 + 3 = 43$$

Use physical resources to support expanded form of regrouping.

Make the first number in the calculation.



Physically take away the second number starting with the ones.



Count the remainder.

Use an expanded form of a formal method to subtract two 2 digit numbers with regrouping.

$$400 + 130$$

$$~~500 + 30~~ + 7$$

$$- 200 + 50 + 4$$

$$200 + 80 + 3$$

Use a formal method to subtract two 3 digit numbers without regrouping.

874 - 523 becomes

$$\begin{array}{r} 874 \\ - 523 \\ \hline 351 \end{array}$$

Answer: 351

Use expanded to support with carrying into a formal method

$$\begin{array}{r} 80 \\ 400 + 90 + 16 \\ - 100 + 70 + 9 \\ \hline 300 + 10 + 7 = 317 \end{array}$$

Use a formal method to subtract two 3 digit numbers where carrying is required.

$$\begin{array}{r} 2\cancel{4}^32 \\ - 026 \\ \hline 266 \end{array}$$

$$\begin{array}{r} 3\cancel{4}^33 \\ - 237 \\ \hline 106 \end{array}$$

As the year progresses

Year 4

Use a formal method to subtract two 4 digit numbers without regrouping.

$$\begin{array}{r} 3678 \\ - 1341 \\ \hline 2337 \end{array}$$

Use a formal method to subtract two 4 digit numbers with 1 set of regrouping.

$$\begin{array}{r} 3 \\ 784\overset{1}{2} \\ - 1829 \\ \hline 6013 \end{array}$$

Use a formal method to subtract two 4 digit numbers with multiple carrying.

$$\begin{array}{r} 8 12 1 \\ 932 \\ - 457 \\ \hline 475 \end{array}$$

$$\begin{array}{r} 3 12 1 \\ 4328 \\ - 1436 \\ \hline 2892 \end{array}$$

Use a formal method to subtract two or more 2 digit/3 digit numbers using a formal method.

$$\begin{array}{r} 367 \\ - 134 \\ \hline 233 \\ - 121 \\ \hline 112 \end{array}$$

Solve missing number problems using a formal method with up to 4 digit numbers.

$$\begin{array}{r} 131\boxed{} \\ - 7\boxed{}0 \\ \hline 521 \end{array}$$

Use a formal method to subtract using decimals.

$$\begin{array}{r} 5.6\text{kg} - 3.3\text{kg} \\ 5.60 \\ - 3.30 \\ \hline 2.30 \end{array}$$

As the year progresses

Year 5 (Revised in Year 6)

Use a formal method to solve two 5 digit numbers with carrying.

$$\begin{array}{r} 75306 \\ - 52451 \\ \hline 22855 \end{array}$$

Use a formal method solve missing number problems with two 5 digit numbers.

$$\begin{array}{r} 8 \quad \quad \quad 7 \\ \cancel{9}^1 \quad 6 \quad 7 \quad \cancel{8}^1 \quad 3 \\ - \\ \hline 5 \quad 8 \quad 7 \quad 3 \quad 5 \\ 3 \quad 8 \quad 0 \quad 4 \quad 8 \end{array}$$

Use knowledge of decimals to subtract multiple numbers together.

	1	0	5	.	3	4	1	9	kg
-		3	6	.	0	8	0	kg	
		6	9	.	3	3	9	kg	

Use formal method to subtract 6 and 7 digit numbers together progressing to missing number calculations.

$$\begin{array}{r} \square 5 \square 0 \square \\ - 2 \square 3 \square 3 \\ \hline 5 \quad 9 \quad 3 \quad 2 \quad 8 \end{array}$$

$$\begin{array}{r} 6 \quad 7 \quad 3 \quad 1 \quad 2 \quad _ \\ + \\ \hline \quad 2 \quad _ \quad 5 \quad 4 \quad 2 \\ \hline 6 \quad _ \quad 9 \quad 6 \quad 6 \quad 6 \end{array}$$

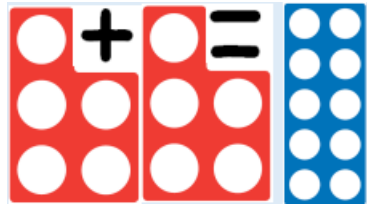
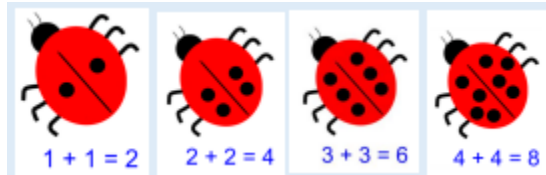
As the year progresses



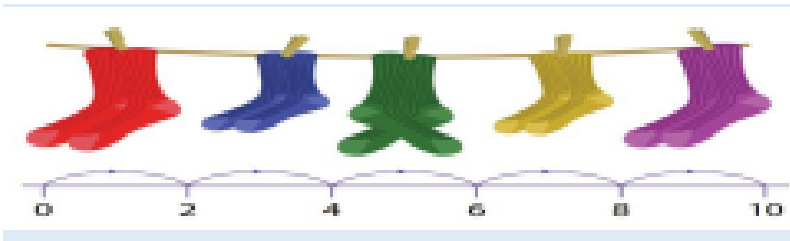
Multiplication Calculation Progression

EYFS

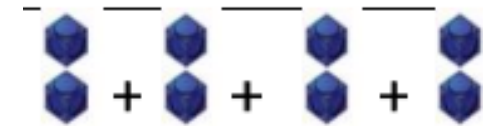
Solve doubling using concrete and pictorial resources.



Use a number line to solve doubling.



Use repeated addition to support calculating.



As the year progresses

Year 1

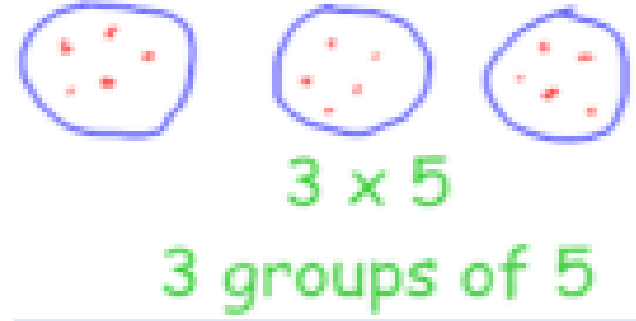
Use physical and pictorial representations to count in 2s, 5s and 10s.



Understand that multiplication as repeated addition.



Use pictorial and abstract representations to solve multiplication problems.



$$5 + 5 + 5$$

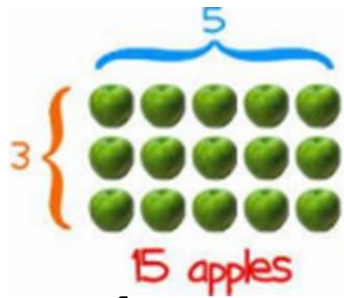
or

$$3 \times 5$$

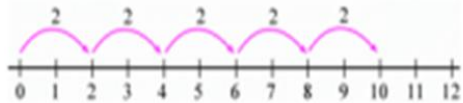
As the year progresses

Year 2

Use arrays as an organised form to represent multiplication problems.

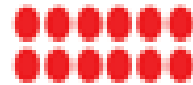


Progressing to the use of number lines.



Use understanding of commutativity to solve multiplication problems.

$$2 \times 6$$



$$2 \times 6 = 12$$

$$6 \times 2 = 12$$

$$6 \times 2$$

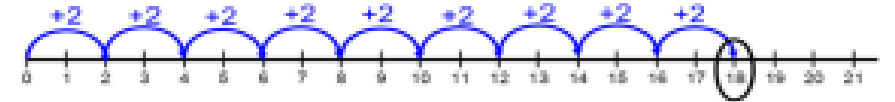


Use repeated addition to solve multiplication problems on a number line

$$9 \text{ groups of } 2 = 18$$

$$9 \text{ jumps of } 2 = 18$$

$$9 \times 2 = 18$$



As the year progresses

Year 3

Develop recall of multiplication facts.

x	3	4	8
5			
6			
4			

x	4	?	?
?	8	6	10
6	24	18	30
?	32	24	40



Develop use of grid method using physical resources to solve multiplication problems.

Place Value Counters:

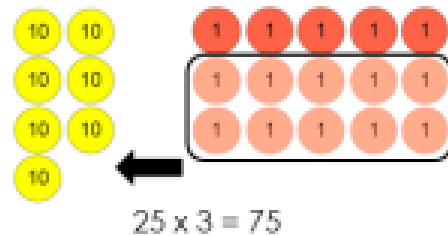
Partition the numbers into tens and ones.

	20	5
3		

Calculate each box.

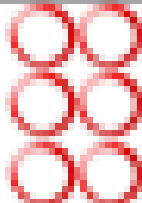
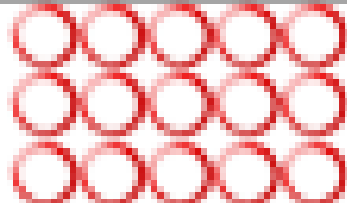
	20	5
3	 60	 15

Add up the totals, exchanging as necessary.



Use pictorial representations with grid method to solve 2 digit by 1 digit numbers.

Draw the counters:

	20	5	
3	 60	 15	= 7
	60	15	

$25 \times 3 = 75$

As the year progresses

Year 4

Develop recall of all multiplication facts.

X	12	3	8	6	5	11	10	7	9	4	2
11											
7											
4											
9											
5											
8											
3											
12											
6											
2											
10											

Develop grid method using 2 digit by 1 digit numbers.

	20	5
3	60	15

$25 \times 3 = 75$

$= 75$

Develop grid method using 3 digit by 1 digit numbers.

$127 \times 6 = 762$

x	100	20	7
6	600	120	42

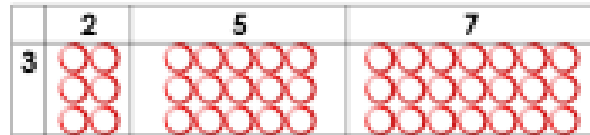
$600 + 120 + 42 = 762$ (add the partial products)

As the year progresses

Year 5

Solve 3 digit by 1 digit multiplication progressing into short multiplication (expanded)

Draw the counters:



		2	1	(3 x 7)
		1	5	(3 x 50)
+	6	0	0	(3 x 200)
	7	7	1	

	2	5	7	
x			3	
		2	1	(3 x 7)
		1	5	(3 x 50)
+	6	0	0	(3 x 200)
	7	7	1	

Use short multiplication (expanded) to solve 3 digit by 2 digit numbers.

		2	4	5	
x			3	2	
					(2 x 5)
					(2 x 40)
					(2 x 200)
					(30 x 5)
					(30 x 40)
					(30 x 200)

Use short multiplication (expanded) to solve 4 digit by 2 digit numbers.

		1	1	1	3	
x				2	2	
						(2 x 3)
						(2 x 10)
						(2 x 100)
						(2 x 1,000)
						(20 x 3)
						(20 x 10)
						(20 x 100)
						(20 x 1,000)
						Total

As the year progresses

Year 6

Use long multiplication through 3 digit and 1 digit calculations.

$$\begin{array}{r}
 342 \times 7 \\
 \hline
 2394 \\
 \hline
 21 \\
 \hline
 342 \times 7 = 2394
 \end{array}$$

Use long multiplication to solve 3 digit by 2 digit calculations.

			2	5	7
		x		6	3
			7 ₁	7 ₂	1
	1	5 ₃	4 ₄	2	0
	1	6	1	9	1

Use long multiplication to solve 4 digit by 2 digit calculations.

			6	3	2	1
x				2	5	
+	3	1 ₁	6 ₁	0	5	
1	2	6	4	2	0	
1	5	8	0	2	5	

Use long multiplication to solve calculations that require the use of decimals.

$$\begin{array}{r}
 53.2 \\
 \times 24.0 \\
 \hline
 212.8 \\
 1064.0 \\
 \hline
 1276.8
 \end{array}$$

As the year progresses

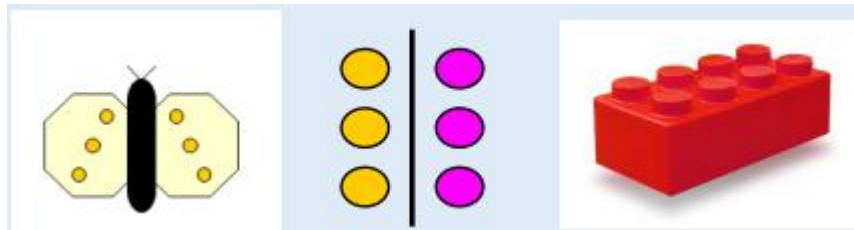


Division Calculation Progression

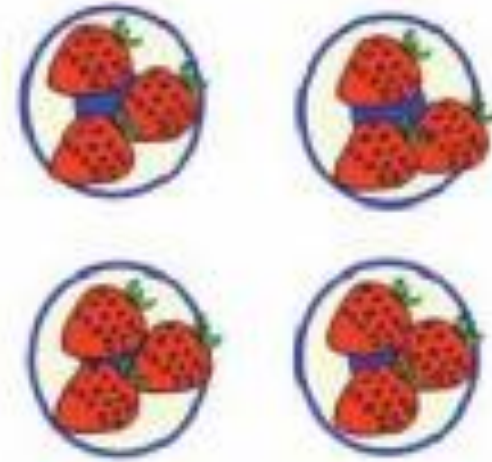
EYFS

Solve halving problems up to 10 using concrete and pictorial resources.

Half of 8 is 4



Use concrete and pictorial representations to show sharing.



As the year progresses

Year 1

Use concrete and pictorial resources to show the concept of sharing.



$$12 \div 2$$

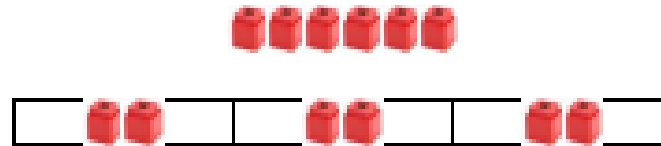


$$12 \div 3$$

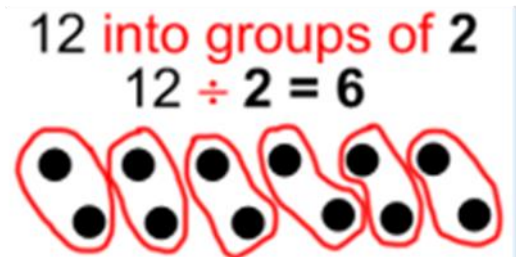


$$12 \div 4$$

Develop understanding of sharing through the use of models and images.



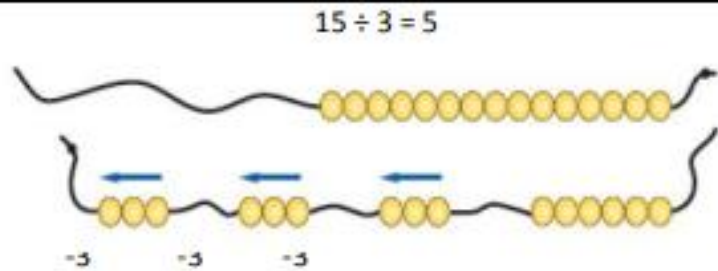
Show understanding of dividing into groups using a form of arrays.



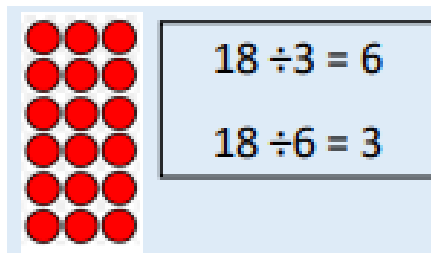
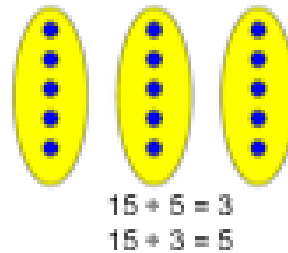
As the year progresses

Year 2

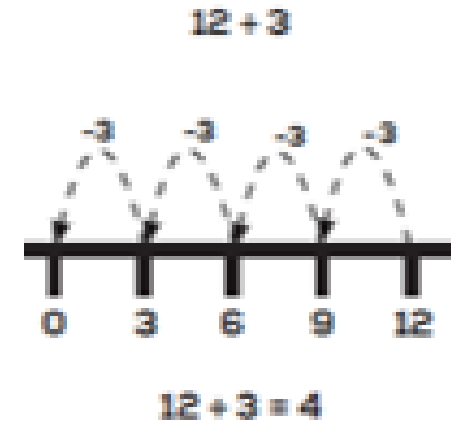
Develop understanding of sharing and grouping through the use of concrete and pictorial resources.



Develop understanding of sharing and grouping through the use of arrays.



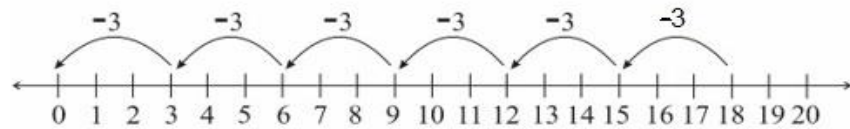
Use a number line to use repeated subtraction to solve division calculations.



As the year progresses

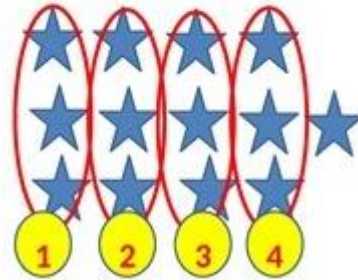
Year 3

Use a number line to solve division calculations linked to known multiplication facts.



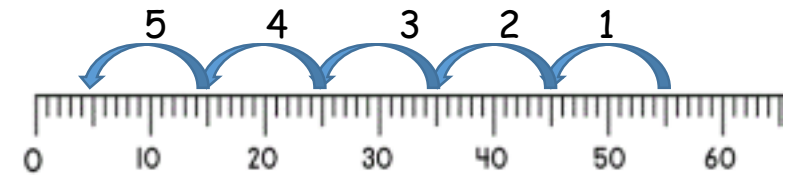
Use concrete and pictorial representations (arrays) to find remainders when dividing.

$$13 \div 3 = 4 \text{ r}1$$



Use a number line to solve division calculations linked to known multiplication facts with remainders.

$$55 \div 10 = 5 \text{ r}5$$



As the year progresses

Year 4

Use known times tables facts to partition division calculations.

$$65 \div 5 = 13$$

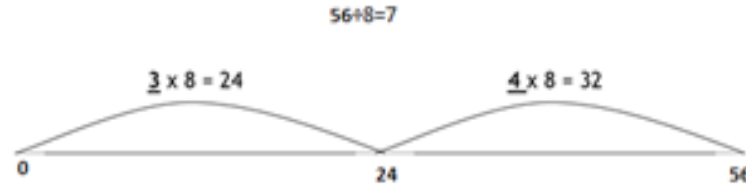
$$65 = 50 + 15$$

$$50 \div 5 = 10$$

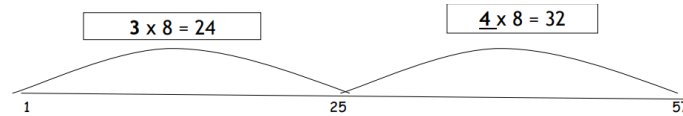
$$15 \div 5 = 3$$

$$10 + 3 = 13$$

Use a form of 'chunking' on a number line to solve division problems.

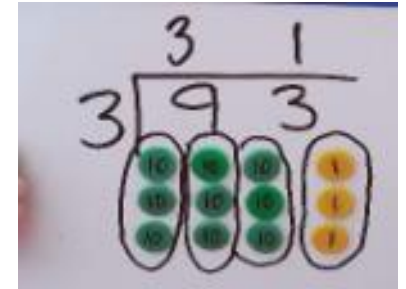


Progressing to the use of number lines to solve division calculations where there are remainders.



Use a number line to calculations (3 digit by 1 digit).

Use resources to support with short division (bus stop) (2 digit by 1 digit).



Progressing to abstract form of short division (bus stop) (2 digit by 1)

$$24 \div 3 = 8$$

This can also be recorded as...

$$\begin{array}{r} 8 \\ 3 \overline{) 24} \end{array}$$

As the year progresses

Year 5

Develop short division (bus stop) so that the numbers are increasing in complexity.

$$4 \overline{) 18732}$$

$$4 \overline{) 2188732}$$

$$5 \overline{) 0371835}$$



Use short division to solve 3 digit by 1 digit problems with remainders.

$$218 \div 8 = 27 \text{ r } 2$$
$$8 \overline{) 2158}$$

Extend to expressing results in different ways according to the context, including with remainders as fractions, as decimals or by rounding. For example:

- Whole number remainder = $27 \text{ r } 2$
- Fraction remainder = $27 \frac{2}{8} = 27 \frac{1}{4}$
- Decimal remainder = $27 \frac{1}{4} = 27 \frac{25}{100} = 27.25$

Use short division to 4 digit by 1 digit problems without remainders.

$$6 \overline{) 126475824}$$

Use short division to 4 digit by 1 digit problems with remainders.



As the year progresses

Year 6

Use long division to divide, using up to 1 digit by 3 digits, no remainders.

$$144 \div 16 = 9$$

$$\begin{array}{r}
 9 \\
 16 \overline{) 144} \\
 \underline{-64} \quad (4 \times 16) \\
 80 \\
 \underline{-64} \quad (4 \times 16) \\
 16 \\
 \underline{-16} \quad (1 \times 16) \\
 0
 \end{array}$$

Use long division to divide with 2 digit by 3 digit numbers with remainders.

$$432 \div 15 = 28 \text{ r}12$$

$$\begin{array}{r}
 28 \text{ r}12 \\
 15 \overline{) 432} \\
 \underline{300} \quad (20 \times 15) \\
 132 \\
 \underline{120} \quad (8 \times 15) \\
 12 \quad (\text{remainder})
 \end{array}$$

Use long division to divide with 2 digit by 4 digit numbers, no remainders.

$$\begin{array}{r}
 13 \\
 15 \overline{) 1989} \\
 \underline{15} \quad \downarrow \\
 48 \\
 \underline{45} \quad \downarrow \\
 39
 \end{array}$$

Use long division to divide with 2 digit by 4 digit numbers, with remainders.

		2	5	3	r21
37	9	3	8	2	
-	7	4	↓		
	1	9	8		
	1	8	5	↓	
		1	3	2	
		1	1	1	
		2	1		

Use long division to divide with decimal remainders or fractions.

$$\begin{array}{r}
 15.125 \\
 8 \overline{) 121.000} \\
 \underline{-8} \\
 41 \\
 \underline{-40} \\
 10 \\
 \underline{-8} \\
 20 \\
 \underline{-16} \\
 40 \\
 \underline{-40} \\
 0
 \end{array}$$

As the year progresses