

Maths Calculation Policy

2020



*Inspired by Christ, we grow and learn
together, reaching our fullest*

The following calculation policy has been devised to meet the requirements of the 2014 National Curriculum for teaching and learning of Mathematics at St Wilfrid's RCVA Primary School. It has been designed around the White Rose Maths Hub to give our children a consistent and smooth progression of learning in calculations across the school.

In reception, we aim for the children to have the ability to achieve the Early Learning Goals in Numbers by the end of their time in The Foundation Stage. The strategies and methods the children learn within this phase are the foundations of their mathematical learning journey and will be built upon and added to as they progress through the Key Stages. On this journey, they will develop their calculation skills in accordance with this policy.

The strategies for calculation which children learn need to be represented by models and images to support, develop and secure their understanding. As a result of this, a child's fluency in maths is built upon. When teaching a new strategy, it is important to start with numbers which children can easily manipulate, so that they can understand the methodology. It is essential that children develop a sound understanding of the number system in order to carry out calculations both efficiently and accurately.

Age related expectations

Our calculation policy is organised by year group, according to the age related expectations set out in the 2014 National Curriculum for Mathematics, which focuses on the acquisition of skills and mastery. Children in each year group are taught to the appropriate stage for their age. Some children will be working at a lower stage than their age until they are secure to move on. Those children who are more able mathematicians will use their skills in a more independent manner, working on more complex problems rather than working above their age related expectations. This allows the child to apply and broaden their mathematical knowledge and understanding within a range of contexts.

Providing a context for calculations

It is important that calculations are given a real life context or problem solving approach. By using real life contexts and problem solving approaches, children develop a greater understanding of the purpose of calculations, which helps them to decide what operations and what methods are most efficient to use when solving problems. This is an aspect of mathematical learning which takes place in lessons through fluency, reasoning and problem solving.

Choosing a calculation method


Written calculations are based on mental strategies. The four operations of calculation (addition, subtraction, multiplication and division) build on mental skills, which provide the foundations of jottings and informal methods of recording, and in turn lead on to the more formal written methods of calculation. Children need to be taught a range of mental and written methods, which they can then begin to use when solving calculations independently. Children need to be taught and encouraged to use these steps when deciding what approach to take, when doing calculations:











<u>Year</u>	<u>Calculations</u>	<u>Times Tables Coverage</u>
EYFS	<ul style="list-style-type: none"> - $U + U$ - $U - U$ - Doubling single digit numbers - Halving single digit numbers up to 10 	Counting in 1s, 2s, 5s and 10s
Year 1	<ul style="list-style-type: none"> - $U + U$ and $U + TU$ (numbers up to 20) including adding zero. - $U - U$ and $TU - U$ (numbers up to 20) including subtracting zero. - $U \times U$ - $U \div U$ 	2x, 5x and 10x tables
Year 2	<ul style="list-style-type: none"> - $TU + U$, $TU +$ multiples of 10, $TU + TU$, $U + U + U$ - $TU - U$, $TU -$ tens, $TU - TU$ - $U \times U$ - $U \div U$ and $TU \div U$ (within 2, 5 and 10 times tables). 	2x, 5x, 10x tables and counting in steps of 3
Year 3	<ul style="list-style-type: none"> - Add numbers with up to 3 digits, $HTU +$ multiples of 10, $HTU +$ multiples of 100 - Subtract numbers up to 3 digits, $HTU - U$, $HTU -$ multiples of 10, $HTU -$ multiples of 100, $HTU - HTU$ - $TU \times U$ - $TU \div U$ 	2x, 3x, 4x , 5x, 10x and 8x tables
Year 4	<ul style="list-style-type: none"> - Add numbers with up to 4 digits, $ThHTU + ThHTU$, add decimals with up to 2 decimal places in the context of money - Subtract numbers with up to 4 digits, $ThHTU - ThHTU$, subtract decimals with up to 2 decimal places in the context of money - Multiply 3 numbers together, $TU \times U$, $HTU \times U$, multiply by zero and one - $TU \div U$, $HTU \div U$ 	2x, 3x, 4x, 5x, 6x, 7x, 8x, 9x, 10x, 11x and 12x tables
Year 5	<ul style="list-style-type: none"> - Add numbers with more than 4 digits, add decimals with up to 3 decimal places - Subtract numbers with more than 4 digits, subtract decimals with up to 3 decimal places - Multiply whole numbers and decimals with up to 3 decimal places by 10, 100 and 1000 - Divide numbers with up to 4 digits by U (including remainders fractions and decimals, using rounding accordingly) 	All times tables
Year 6	<ul style="list-style-type: none"> - Add numbers with more than 4 digits, add decimals with up to 3 decimal places - Subtract numbers with more than 4 digits, subtract decimals with up to 3 decimal places - Multiply numbers with up to 4 digits by TU, multiply numbers with up to 2 decimal places by a whole number - Divide numbers up to 4 digits by TU (interpreting remainders according to the context), divide decimals up to 2 decimal places by U or TU 	All times tables

Note: **Times tables in red indicate times tables to be taught in the specific year group**





Mathematical vocabulary

<u>EYFS key vocabulary</u>	
	add, and, count on, more, total, sum, altogether, take away, fewer, leave, count back, difference between, group, double, halve, half, some, a lot.





<u>Year 1 key vocabulary</u>	
	add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line.
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?
	groups of, lots of, time, array, altogether, multiply, count
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps





<u>Year 2 key vocabulary</u>	
	add, more, plus, and, make, altogether, total, equal to, double, most, count on, number line, sum, tens, units/ones, partition, plus, addition, column, tens boundary
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?, difference, count on, strategy, tens, ones/units
	groups of, lots of, time, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps, divide, divide by, divide into, division, grouping, number line, repeated subtraction, left, left over





Year 3 key vocabulary

	add, more, plus, and, make, altogether, total, equal to, double, most, count on, number line, sum, tens, units/ones, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?, difference, count on, strategy, tens, ones/units, exchange, decrease, hundreds, value, digit
	groups of, lots of, time, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps, divide, divide by, divide into, division, grouping, number line, repeated subtraction, left, left over, inverse, short division, 'carry', remainder, multiple

Year 4 key vocabulary

	add, more, plus, and, make, altogether, total, equal to, double, most, count on, number line, sum, tens, units/ones, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, thousands boundary, digits, inverse
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?, difference, count on, strategy, tens, ones/units, exchange, decrease, hundreds, value, digit, inverse
	groups of, lots of, time, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps, divide, divide by, divide into, division, grouping, number line, repeated subtraction, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor

<u>Year 5 key vocabulary</u>	
	add, more, plus, and, make, altogether, total, equal to, double, most, count on, number line, sum, tens, units/ones, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, thousands boundary, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?, difference, count on, strategy, tens, ones/units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal
	groups of, lots of, time, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry', place holder
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps, divide, divide by, divide into, division, grouping, number line, repeated subtraction, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor

<u>Year 6 key vocabulary</u>	
	add, more, plus, and, make, altogether, total, equal to, double, most, count on, number line, sum, tens, units/ones, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, thousands boundary, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths
	Equal to, take, take away, less, minus, subtract, leaves, distance/difference between, how many more, how many fewer/less than, most, least, count back, how many left?, how much less is...?, difference, count on, strategy, tens, ones/units, exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal
	groups of, lots of, time, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times, partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry', place holder, tenths, hundredths, decimal
	Share, share equally, one each, two each..., group, groups of, lots of, array, jumps, divide, divide by, divide into, division, grouping, number line, repeated subtraction, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor, common factor

Maths resources



cubes



objects



dice and playing cards



counting sticks



bead strings



number fans

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

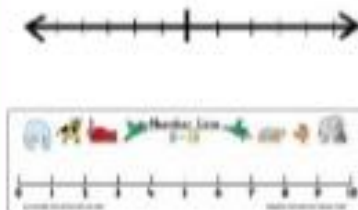
100 squares



base 10 equipment



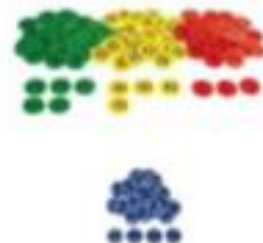
place value arrow cards



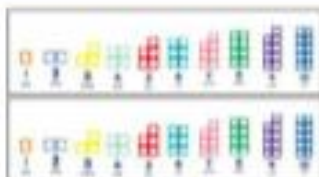
number lines



Cuisenaire rods



place value counters



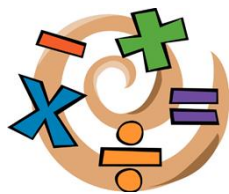
Numicon



money



number cards

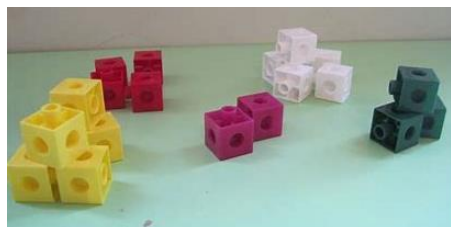


EYFS: Numbers



In Reception, children's learning about number is based on the requirements of the Numbers section of the Early Learning Goals for Mathematics. It is mainly based on games and play. The following methods and strategies are used to teach 'Number' in Reception:

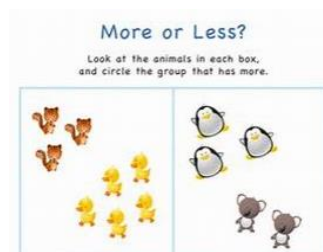
Count objects and quantities of things.



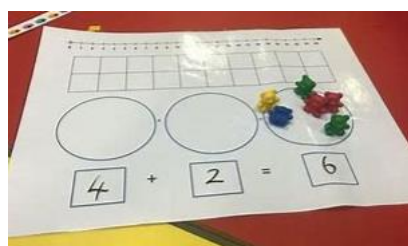
Estimate the numbers of objects and check by counting



Compare sets of objects using language of more and fewer



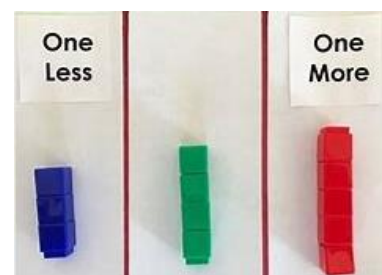
Find totals of items in 2 or more groups by counting all of them



Through play and following their own interest, identify their own maths problems to solve



Say the number that is more or less than a given number to at least 20.



Explore numbers through stories, songs and in the outdoor learning environment, including in our Forest School



Record/begin to write numbers to 20 using a range of different materials and methods e.g paint, chalk, sand,



Through play, role-play, practical activities and discussion, use the names addition and subtraction



Key skills for number in EYFS

By the end of the year, children should be able to:

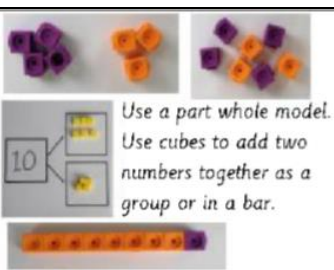
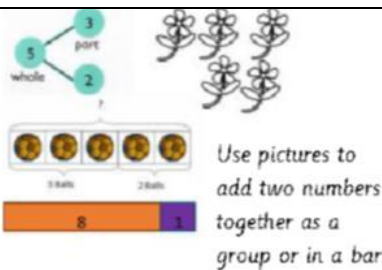


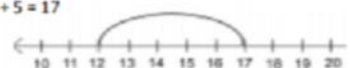
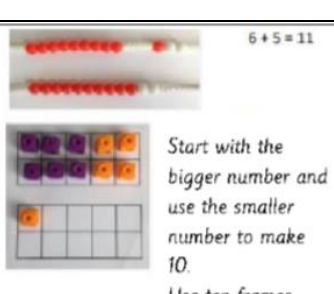
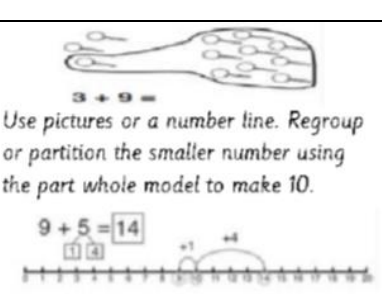

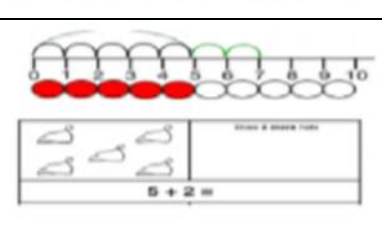
- Count reliably with numbers from 1 to 20.
- Place numbers 0 to 20 in order and say which number is one more or one less than a given number.
- Use quantities and objects to add and subtract 2 single-digit numbers and count on or back to find the answer.
- Solve problems involving doubling, halving and sharing.



Addition




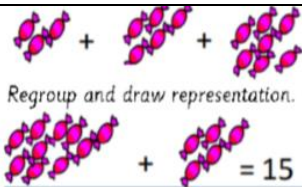
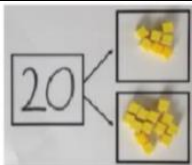


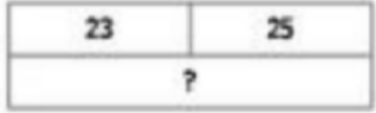

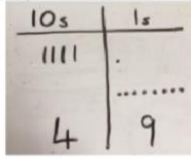
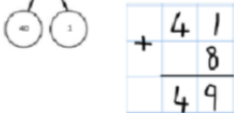

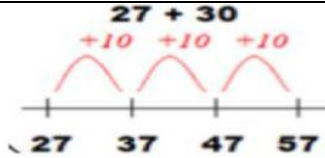

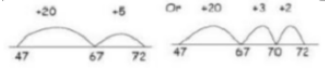
Year 1: add with numbers up to 20

Objective and strategy	Concrete	Pictorial	Abstract
Combining 2 parts to make a part whole model	 <p>Use a part whole model. 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>	$4 + 3 = 7$  $10 = 6 + 4$ Use the part whole diagram as shown above to move into the abstract.
Starting at the bigger number and counting on- using cubes	 <p>Start with the larger number on the bead string and then count on using the smaller number 1 by 1 to find the answer.</p>	$12 + 5 = 17$  <p>Start at the larger number on the number line and count on in ones or in one jump to find the answer.</p>	$5 + 12 = 17$ <p>Place the larger number in your head and count on the smaller number to find the answer.</p>
Regrouping to make 10 using ten frame.	 <p>Start with the bigger number and use the smaller number to make 10. Use ten frames.</p>	 <p>Use pictures or a number line. Regroup or partition the smaller number using the part whole model to make 10.</p>	<p>Emphasis should be on the language</p> <p>'1 more than 5 is equal to 6.' '2 more than 5 is 7.' '8 is 3 more than 5.'</p>
Represent and use number bonds and related subtraction facts within 20.	 <p>2 more than 5.</p>	 <p>5 + 2 =</p>	<p>Emphasis should be on the language</p> <p>'1 more than 5 is equal to 6.' '2 more than 5 is 7.' '8 is 3 more than 5.'</p>

Key skills for addition in Year 1:

- Read and write numbers to 100 in numerals, including 1-20 in words.
- Recall number bonds to 10 and 20, and addition facts with 20
- Count to and across 100
- Count in multiples of 1, 2, 5 and 10
- Solve simple 1 step problems involving addition, using objects, number lines and pictorial representations

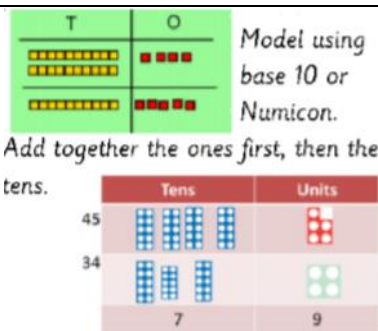

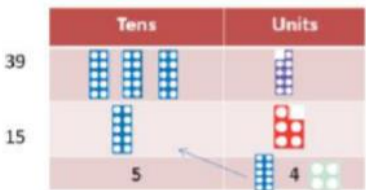
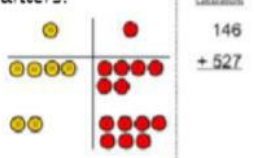
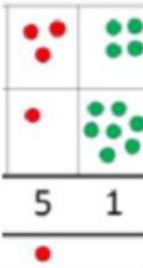
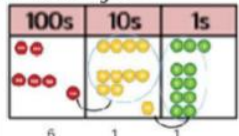
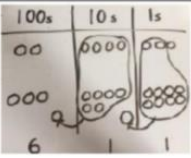
Year 2: add with two digit numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Adding three single digits	 <p>Combine to make 10 first if possible, or bridge 10 then add the third digit.</p>	 <p>Regroup and draw representation.</p>	$\begin{array}{r} 4 + 7 + 6 = 10 + 7 \\ 10 \\ = 17 \end{array}$ <p>Combine the two numbers that make/bridge ten then add on the third.</p>
Using known number facts	 <p>Children explore ways of making numbers within 20.</p>	$\begin{array}{l} 20 \\ \swarrow \searrow \\ \square + \square = 20 \quad 20 - \square = \square \\ \square + \square = 20 \quad 20 - \square = \square \end{array}$	$\begin{array}{l} \square + 1 = 16 \quad 16 - 1 = \square \\ 1 + \square = 16 \quad 16 - \square = 1 \end{array}$
Using bar models	 <p>$3 + 4 = 7$</p>	 <p>$7 + 3 = 10$</p>	 <p>$23 + 25 = 48$</p>
Add a 2-digit number and ones	 <p>Continue to develop understanding of partitioning and place value.</p>	 <p>Children to represent the base 10 as symbols.</p>	$\begin{array}{r} 41 + 8 \\ 1 + 8 = 9 \\ 40 + 9 = 49 \end{array}$ 
Add a 2-digit number and tens	 <p>$25 + 10 = 35$</p> <p>Explore the fact that the ones digit does not change.</p>	 <p>$27 + 30$</p> <p>$+10 +10 +10$</p>	$\begin{array}{l} 27 + 10 = 37 \\ 27 + 20 = 47 \\ 27 + \square = 57 \end{array}$
Add two 2-digit numbers	 <p>Mode using base 10, Numicon and place value counters.</p>	 <p>Use a number line and bridge ten using part whole if necessary.</p>	$\begin{array}{r} 25 + 47 \\ 20 + 5 \quad 40 + 7 \\ 20 + 40 = 60 \\ 5 + 7 = 12 \\ 60 + 12 = 72 \end{array}$

Key skills for addition in Year 2:

- Read and write numbers to at least 100 in numerals and words
- Add a 2-digit number and ones (e.g $27 + 6$)
- Add a 2-digit number and tens (e.g $23 + 40$)
- Add pairs of 2-digit numbers (e.g $35 + 47$)
- Add three 1-digit numbers ($5 + 9 + 7$)
- Know that adding can be done in any order (commutative law)
- Recall number bonds to 20 and number bonds to 10 up to 100 (e.g $30 + 70$)
- Count in steps of 2, 3, 5 and 10 from any number, including 0
- Understand the place value of 2-digit numbers (tens and ones/units)
- Compare and order numbers to 100 using $<$, $>$ and $=$ signs
- Solve problems with addition using concrete objects and pictorial representations, involving numbers, quantities and measures and applying mental and written methods

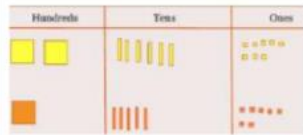
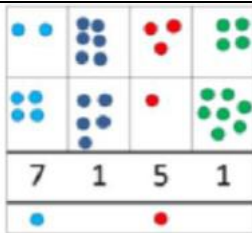
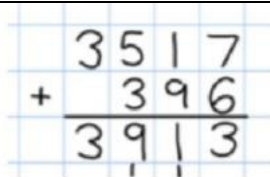
Year 3: add with up to three digits

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column addition-no regrouping	 <p>Model using base 10 or Numicon. Add together the ones first, then the tens.</p>	<p>Children move to drawing the counters using a tens and ones frame.</p> 	$\begin{array}{r} 223 \\ + 114 \\ \hline 337 \end{array}$ <p>Add the ones first, then the tens, then the hundreds.</p>
Column addition-with regrouping	 <p>Move to using place value counters.</p> 	 <p>Children can draw a representation of the grid to further support their understanding, carrying the ten underneath the line.</p>	$\begin{array}{r} 20 + 5 \\ 40 + 8 \\ 60 + 13 = 73 \end{array}$ <p>Start by partitioning the numbers before using the formal column method, to show the exchange.</p> $\begin{array}{r} 536 \\ + 85 \\ \hline 621 \\ 11 \end{array}$
Using place value counters (up to 3 digits)	<p>Use place value counters to show the exchange.</p> 	 <p>Children to represent the counters in a place value chart, circling when they make an exchange.</p>	$\begin{array}{r} 243 \\ + 368 \\ \hline 611 \\ 11 \end{array}$

Key skills for addition in Year 3:

- Read and write numbers to 1000 in numerals and words
- Add a 2-digit number mentally, including those exceeding 100
- Add a 3-digit number and ones mentally (e.g $175 + 8$)
- Add a 3-digit number and tens mentally (e.g $249 + 50$)
- Add a 3-digit number and hundreds mentally (e.g $381 + 400$)
- Estimate answers to calculations using the inverse operation to check answers
- Solve problems including missing number problems, using number facts, place value and more complex additions
- Recognise the place value of each digit in 3-digit numbers (hundreds, tens, ones/units)
- Continue to practise a wide range of mental addition strategies i.e number bonds, adding to the nearest multiple of 10, 100 and 1000 and adjusting, using near doubles, partitioning and recombining.

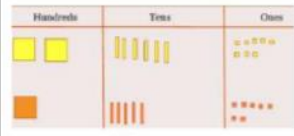
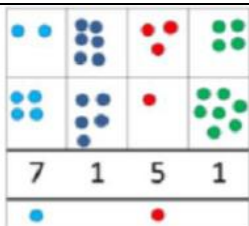
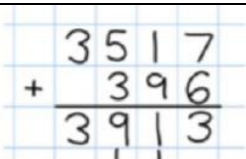
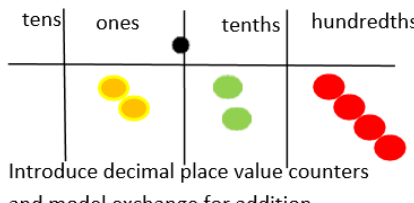
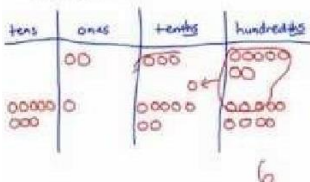

Year 4: add with up to four digits

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method-regrouping (up to 4 digits)	<p>Children continue to use base 10 or PV counters to add, exchanging 10 ones for a ten, ten tens for a hundred, etc.</p> 	 <p>Draw representations using a place value grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>

Key skills for addition in Year 4:

- Select the most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in 4 digit numbers (thousands, hundreds, tens, ones/units).
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use the inverse operation to check answers to a calculation.
- Solve 2 step problems in context, deciding which operations and methods to use and explain why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, i.e add number bonds, add the nearest multiple of 10, 100 or 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers up to 4 digits in context, deciding which operations and methods to use and explain why.

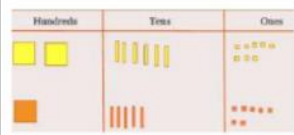
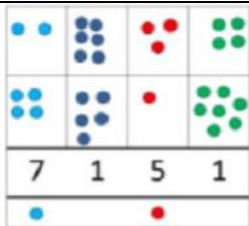
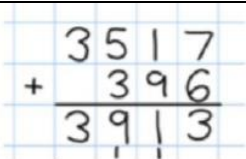
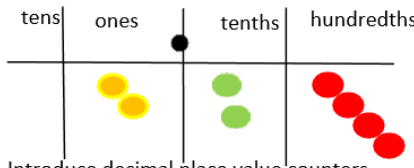
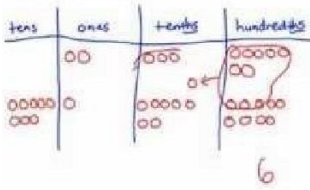
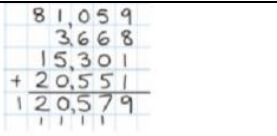
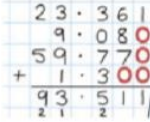
Year 5: add numbers with more than four digits

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method-regrouping (more than 4 digits)	<p>Children continue to use base 10 or PV counters to add, exchanging 10 ones for a ten, ten tens for a hundred, etc.</p> 	 <p>Draw representations using a place value grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>
Add decimals with 2 decimal places, including money	<p>As year 4</p>  <p>Introduce decimal place value counters and model exchange for addition.</p>	<p>2.37 + 81.79</p> 	<p>72.8</p> <p>+ 54.6</p> <p><u>127.4</u></p> <p>1 1</p> 

Key skills for addition in Year 5:

- Add numbers mentally with increasingly large numbers using a range of mental strategies i.e add the nearest multiple of 10, 100 and 1000 and adjust, use near doubles, the inverse, partitioning and recombining and number bonds.
- Use rounding to check answers and accuracy
- Read, write, order and compare numbers up to at least 1 million and determine the value of each digit.
- Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000
- Add numbers with more than 4 digits, using a formal method of column addition

Year 6: add several numbers of increasing complexity

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method- regrouping (more than 4 digits)	<p>Children continue to use base 10 or PV counters to add, exchanging 10 ones for a ten, ten tens for a hundred, etc.</p> 	 <p>Draw representations using a place value grid.</p>	 <p>Continue from previous work to carry hundreds as well as tens.</p> <p>Relate to money and measures.</p>
Add decimals with 2 decimal places, including money	<p>As year 4</p>  <p>Introduce decimal place value counters and model exchange for addition.</p>	<p>2.37 + 81.79</p> 	 <p>Insert zeros for place holders.</p> 

*The methods used will follow on from those taught in Year 5 and Year 6, many of those problems will be in the context of money or measure.


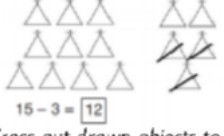
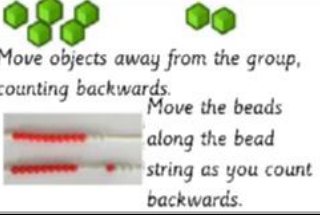
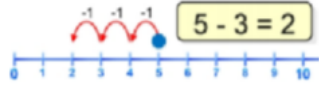
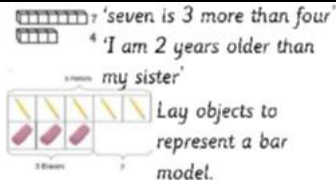
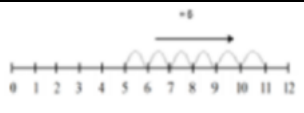
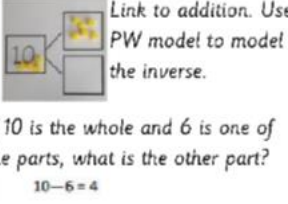
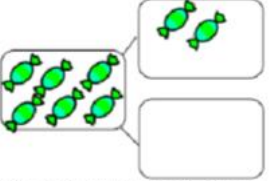
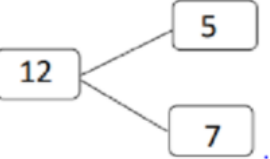
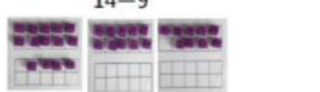
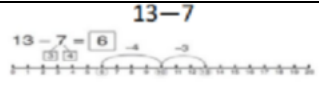
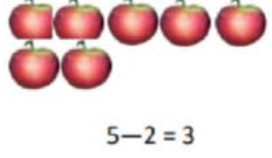


**A large focus in Year 6 will be the use of abstract methods

Key skills for addition in Year 5:

- Perform mental calculations, including 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 explain why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any number (including decimal numbers) up to a required degree of accuracy.
- Understand how to add mentally with larger numbers and calculations of increasing complexity.

Subtraction


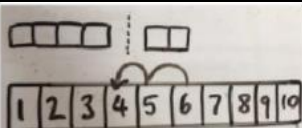
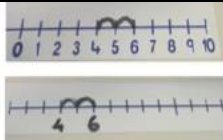
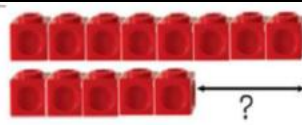
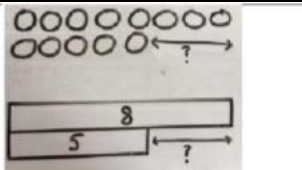
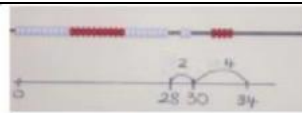
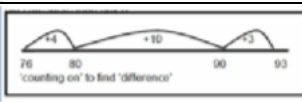
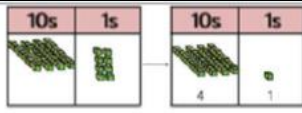
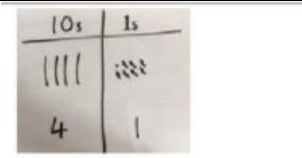
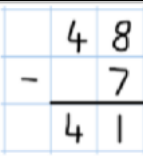
Year 1: subtract from numbers up to 20

Objective and strategy	Concrete	Pictorial	Abstract
Taking away ones	 <p>Use physical objects such as counters or cubes, to show how objects can be taken away.</p>	 <p>Cross out drawn objects to show what has been taken away.</p>	$7 - 4 = 3$ $16 - 9 = 7$
Counting back	 <p>Move objects away from the group, counting backwards. Move the beads along the bead string as you count backwards.</p>	 <p>Count back in ones using a number line.</p>	Put 13 in your head, count back 4. What number are you at?
Find the difference	 <p>Lay objects to represent a bar model.</p>	 <p>Count back in ones using a number line.</p>	Hannah has 12 sweets and her sister has 5 How many more sweets does Hannah have than her sister?
Represent and use number bonds and related subtraction within 20 (part whole model)	 <p>Link to addition. Use PW model to model the inverse. If 10 is the whole and 6 is one of the parts, what is the other part? $10 - 6 = 4$</p>	 <p>Use pictorial representations to show the part.</p>	 <p>Move to using numbers within the part whole model.</p>
Make 10	 <p>Make 14 on a ten frame. Take away 4 to make ten, then take one more away so that you have taken 5.</p>	 <p>Jump back 3 first, then another 4. Use ten as the stopping point.</p>	$16 - 8$ How many do we subtract first to get to 10? How many do we have left to take off?
Bar model	 <p>$5 - 2 = 3$</p>		 <p> $10 = 8 + 2$ $10 = 2 + 8$ $10 - 2 = 8$ $10 - 8 = 2$ </p>

Key skills for subtraction in 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 1-digit and 2-digit numbers to 20, including zero
- Solve one step problems that involve addition and subtraction, using concrete objects (i.e bead strings, objects, cubes, pictures and missing number problems).
- Read and write numbers from 0 to 20 in numerals and words.

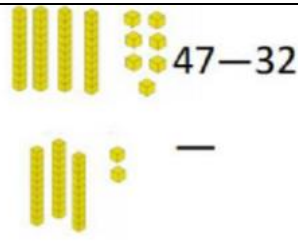
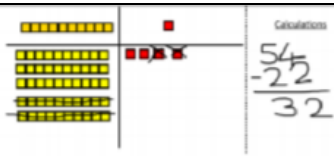
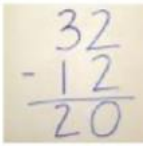
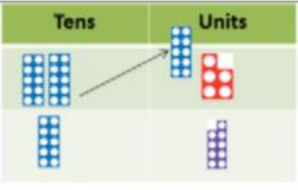
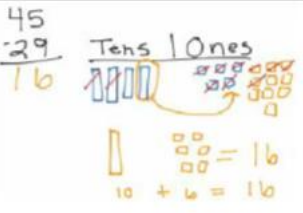
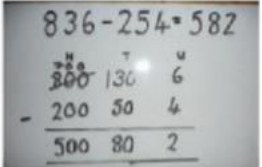
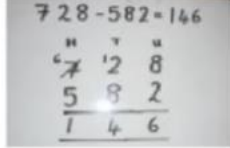
Year 2: subtract with 2 numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Counting back	 <p>Using number lines or number tracks, children start with the greatest number and count back.</p>	 <p>Children to represent what they see pictorially.</p>	 <p>Represent the calculation on a number line and show their jumps. Encourage the children to use an empty number line.</p>
Find the difference	 <p>Using cubes, Numicon or other objects to find the difference between two numbers.</p>	 <p>Children to draw the cubes or a bar model to illustrate what they need to calculate.</p>	<p>Find the difference between 8 and 5</p> <p>$8 - 5$, the difference is </p> <p>Children to explore why $9 - 6$, $8 - 5$ and $7 - 4$ have the same difference</p>
Make 10	 <p>$34 - 28$ Use bead strings to model counting to the next ten and then the remaining part of the number.</p>	 <p>Use a number line to count on to the next ten and then the remaining part of the number.</p>	<p>$93 - 76 = 17$</p>
Column method using base 10	 <p>Use base 10 to represent each part of the numbers, taking away the ones first.</p>	 <p>Children to represent the base 10 pictorially.</p>	 <p>Children to use the column method</p>

Key skills for subtraction in 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, 100 square
- Mentally subtract a 2-digit number and ones; a 2-digit number and tens and two x 2-digit numbers.
- Show that subtraction of one number from another number cannot be done in any order
- Recognise and use the inverse relationships between addition and subtraction to check calculations and missing number problems.
- Solve simple addition and subtraction problems, including measure, using concrete objects, pictorial representations and also apply increasing knowledge of mental and written methods.

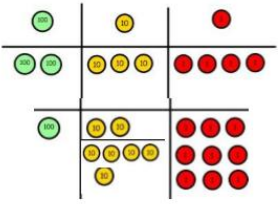
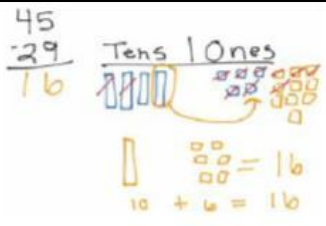
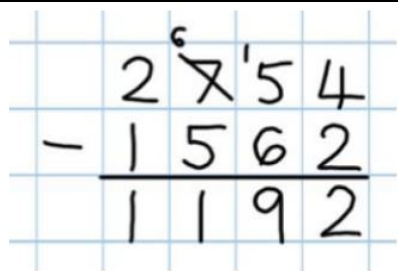
Year 3: subtract with 2 and 3 digit numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method without grouping	 <p>Use base 10 or Numicon to model.</p>	 <p>Draw representations to support understanding.</p>	$47 - 24 = 23$ $\begin{array}{r} 40 + 7 \\ - 20 + 4 \\ \hline 20 + 3 \end{array}$ <p>The above step may be needed to lead to clear column subtraction understanding.</p> 
Column method with regrouping (up to 3 digits using place value counters)	 <p>Begin with base 10 or Numicon. Move to place value counters, modelling the exchange of ten in to ten ones/units. Use the phrase 'exchange'.</p>	 <p>Children may draw base 10 or place value counters and cross off.</p>	 <p>Begin by partitioning into place value columns.</p>  <p>Next, move to the formal method.</p>

Key skills for subtraction in Year 3:

- Read and write numbers up to 1000 in numerals and words.
- Select the most appropriate method to subtract and explain why.
- Solve problems, including missing number problems.
- Estimate answers and use the inverse operation to check.
- Recognise the place value of each digit in a 3-digit number.
- Find 10 or 100 more or less than a given number.
- Use **counting on** as a mental strategy to find the difference when numbers are close together or near multiples of 10.
- Mentally subtract a **3-digit number and ones**, a **3-digit number and tens** and a **3-digit number and hundreds**.

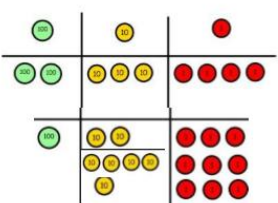
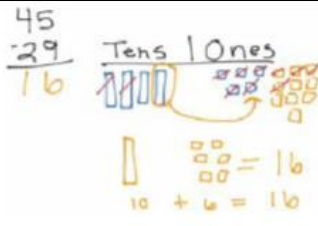
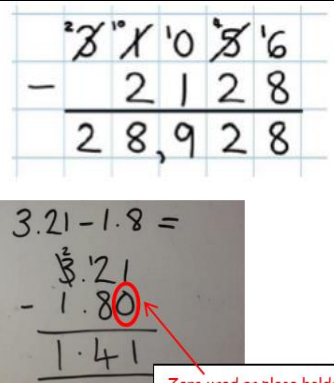
Year 4: subtract with up to 4 digit numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method with regrouping (up to 4 digits)	<p style="text-align: center;">234 - 179</p>  <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	 <p>Children may draw base 10 or place value counters and cross off.</p>	 <p>Use the phrase 'take and make' for exchange</p>

Key skills for subtraction in Year 4:

- Subtract by counting on where numbers are close together or when they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and explain why.
- Solve simple measure and money problems, involving fractions and decimals to two decimal places.
- Find 1000 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise the place value of each number in a 4-digit number.
- Round any number to the nearest 10, 100 or 1000

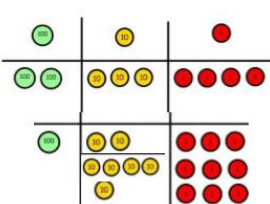
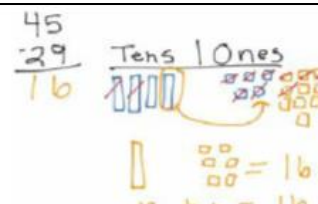
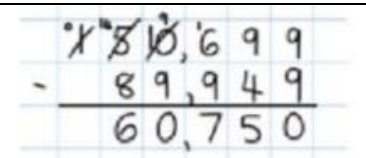

Year 5: subtract with at least 4 digit numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method with regrouping	<p>234 - 179</p>  <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	 <p>Children may draw base 10 or place value counters and cross off.</p>	

Key skills for subtraction in Year 5:

- Subtract numbers mentally with increasingly large numbers.
- In a range of contexts, use rounding and estimation to check answers to calculations and determine levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and explain why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through zero.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10,000 and 100,000

Year 5: subtract with increasingly large and more complex numbers and decimal values

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column method with regrouping	<p style="text-align: center;">$234 - 179$</p>  <p>Model process of exchange using Numicon, base ten and then move to PV counters.</p>	 <p>Children may draw base 10 or place value counters and cross off.</p>	 

Mental strategies

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

Key skills for subtraction in Year 6:

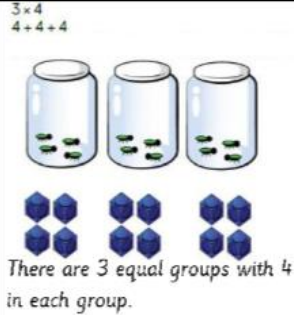
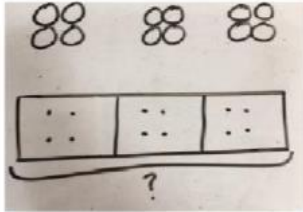

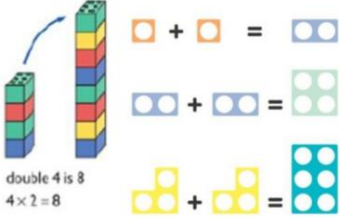

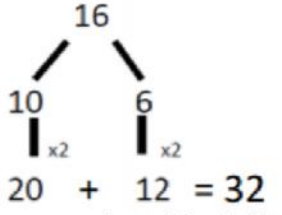
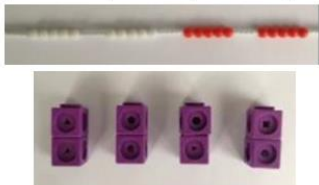
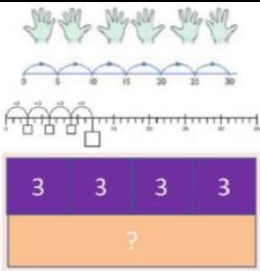
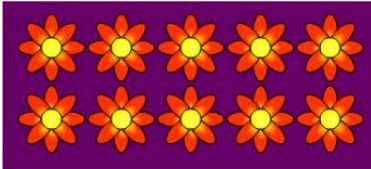
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and explain why.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Use negative numbers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



Multiplication



Year 1: multiply with concrete objects, arrays and pictorial representations

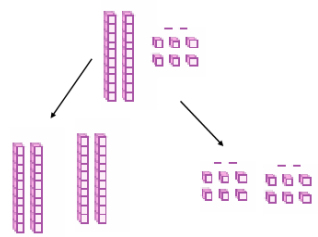
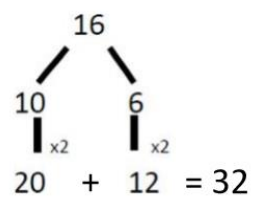
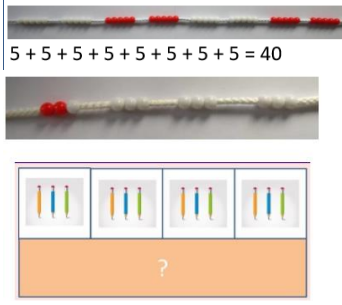
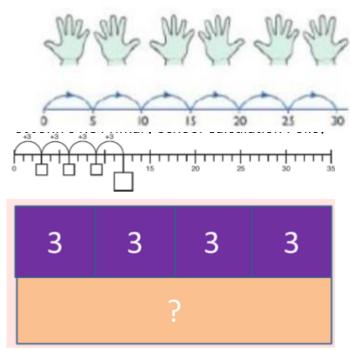
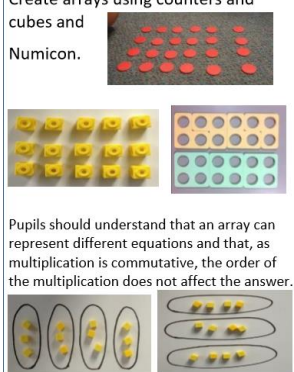
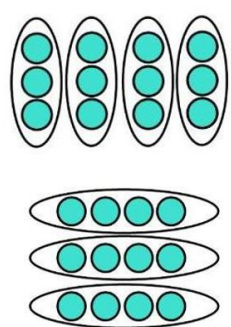


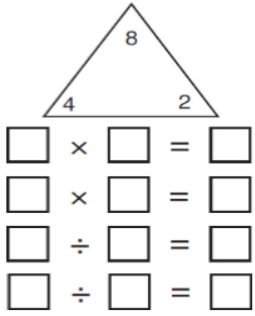
<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Recognising and making equal groups using repeated addition	 <p>3 x 4 4 + 4 + 4</p> <p>There are 3 equal groups with 4 in each group.</p>	 <p>Children to represent the practical resources in a picture and use a bar model.</p>	 <p>2 + 2 + 2 + 2 + 2 = 10</p> <p>3 x 4 = 12</p> <p>4 + 4 + 4 = 12</p>
Doubling	<p>Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling</p>  <p>double 4 is 8 4 x 2 = 8</p>	<p>Draw pictures and representations to show how to double numbers.</p> <p>Double 4 is 8</p> 	 <p>16</p> <p>10 6</p> <p>x2 x2</p> <p>20 + 12 = 32</p> <p>Partition a number and then double each part before recombining it back together.</p>
Counting in multiples	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting.</p> 	 <p>Number lines, counting sticks and bar models should be used to show representations of counting in multiples.</p>	<p>0, 2, 4, 6, 8, 10 0, 3, 6, 9, 12, 15 0, 5, 10, 15, 20, 25, 30</p> <p>4 x 3 = <input type="text"/></p> <p>Count in multiples of a number aloud.</p>
Understanding using arrays	<p>Use objects laid out in arrays to find the answers to 2 lots 5, 3 lots of 2 etc.</p> 	<p>Draw representations of arrays to show understanding.</p>	<p>3 x 2 = 6</p> <p>2 x 5 = 10</p>

Key skills for multiplication in 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 support of the teacher.
- Make connections between arrays, number patterns and counting in 2s, 5s and 10s.
- Begin to understand doubling, using concrete objects and pictorial representations.

Year 2: multiply using arrays and repeated addition

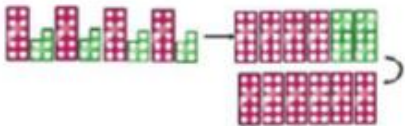
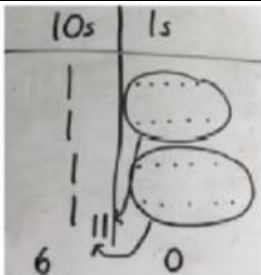
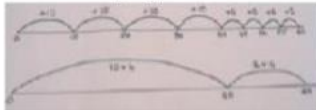
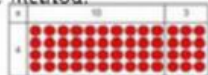
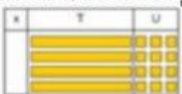

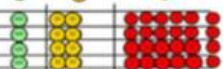
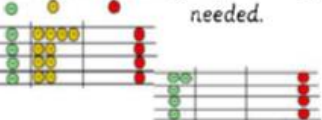
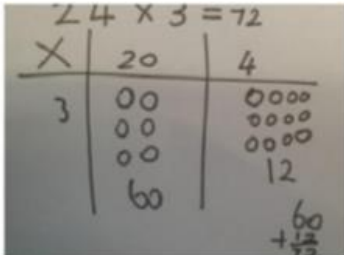
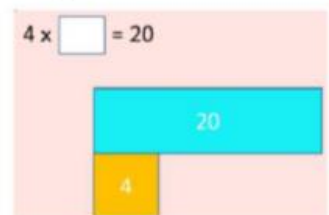
(using at least 2s, 5s and 10s)

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Doubling	<p>Model doubling using dienes and PV counters.</p>  $40 + 12 = 52$	<p>Draw pictures and representations to show how to double numbers</p>	<p>Partition a number and then double each part before recombining it back together.</p>  $20 + 12 = 32$
Counting in multiples of 2, 3, 4, 5 and 10 from 0 (repeated addition)	<p>Count the groups as children are skip counting, children may use their fingers as they are skip counting. Use bar models.</p>  $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40$	<p>Number lines, counting sticks and bar models should be used to show representation of counting in multiples.</p> 	<p>Count in multiples of a number aloud.</p> <p>Write sequences with multiples of numbers</p> <p>0, 2, 4, 6, 8, 10</p> <p>0, 3, 6, 9, 12, 15</p> <p>0, 5, 10, 15, 20, 25, 30</p> $4 \times 3 = \square$
Multiplication is commutative	<p>Create arrays using counters and Numicon.</p>  <p>Pupils should understand that an array can represent different equations and that, as multiplication is commutative, the order of the multiplication does not affect the answer.</p>	<p>Use representations of arrays to show different calculations and explore commutativity.</p> 	<p>$12 = 3 \times 4$</p> <p>$12 = 4 \times 3$</p> <div style="border: 1px solid black; padding: 5px; margin: 5px;"> <p>Use an array to write multiplication sentences and reinforce repeated addition.</p>  <p>$5 + 5 + 5 = 15$</p> <p>$3 + 3 + 3 + 3 + 3 = 15$</p> <p>$5 \times 3 = 15$</p> <p>$3 \times 5 = 15$</p> </div>
Using the inverse		 $\square \times \square = \square$ $\square \times \square = \square$ $\square \div \square = \square$ $\square \div \square = \square$	<p>$2 \times 4 = 8$</p> <p>$4 \times 2 = 8$</p> <p>$8 \div 2 = 4$</p> <p>$8 \div 4 = 2$</p> <p>$8 = 2 \times 4$</p> <p>$8 = 4 \times 2$</p> <p>$2 = 8 \div 4$</p> <p>$4 = 8 \div 2$</p> <p>Show all 8 related fact family sentences.</p>

Key skills for multiplication in Year 2:

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

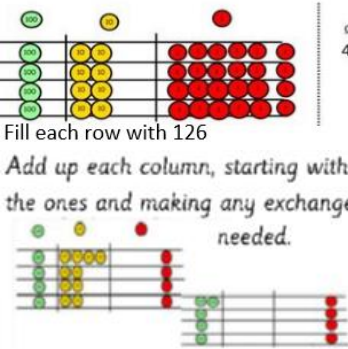
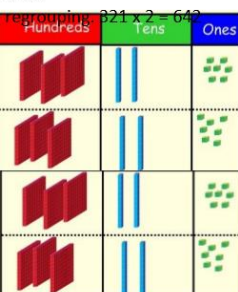
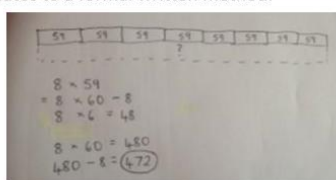
Year 3: multiply 2-digit numbers by a single digit number

Objective and strategy	Concrete	Pictorial	Abstract															
Partition to multiply	<div><p>4×15</p><p>Using Numicon or base 10, partition the numbers.</p></div>	<div><p>Children to represent the concrete manipulatives pictorially.</p></div>	<div><p>4×15</p><p>$10 \times 4 = 40$ $5 \times 4 = 20$ $40 + 20 = 60$</p><p>Children to be able to use an array to write a range of calculations.</p></div>															
Grid method	<div><p>Make links with arrays to introduce the method.</p><p>4 rows of 10 4 rows of 3</p><p>Move on to base 10 to move towards a more compact method.</p><p>4 rows of 13</p><p>Use PV counters to show how we are finding groups of a number.</p><p>4 x 126</p><p>Fill each row with 126.</p><p>4 x 126</p><p>Add up each column, starting with the ones and making any exchanges needed.</p></div>	<div><p>Children can draw place value counters using colours to show different amounts or just use the circles in different columns to show their thinking as shown below.</p><p>Bar models are used to explore missing numbers.</p></div>	<div><table><tr><td>x</td><td>30</td><td>5</td></tr><tr><td>7</td><td>210</td><td>35</td></tr></table><p>$210 + 35 = 245$</p><p>Start by multiplying by 1 digit numbers and showing the clear addition alongside the grid.</p><table><tr><td></td><td>10</td><td>8</td></tr><tr><td>10</td><td>100</td><td>80</td></tr><tr><td>3</td><td>30</td><td>24</td></tr></table><p>Moving forward, multiply by a 2 digit number showing the different rows within the grid method.</p></div>	x	30	5	7	210	35		10	8	10	100	80	3	30	24
x	30	5																
7	210	35																
	10	8																
10	100	80																
3	30	24																

Key skills for multiplication in Year 3:

- Recall and use multiplication facts for the 2, 3, 4, 5, 8 and 10 times tables and multiply multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including 2-digit number x 1-digit numbers.
- Solve multiplication problems, including missing number problems (e.g. $? \times 5 = 20$ $3 \times ? = 18$ $? \times ? = 32$).
- Develop mental strategies using commutativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$)
- Solve simple problems in contexts, deciding which operations and explaining methods to use.
- Start to develop reliable methods for multiplication.

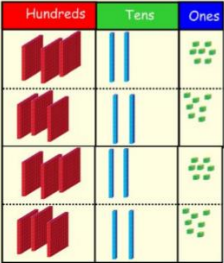
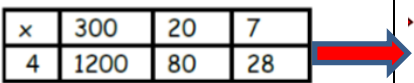


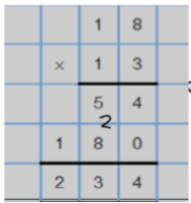
Year 4: multiply 2-digit and 3-digit numbers by a single digit number, using all multiplication tables to 12 x 12

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>											
<p>Grid method recap from year 3 for 2-digit x 1-digit</p> <p>Move on to multiplying 3-digit number by a 1-digit number (Year 4 expectation)</p>	<p>Use place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows</p>  <p>Fill each row with 126</p> <p>Add up each column, starting with the ones and making any exchanges needed.</p>	<p>Children can represent their work 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 the circles in the different columns to show their thinking as shown below.</p>	<p>Start with multiplying by one-digit numbers and showing the clear addition alongside the grid.</p> <table border="1" data-bbox="1241 607 1487 678"><tr><td>x</td><td>30</td><td>5</td></tr><tr><td>7</td><td>210</td><td>35</td></tr></table> <p>210 + 35 = 245</p>	x	30	5	7	210	35					
x	30	5												
7	210	35												
<p>Column multiplication</p>	<p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$</p>  <p>It is important at this stage that they always multiply the ones first.</p>	<table border="1" data-bbox="836 1061 1106 1128"><tr><td>x</td><td>300</td><td>20</td><td>7</td></tr><tr><td>4</td><td>1200</td><td>80</td><td>28</td></tr></table> <p>The grid method may be used to show how this relates to a formal written method.</p>  <p>Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.</p>	x	300	20	7	4	1200	80	28	<table data-bbox="1278 1050 1425 1352"><tr><td>327</td></tr><tr><td>x 4</td></tr><tr><td>1308</td></tr></table> <p>This may lead to a compact method.</p>	327	x 4	1308
x	300	20	7											
4	1200	80	28											
327														
x 4														
1308														

Key skills for multiplication in Year 4:

- Count in multiples of 6, 7, 9, 25 and 100
- Recall multiplication facts for all multiplication tables to 12 x 12
- Recognise the place value of each digit in a 4-digit number (thousands, hundreds, tens and ones/unites).
- Use place value, known facts and derived facts to multiply mentally e.g multiply by 1, 10, 100 and 0 and multiply 3 numbers together.
- Use commutativity and other mental strategies accurately and confidently (e.g $3 \times 6 = 6 \times 3$, $2 \times 6 \times 5 = 10 \times 60$, $39 \times 7 = 30 \times 7 + 9 \times 7$ etc)
- Solve problems with increasingly complex multiplication in a range of contexts.

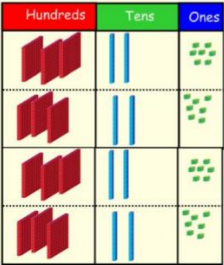
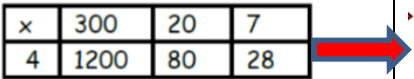
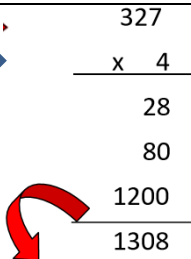

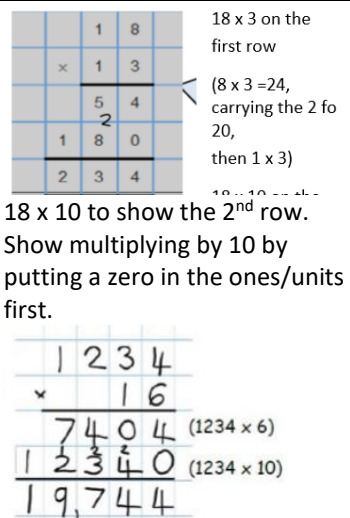
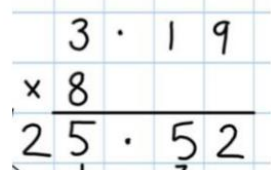
Year 5: multiply up to 4-digit numbers by a 1-digit or 2-digit numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column multiplication for 3 and 4 digit numbers by a 1 digit number	 <p>It is important at this stage that they always multiply the ones first.</p> <p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$</p>		$\begin{array}{r} 327 \\ \times 4 \\ \hline 28 \\ 80 \\ 1200 \\ \hline 1308 \end{array}$  $\begin{array}{r} 327 \\ \times 4 \\ \hline 1308 \end{array}$ <p>This will lead to a compact method.</p>
Column multiplication	Manipulatives may still be used with the corresponding long multiplication modelled alongside.	 <p>Continue to use bar modelling to support problem solving</p>	 <p>18 x 3 on the first row ($8 \times 3 = 24$, carrying the 2 to 20, then 1×3)</p> <p>18 x 10 to show the 2nd row. Show multiplying by 10 by putting a zero in the ones/units first.</p> $\begin{array}{r} 1234 \\ \times 6 \\ \hline 7404 \\ 12340 \\ \hline 19744 \end{array}$ <p>(1234×6) (1234×10)</p>

Key skills for multiplication in Year 5:

- Identify multiples and factors, using knowledge of multiplication tables to 12 x 12
- Recognise and use square and cube numbers and their notation.
- Solve problems involving multiplication, using knowledge of factors and multiples, squares and cubes.
- Multiply integers (whole numbers) and decimals by 10, 100 and 1000
- Solve problems involving combinations of operations, choosing and using calculations and methods appropriately.

Year 6: multiply up to 4-digit numbers by a 1-digit or 2-digit numbers with up to 2 decimal places by whole numbers

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Column multiplication for 3 and 4 digit numbers by a 1 digit number	 <p>It is important at this stage that they always multiply the ones first.</p> <p>Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. $321 \times 2 = 642$</p>		 <p>This will lead to a compact method.</p>
Column multiplication	<p>Manipulatives may still be used with the corresponding long multiplication modelled alongside.</p>	 <p>Continue to use bar modelling to support problem solving</p>	
Multiply numbers with up to 2 decimal places			<p>Remind children that the single digit belongs in the ones column. Line up the decimal points in the question and answer.</p> 

Key skills for multiplication in Year 6:

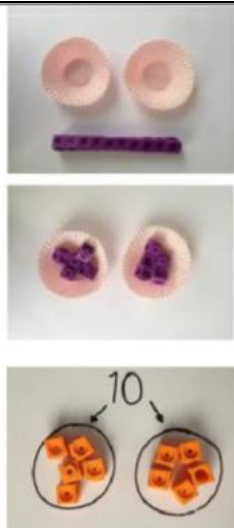
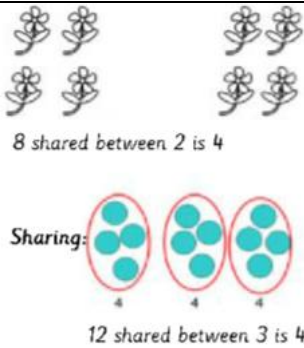
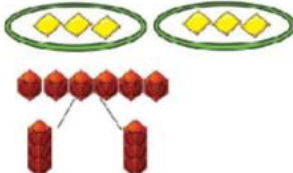
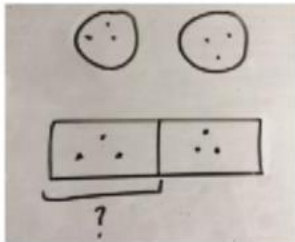
- Recall multiplication facts for all times tables up to 12×12 (Year 4 and Year 5)
- Multiply multi-digit number up to 4-digit \times 2-digit numbers using long multiplication
- Use short multiplication to multiply numbers with up to 4 digits by a single digit.
- Perform mental calculations with mixed 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.



Division



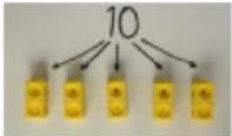

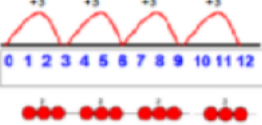


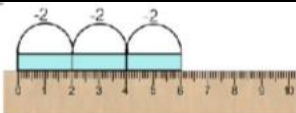
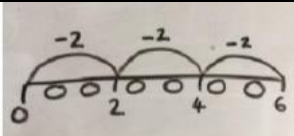
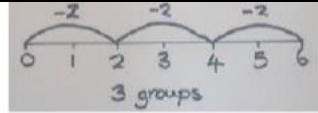

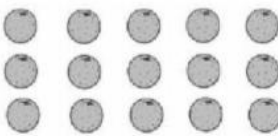
Year 1: group and share small quantities

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>		
Division as sharing	 <p>I have 10 cubes. Can you share them equally in 2 groups?</p>	 <p>Children use pictures or shapes to share quantities.</p>	12 shared between 3 is 4		
Division as grouping	 <p>Children to group using a range of objects.</p>	<p>Represent the grouping pictorially.</p> 	<table border="1" data-bbox="1150 1120 1465 1171"><tr><td>3</td><td>3</td></tr></table> <p>Children should also be encouraged to use simple bar representations.</p>	3	3
3	3				

Key skills for division in Year 1:

- 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.
- Through grouping and sharing small quantities, pupils begin to understand division and find simple fractions of objects, numbers and quantities.
- Children make connections between arrays, number patterns and counting in 2s, 5s and 10s.

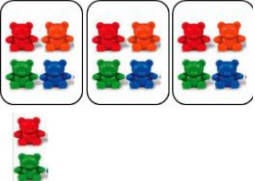


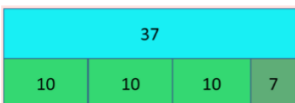
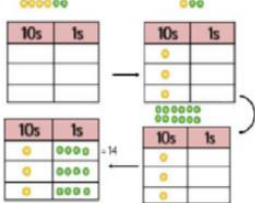
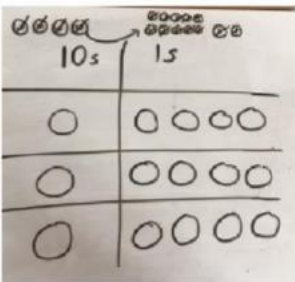
Year 2: group and share using the ÷ and = signs

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Division as grouping	  <p>Divide the quantities into equal groups. Use objects to aid understanding.</p>	  <p>Use number lines for grouping.</p>  <p>Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be in each group.</p>	$28 \div 7 = 4$ Divide 28 into 7 groups. How many are in each group?
Repeated subtraction	 <p>Use rods or multilink above a ruler.</p>	 <p>Children to represent repeated subtraction pictorially.</p>	 <p>Use an abstract number line to represent the equal groups that have been subtracted.</p>
Division with arrays	 <p>Link division to multiplication by creating an array and thinking about the number sentences that can be created.</p> <p>E.g. $15 \div 3 = 5$ $15 \div 5 = 3$ $5 \times 3 = 15$ $3 \times 5 = 15$</p>	<p>Draw an array and use lines to split the array into groups to make multiplication and division sentences.</p> 	$7 \times 4 = 28$ $4 \times 7 = 28$ $28 \div 7 = 4$ $28 \div 4 = 7$ $28 = 7 \times 4$ $28 = 4 \times 7$ $4 = 28 \div 7$ $7 = 28 \div 4$ Find the inverse of multiplication and division sentences by creating

Key skills for division in Year 2:

- Count in steps of 2, 3 and 5 from 0
- Recall and use multiplication and division facts for the 2s, 5s and 10s multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs.
- Show the multiplication of two numbers can be done in any order (commutative) and division of one number by another number.
- Solve problems involving multiplication and division using objects, arrays, repeated addition, mental methods and multiplication and division facts, including problems in contexts.


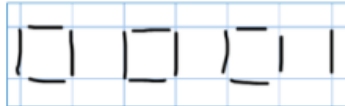
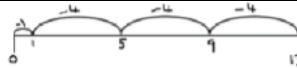

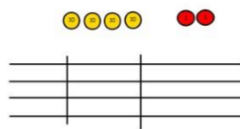


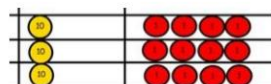
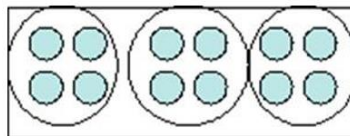
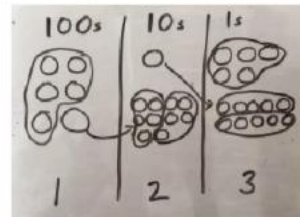
Year 3: use short division to divide 2-digit numbers by 1-digit numbers (where there is no remainder in the final answer)

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
<p>Division with remainders</p>	<p>$14 \div 3 =$</p> <p>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.</p>  <p>Draw dots and group them to divide an amount and clearly show a remainder.</p>  <p>Use bar models to show division with remainders.</p>  <p>Example without remainder: $40 \div 5$ Ask "How many 5s in 40?" $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 8 \text{ fives}$</p> <p>Example with remainder: $38 \div 6$ $6 + 6 + 6 + 6 + 6 + 2 = 6 \text{ sixes with a remainder of } 2$</p> <p>For larger numbers, when it becomes inefficient to count in single multiples, bigger jumps can be recorded using known facts.</p>	<p>Complete written divisions and show the remainder using r.</p> <p style="text-align: center;">$29 \div 8 = 3 \text{ REMAINDER } 5$</p> <p style="text-align: center;"> $\uparrow \quad \uparrow \quad \uparrow \quad \uparrow$ dividend divisor quotient remainder </p>
<p>Dividing a 2-digit number by a 1-digit number</p>	 <p>Use place value counters to represent the sharing of numbers.</p>	<p>Children to represent the place value counters pictorially.</p> 	<p>$42 \div 3$ $42 = 30 + 12$ $30 \div 3 = 10$ $12 \div 3 = 4$ $10 + 4 = 14$</p> <p>Children to be able to make sense of the place value counters and write calculations to show the process.</p>

Key skills for division in Year 3:

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

Year 4: divide up to 3-digit numbers by a 1-digit number (initially without remainders and then with)

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>				
Division with a remainder	<div></div> <p>Use of lollipop sticks to form wholes – squares are made because we are dividing by 4. There are 3 whole squares with 1 left over.</p>	<p>Children to represent the lollipop sticks pictorially.</p> <div></div>	<div></div> <p>Children should be encouraged to use their times tables facts; they could also represent repeated addition on a number line.</p>				
Short division (3-digit numbers by 1-digit)	<div><p>96 ÷ 3</p><table><tr><td></td><td>Tens</td><td>Units</td></tr><tr><td>3</td><td>3</td><td>2</td></tr></table><div></div><p>Use place value counters to divide using the bus stop method alongside</p><div></div><p>42 ÷ 3=</p><p>Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.</p><div></div><div></div><p>We exchange this ten for ten ones and then share the ones equally among the groups.</p><div></div><p>We look how much in 1 group so the answer is 14.</p></div> <div><p>Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.</p><div></div><p>Encourage them to move towards counting in multiples to divide more efficiently.</p><p>Represent the place value counters pictorially.</p><div></div></div> <div><div>$\begin{array}{r} 123 \\ 5 \overline{) 615} \\ \underline{5} \\ 11 \\ \underline{10} \\ 10 \\ \underline{10} \\ 0 \end{array}$</div><p>Children to complete the calculation using the short division scaffold.</p><p>Begin with divisions that divide equally with no remainder.</p><div>$\begin{array}{r} 218 \\ 4 \overline{) 872} \\ \underline{8} \\ 7 \\ \underline{8} \\ 0 \end{array}$</div><p>Move onto divisions with a remainder.</p><div>$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 2 \end{array}$</div></div>		Tens	Units	3	3	2
	Tens	Units					
3	3	2					

Key skills for division in Year 4:

- Recall multiplication and division facts for all numbers up to 12×12
- Use place value, known and derived facts to divide mentally, including multiplying and dividing by 10 and 100
- Become fluent in the formal written method of short division with exact answers when dividing by a 1-digit number.
- Develop secure mental methods and extend this to 3-digit numbers to derive fact families (e.g. $200 \times 3 = 600$ so $600 \div 3 = 200$).
- Solve two-step problems in context, choosing the appropriate operation, working with increasingly more difficult numbers.

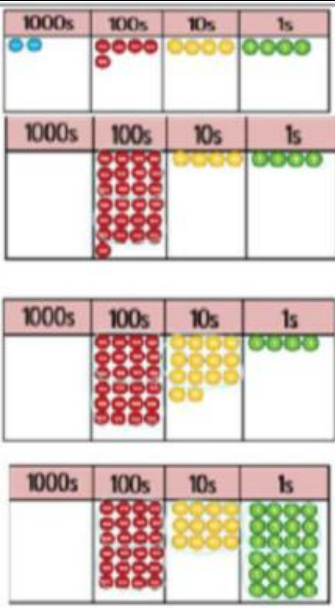
Year 5: divide up to a 4-digit number by a 1-digit number, including those with remainders

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Short division (up to 4 digits by a 1-digit number including remainder)	<i>As Year 4, using remainders.</i>	<i>As Year 4, using remainders.</i>	$\begin{array}{r} 86 \text{ r } 2 \\ 5 \overline{) 432} \\ \underline{40} \\ 32 \\ \underline{30} \\ 20 \\ \underline{20} \\ 0 \end{array}$ $\begin{array}{r} 0663 \text{ r } 5 \\ 8 \overline{) 53029} \\ \underline{40} \\ 13 \\ \underline{96} \\ 34 \\ \underline{24} \\ 10 \\ \underline{8} \\ 29 \\ \underline{24} \\ 5 \end{array}$

Key skills for division in Year 5:

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Year 4)
- Multiply and divide numbers mentally, drawing upon known facts (fact families)
- Identify multiples and factors, including finding all factor pairs of a number and common factors of two numbers.
- Solve problems involving multiplication and division using their knowledge of factors, multiples, squares and cubes.
- 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 1-digit number using the formal written method of short division and interpret remainders approximately for the context.
- Use multiplication and division as inverse.
- Interpret non-integer answers to division calculations by expressing results in different ways according to the context, including using remainders as fractions, decimals or by rounding (e.g $98 \div 4 = 24 \text{ r } 2$ or $24 \frac{1}{2}$ or 24.5 or 25).
- Solve problems involving combinations of all four operations, including the equals sign, including using division for scaling by simple fractions and problems involving simple ratios

Year 6: divide at least 4-digit numbers by both 1-digit and 2-digit numbers (including decimals and quantities)

<u>Objective and strategy</u>	<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
Short division	As Year 5, ensuring that children also exchange into the tenths and hundredths column		
Long division (children should exchange into the tenths and hundredths column too)		<p>We can't group 2 thousands into groups of 12 so we will exchange them.</p> <p>We can group 24 hundreds into groups of 12 which leaves 1 hundred.</p> <p>After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.</p> <p>After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 groups of 12, which leaves no remainder.</p>	$\begin{array}{r} 02 \\ 12 \overline{) 2544} \\ \underline{24} \\ 1 \end{array}$ $\begin{array}{r} 021 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 2 \end{array}$ $\begin{array}{r} 0212 \\ 12 \overline{) 2544} \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{array}$

Key skills for division in Year 6:

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations.
- Use written methods in cases where the answer has up to two decimal places.
- Divide numbers up to 4 digits by a 2 digit whole number using formal method of long division.
- Interpret remainders as whole number remainders, fractions, decimals or by rounding, depending on the context.
- Use short division where appropriate.
- Perform mental calculations, including 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.
- Solve problems which require answers to be rounded to specified degrees of accuracy.