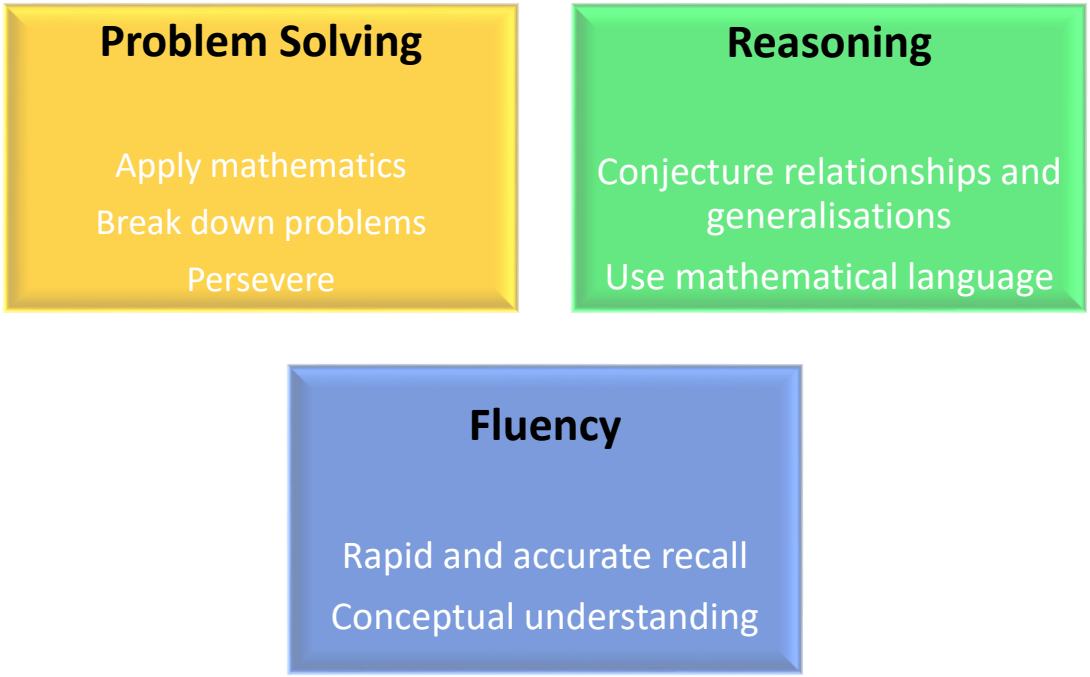
Barton Church of England (VA) Primary School

Maths Calculation Policy

Contents

At Barton Church of England Primary School, we believe that mathematics combines logical and imaginative thinking, developing a thirst for curiosity in the world around us.

In our teaching, we integrate three elements: Problem solving, Reasoning and Fluency, focusing on *understanding* the maths. Pupils are then able to communicate, explain and develop links between the different areas of study.



(National Curriculum, 2014)

This booklet explains the different methods of calculations which are taught at Barton Church of England Primary School. We expect our pupils to leave our school with a toolkit of calculation methods: mental methods, methods with jottings and formal written methods.

We ensure that all our pupils have the opportunity to apply these methods when solving real-life problems, investigations and challenges. In order to achieve this, pupils develop confidence in choosing the most appropriate and efficient method for the context.

The methods for addition, subtraction, multiplication and division are described in the order in which they are introduced, going from concrete to pictorial to abstract. For any pupils who need more time consolidating certain methods, extra support is given before moving on. For those pupils who grasp concepts and methods rapidly, we provide challenge through increasingly rich and sophisticated problems, before any acceleration through new content.

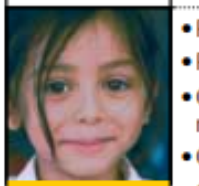
EYFS Calculation Policy

It is vital to lay secure foundations in early mathematics. At Barton, we engage our youngest pupils with maths, helping them to explore numbers in the everyday environment e.g. labelling, quantifying and calculating. Counting and matching objects to numbers in many different contexts, is a most significant aspect of children's early understanding of number and one which is explored daily through physical play and activities.

The following pages explain how pupils, teachers and parents can together develop a positive understanding and confidence in maths at an early age.

EYFS Calculation Policy

Mathematics: Numbers

	A Unique Child: observing what a child is learning	Positive Relationships: what adults could do	Enabling Environments: what adults could provide
 30-50 months	• Uses some number names and number language spontaneously. • Uses some number names accurately in play. • Recites numbers in order to 10. • Knows that numbers identify how many objects are in a set. • Beginning to represent numbers using fingers, marks on paper or pictures. • Sometimes matches numeral and quantity correctly. • Shows curiosity about numbers by offering comments or asking questions. • Compares two groups of objects, saying when they have the same number. • Shows an interest in number problems. • Separates a group of three or four objects in different ways, beginning to recognise that the total is still the same. • Shows an interest in numerals in the environment. • Shows an interest in representing numbers. • Realises not only objects, but anything can be counted, including steps, claps or jumps.	• Use number language, e.g. *'one', 'two', 'three', 'lots', 'fewer', 'hundreds', 'how many?'* and *'count'* in a variety of situations. • Support children's developing understanding of abstraction by counting things that are not objects, such as hops, jumps, clicks or claps. • Model counting of objects in a random layout, showing the result is always the same as long as each object is only counted once. • Model and encourage use of mathematical language e.g. asking questions such as 'How many saucepans will fit on the shelf?' • Help children to understand that one thing can be shared by number of pieces, e.g. a pizza. • As you read number stories or rhymes, ask e.g. *'When one more frog jumps in, how many will there be in the pool altogether?'* • Use pictures and objects to illustrate counting songs, rhymes and number stories. • Encourage children to use mark-making to support their thinking about numbers and simple problems. • Talk with children about the strategies they are using, e.g. to work out a solution to a simple problem by using fingers or counting aloud.	• Give children a reason to count, e.g. by asking them to select enough wrist bands for three friends to play with the puppets. • Enable children to note the 'missing set', e.g. *'There are none left'* when sharing things out. • Provide number labels for children to use, e.g. by putting a number label on each bike and a corresponding number on each parking space. • Include counting money and change in role-play games. • Create opportunities for children to separate objects into unequal groups as well as equal groups. • Provide story props that children can use in their play, e.g. varieties of fruit and several baskets like Handa's in the story *Handa's Surprise* by Eileen Browne.
 40-60+ months	• Recognise some numerals of personal significance. • Recognises numerals 1 to 5. • Counts up to three or four objects by saying one number name for each item. • Counts actions or objects which cannot be moved. • Counts objects to 10, and beginning to count beyond 10. • Counts out up to six objects from a larger group.	• Encourage estimation, e.g. estimate how many sandwiches to make for the picnic. • Encourage use of mathematical language, e.g. number names to ten: *'Have you got enough to give me three?'* • Ensure that children are involved in making displays, e.g. making their own pictograms of lunch choices. Develop this as a 3D representation using bricks and discuss the most popular choices. • Add numerals to all areas of learning and development, e.g. to a display of a favourite story, such as 'The Three Billy Goats Gruff'.	• Provide collections of interesting things for children to sort, order, count and label in their play. • Display numerals in purposeful contexts, e.g. a sign showing how many children can play on a number track. • Use tactile numeral cards made from sandpaper, velvet or string. • Create opportunities for children to experiment with a number of objects, the written numeral and the written number word. Develop this through matching activities with a range of numbers, numerals and a selection of objects.

Mathematics: Numbers

	A Unique Child: observing what a child is learning	Positive Relationships: what adults could do	Enabling Environments: what adults could provide
	• Selects the correct numeral to represent 1 to 5, then 1 to 10 objects. • Counts an irregular arrangement of up to ten objects. • Estimates how many objects they can see and checks by counting them. • Uses the language of 'more' and 'fewer' to compare two sets of objects. • Finds the total number of items in two groups by counting all of them. • Says the number that is one more than a given number. • Finds one more or one less from a group of up to five objects, then ten objects. • In practical activities and discussion, beginning to use the vocabulary involved in adding and subtracting. • Records, using marks that they can interpret and explain. • Begins to identify own mathematical problems based on own interests and fascinations. **Early Learning Goal** **Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.**	• Make books about numbers that have meaning for the child such as favourite numbers, birth dates or telephone numbers. • Use rhymes, songs and stories involving counting on and counting back in ones, twos, fives and tens. • Emphasise the empty set and introduce the concept of nothing or zero. • Show interest in how children solve problems and value their different solutions. • Make sure children are secure about the order of numbers before asking what comes after or before each number. • Discuss with children how problems relate to others they have met, and their different solutions. • Talk about the methods children use to answer a problem they have posed, e.g. *'Get one more, and then we will both have two.'* • Encourage children to make up their own story problems for other children to solve. • Encourage children to extend problems, e.g. *"Suppose there were three people to share the bricks between instead of two".* • Use mathematical vocabulary and demonstrate methods of recording, using standard notation where appropriate. • Give children learning English as additional language opportunities to work in their home language to ensure accurate understanding of concepts.	• Use a 100 square to show number patterns. • Encourage children to count the things they see and talk about and use numbers beyond ten • Make number games readily available and teach children how to use them. • Display interesting books about number. • Play games such as hide and seek that involve counting. • Encourage children to record what they have done, e.g. by drawing or tallying. • Use number staircases to show a starting point and how you arrive at another point when something is added or taken away. • Provide a wide range of number resources and encourage children to be creative in identifying and devising problems and solutions in all areas of learning. • Make number lines available for reference and encourage children to use them in their own play. • Big number lines may be more appropriate than counters for children with physical impairments. • Help children to understand that five fingers on each hand make a total of ten fingers altogether, or that two rows of three eggs in the box make six eggs altogether.

(Development matters in the EYFS, 2012)

Examples of Mathematical teaching and learning in EYFS

We made playdoh snakes, then put them in order of size, using the language: Most, more, less, least, longer, shorter, longest, shortest

We looked carefully at the blocks to talk about halves and quarte

We were able to match the fruit into the correct basket using our knowledge of counting to 10.

The children wanted to measure the length of the hall using their bodies. We estimated how many children could fit and then we found out!

We carefully measured our ingredients to make apple crumble.

We counted how many milk cartons we needed to bring with us on our school trip.

Progression of calculation methods for the four operations

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model. Starting at the bigger number and counting on- using cubes. Regrouping to make 10 using ten frame.	Adding three single digits. Use of base 10 to combine two numbers.	Column method- regrouping. Using place value counters (up to 3 digits).	Column method- regrouping. (up to 4 digits)	Column method- regrouping. Use of place value counters for adding decimals.	Column method- regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Taking away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use of base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping. (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals- with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals- with different amounts of decimal places.

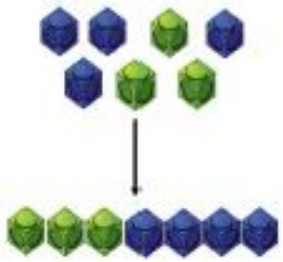
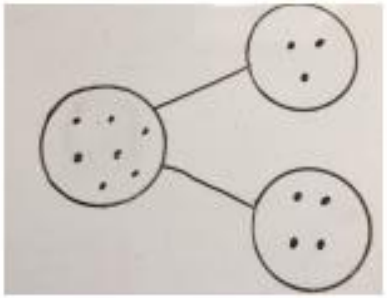
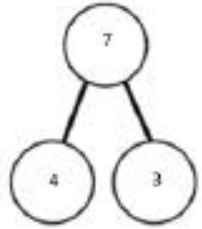
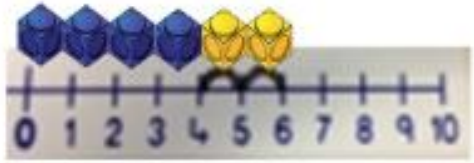
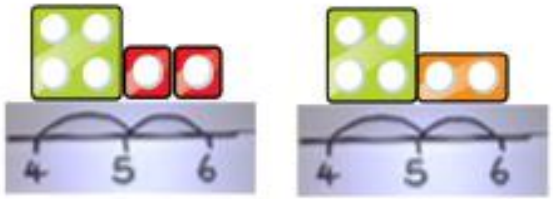
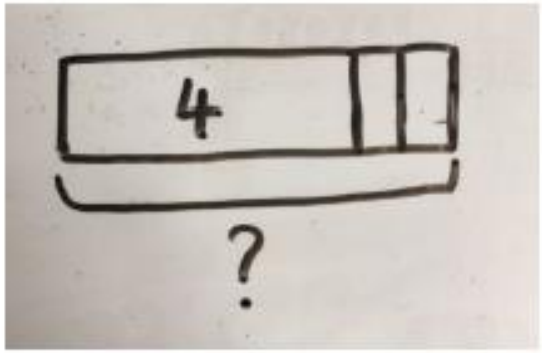
Multiplication	Recognising and making equal groups. Doubling Counting in multiples Use cubes, Numicon and other objects in the classroom	Arrays- showing commutative multiplication	Arrays 2d × 1d using base 10	Column multiplication- introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first(up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)
Division	Sharing objects into groups Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping Division within arrays- linking to multiplication Repeated subtraction	Division with a remainder-using lollipop sticks, times tables facts and repeated subtraction. 2d divided by 1d using base 10 or place value counters	Division with a remainder Short division (up to 3 digits by 1 digit- concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too

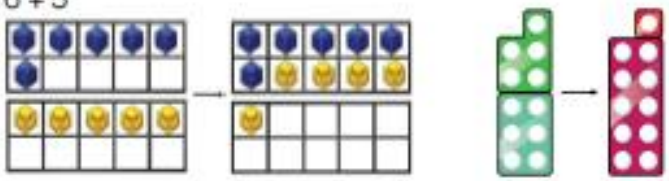
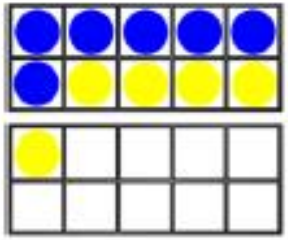
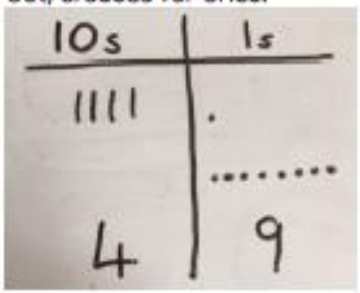
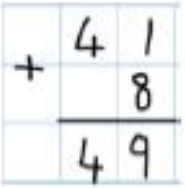
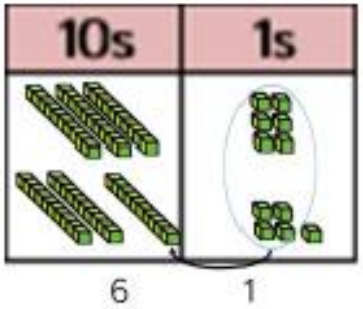
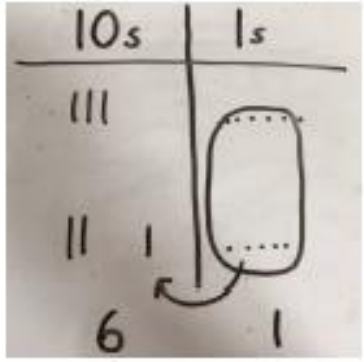
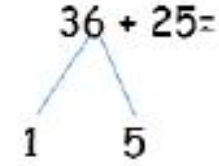
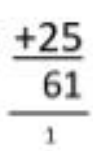
Addition: Key Vocabulary and Resources

	Key Vocabulary	Additional Resources
EYFS & Year 1	add, more, plus, and make altogether, total, equal to, equals, double, most, count on, number line	NRICH: Incey Wincey Spider NRICH: Number Lines NRICH: Getting the Balance NRICH: Ladybirds in the Garden Videos: www.tes.co.uk/teaching-resource/Number-bonds-to-ten-6413321
Year 2	As above plus: sum, tens, ones, partition, addition, column, tens boundary	NRICH: Weighted Numbers NRICH: Number Balance NRICH: Pairs of Numbers Videos: www.ncetm.org.uk/resources/40533
Year 3	As above plus: hundreds boundary, increase, vertical, "carry", expanded, compact, hundreds, digits	NRICH: Super Shapes NRICH: Roll These Dice NRICH: Strike it Out NRICH: Which Is Quicker? NRICH: Reach 100 NRICH: Consecutive Numbers NRICH: Sea Level Videos: www.teachertube.com/video/24325
Year 4	As above plus: thousands, inverse, decimal point, tenths, hundredths	
Year 5 & 6	As above plus: decimal places, thousandths	

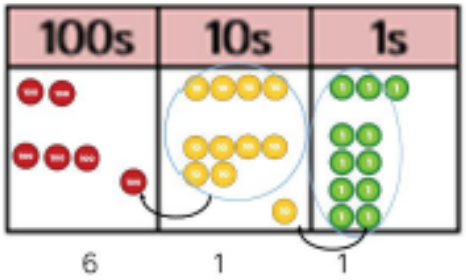
Calculation policy: Addition

Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

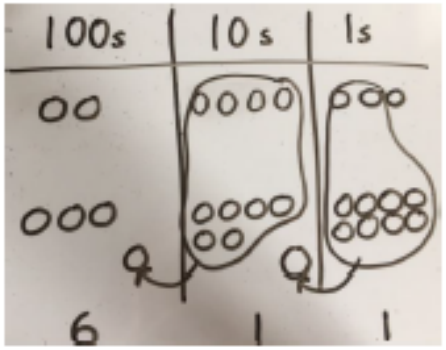
Concrete	Pictorial	Abstract
Combining two parts to make a whole (use other resources too e.g. eggs, shells, teddy bears, cars). 	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
Counting on using number lines using cubes or Numicon.  	A bar model which encourages the children to count on, rather than count all. 	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4 + 2 

<table>
<tr>
<td>Regrouping to make 10; using ten frames and counters/cubes or using Numicon.
6 + 5
  </td>
<td>Children to draw the ten frame and counters/cubes.
  </td>
<td>Children to develop an understanding of equality e.g.
6 + □ = 11
6 + 5 = 5 + □
6 + 5 = □ + 4</td>
</tr>
<tr>
<td>TO + O using base 10. Continue to develop understanding of partitioning and place value.
41 + 8
  </td>
<td>Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.
  </td>
<td>41 + 8
 
1 + 8 = 9
40 + 9 = 49
  </td>
</tr>
<tr>
<td>TO + TO using base 10. Continue to develop understanding of partitioning and place value.
36 + 25
  </td>
<td>Chidlren to represent the base 10 in a place value chart.
  </td>
<td>Looking for ways to make 10.
 
30 + 20 = 50
5 + 5 = 10
50 + 10 + 1 = 61
Formal method:
  </td>
</tr>
</table>

Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.

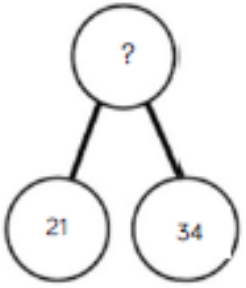


Chidren to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$$

Conceptual variation; different ways to ask children to solve 21 + 34



?	
21	34

Word problems:
In year 3, there are 21 children and in year 4, there are 34 children.
How many children in total?

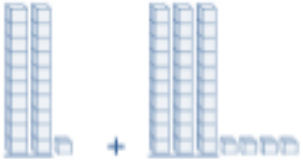
21 + 34 = 55. Prove it

$$\begin{array}{r} 21 \\ +34 \\ \hline \\ \hline \end{array}$$

21 + 34 =

□ = 21 + 34

Calculate the sum of twenty-one and thirty-four.



Missing digit problems:

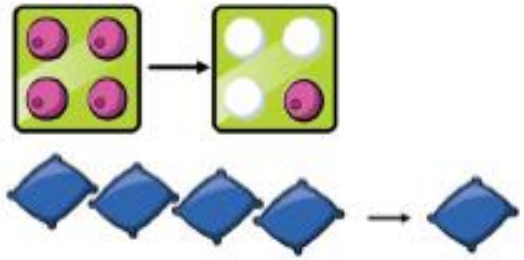
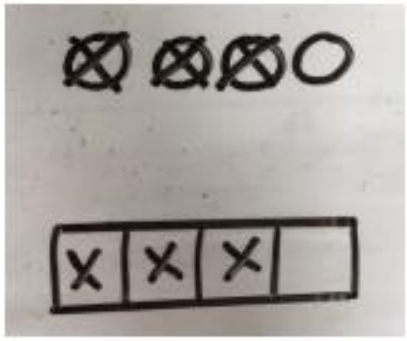
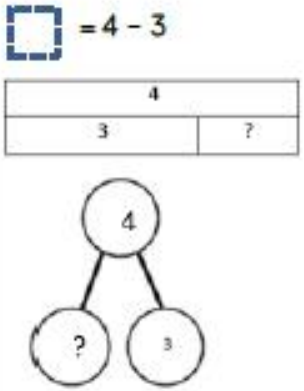
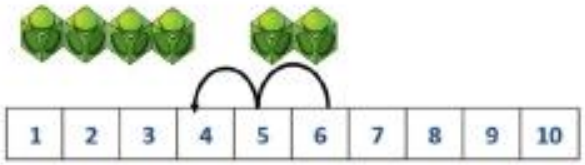
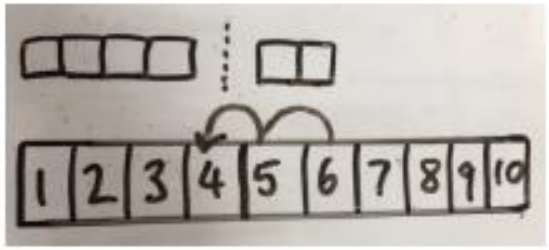
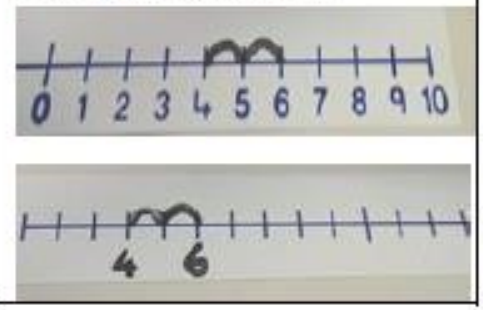
10s	1s
10 10	1
10 10 10	?
?	5

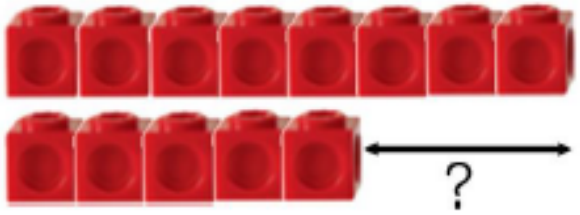
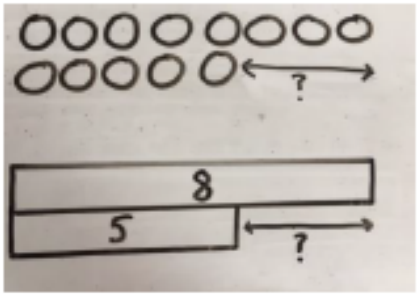
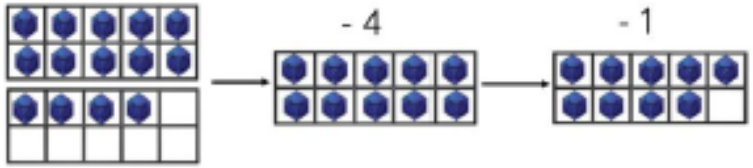
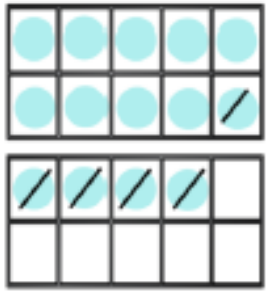
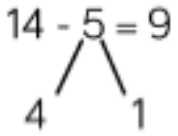
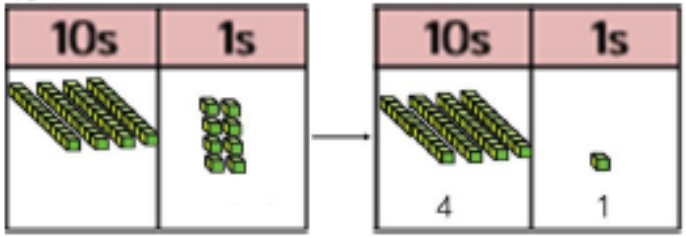
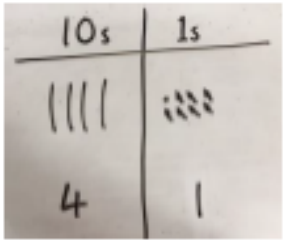
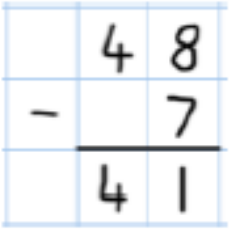
Subtraction: Key Vocabulary and Resources

	Key Vocabulary	Additional Resources
EYFS & Year 1	equal to, take, take away, less, minus, subtract, leaves, distance between, how many more, how many fewer/ less than, most, least, count back, how many left, how much less is __?, difference, count on, tens, ones	NRICH: Maths Story Time NRICH: Using Incey Wincey Spider NRICH: Using Golden Beans for Counting NRICH: Maths Story Time NRICH: Using Incey Wincey Spider NRICH: Using Golden Beans for Counting Videos: www.tes.co.uk/teaching-resource/Number-bonds-to-ten-6413321
Year 2	As above plus: strategy, partition	NRICH: Butterfly Flowers NRICH: Number Round Up NRICH: 4 Dom NRICH: Super Shapes NRICH: Roll These Dice NRICH: Strike it Out Videos: www.ncetm.org.uk/resources/40533 Videos: www.ncetm.org.uk/resources/40532 two videos about subtraction
Year 3	As above plus: exchange, decrease, hundreds, value, digit	NRICH: Buying a Balloon NRICH: Take Three Numbers NRICH: Three Neighbours NRICH: Fifteen Cards
Year 4	As above plus: inverse, tenths, hundredths, decimal point, decimal	
Year 5 & 6	As above plus: decimal places, thousandths	NRICH: Up and Down Staircases NRICH: Magic Vs NRICH: Number Differences NRICH: Exploring Wild and Wonderful Number Patterns NRICH: Exploring Number Patterns You Make NRICH: Make 37 NRICH: GOT IT Videos: www.ncetm.org.uk/resources/40532 three videos about subtraction

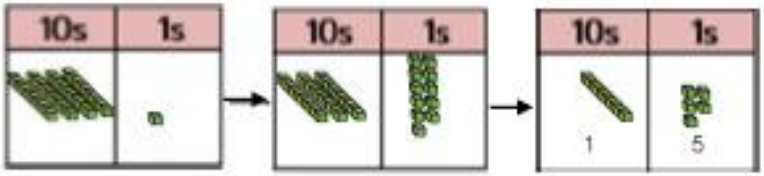
Calculation policy: Subtraction

Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Concrete	Pictorial	Abstract
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used). 4 – 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	4- 3 = 
Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 – 2 = 4 	Children to represent what they see pictorially e.g. 	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line 

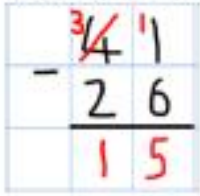
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5. 	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 8 – 5, the difference is ☐ Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.
Making 10 using ten frames. 14 – 5 	Children to present the ten frame pictorially and discuss what they did to make 10. 	Children to show how they can make 10 by partitioning the subtrahend.  14 – 4 = 10 10 – 1 = 9
Column method using base 10. 48-7 	Children to represent the base 10 pictorially. 	Column method or children could count back 7. 

Column method using base 10 and having to exchange.
41 – 26

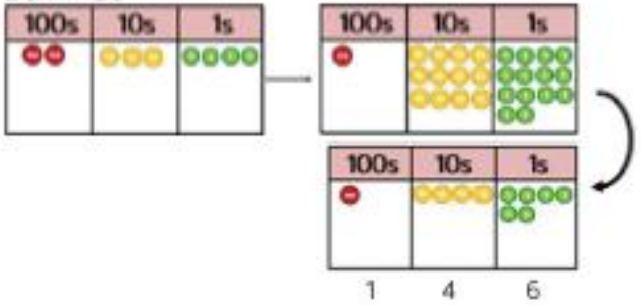


Represent the base 10 pictorially, remembering to show the exchange.

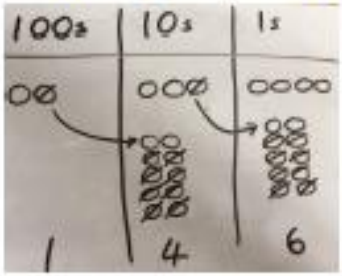
Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11.



Column method using place value counters.
234 – 88



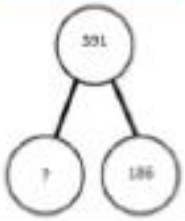
Represent the place value counters pictorially; remembering to show what has been exchanged.



Formal colum method. Children must understand what has happened when they have crossed out digits.

$$\begin{array}{r} {}^{2}\not{2}\,{}^{1}\not{3}4 \\ -\ 88 \\ \hline 6 \end{array}$$

Conceptual variation; different ways to ask children to solve 391 - 186



391	
186	?

Raj spent £391, Timmy spent £186.
How much more did Raj spend?

Calculate the difference between 391 and 186.

□ = 391 – 186

391
-186
———

What is 186 less than 391?

Missing digit calculations

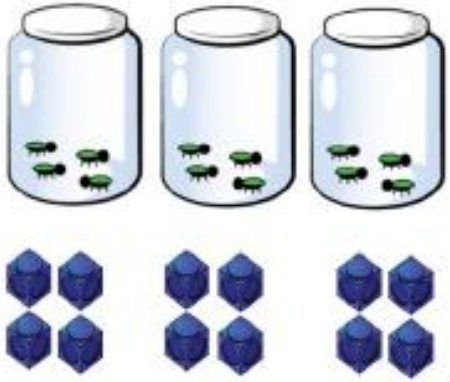
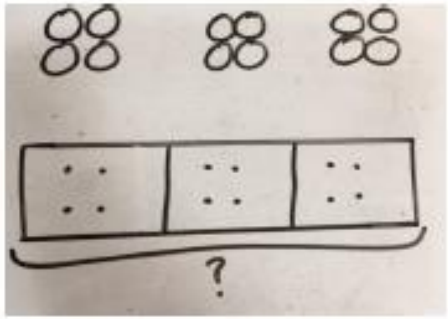
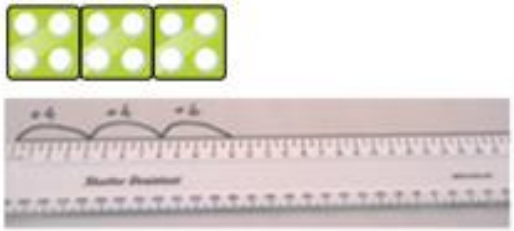
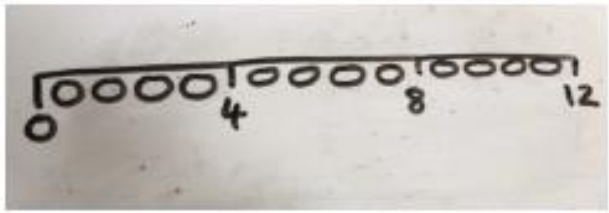
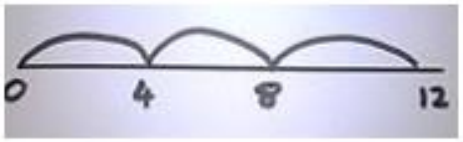
$$\begin{array}{r} 3\ 9\ \square \\ -\ \square\ \square\ 6 \\ \hline \square\ 0\ 5 \end{array}$$

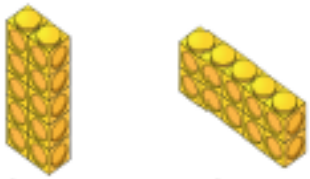
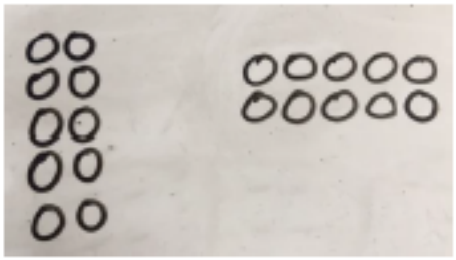
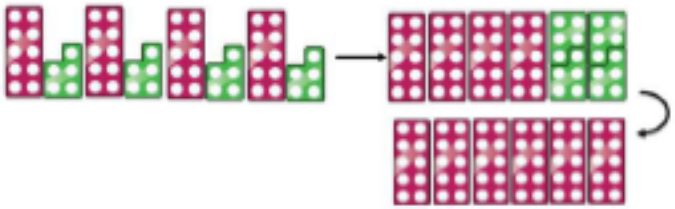
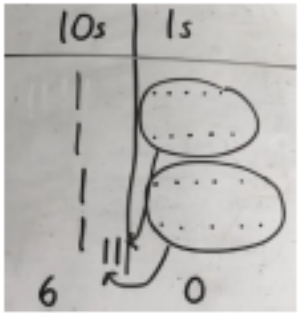
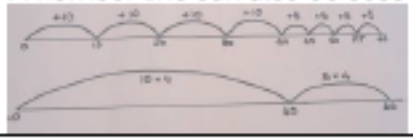
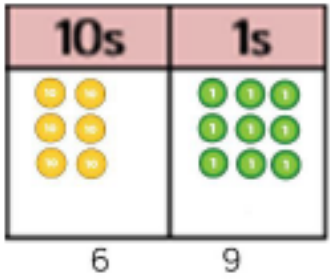
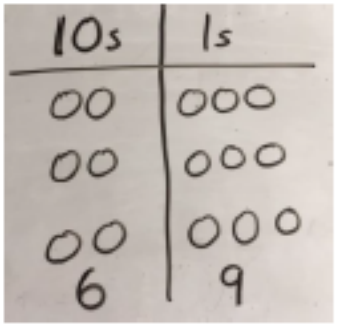
Multiplication: Key Vocabulary and Resources

	Key Vocabulary	Additional Resources
EYFS	groups of, lots of, times, altogether, multiply, count	NRICH EYFS: Maths Story Time NRICH: Are You Well Balanced? NRICH: Buzzy Bee
Year 1	As above plus: array	NRICH: Clapping Times NRICH: Lots of Lollies NRICH: Growing Garlic NRICH: Ordering Cards Videos: www.ncetm.org.uk/resources/40530
Year 2	As above plus: multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times…	
Year 3	As above plus: partition, grid method, multiple, product, tens, ones, value	NRICH: Multiplication Square Jigsaw NRICH: Shape Times Shape NRICH: What do you need? NRICH: Multiples Grid
Year 4	As above plus: total, inverse, square, factor, integer, decimal, column method	
Year 5 & 6	As above plus: short multiplication, long multiplication	NRICH: Music to my ears NRICH: Multiplication Squares NRICH: Flashing Lights NRICH: One Wasn't Square NRICH: Cycling Squares Videos: www.ncetm.org.uk/resources/4053 Moving from grid to column method www.ncetm.org.uk/resources/40533

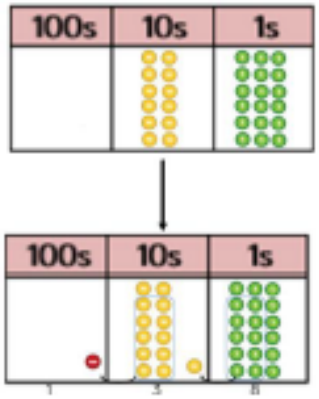
Calculation policy: Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

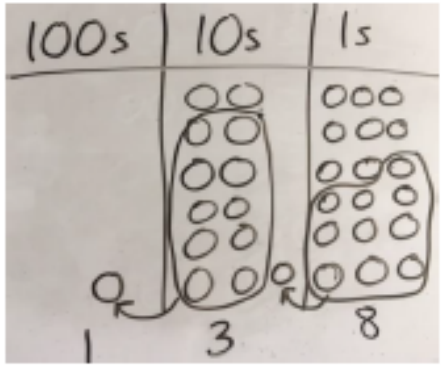
Concrete	Pictorial	Abstract
Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group. 	Children to represent the practical resources in a picture and use a bar model. 	3 × 4 = 12 4 + 4 + 4 = 12
Number lines to show repeated groups- 3 × 4  Cuisenaire rods can be used too.	Represent this pictorially alongside a number line e.g.: 	Abstract number line showing three jumps of four. 3 × 4 = 12 

Use arrays to illustrate commutativity counters and other objects can also be used. $2 \times 5 = 5 \times 2$  2 lots of 5 5 lots of 2	Children to represent the arrays pictorially. 	Children to be able to use an array to write a range of calculations e.g. $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$
Partition to multiply using Numicon, base 10 or Cuisenaire rods. 4×15 	Children to represent the concrete manipulatives pictorially. 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60 A number line can also be used 
Formal column method with place value counters (base 10 can also be used.) 3×23 	Children to represent the counters pictorially. 	Children to record what it is they are doing to show understanding. 3×23 20 3 $3 \times 20 = 60$ $3 \times 3 = 9$ $60 + 9 = 69$ 23 × 3 69

Formal column method with place value counters.
6 x 23



Children to represent the counters/base 10, pictorially e.g. the image below.



Formal written method

$$6 \times 23 =$$

$$\begin{array}{r} 23 \\ \times\ 6 \\ \hline 138 \\ \hline 1\ 1 \end{array}$$

When children start to multiply 3d × 3d and 4d × 2d etc., they should be confident with the abstract:

To get 744 children have solved 6 × 124.
To get 2480 they have solved 20 × 124.

$$\begin{array}{r} 1\ 2\ 4 \\ \times\ \ \ 2\ 6 \\ \hline 7\ 4\ 4 \\ 2\ 4\ 8\ 0 \\ \hline 3\ 2\ 2\ 4 \\ \hline 1\ 1 \end{array}$$

Answer: 3224

Conceptual variation; different ways to ask children to solve 6 × 23

23	23	23	23	23	23

?

Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?

With the counters, prove that 6 x 23 = 138

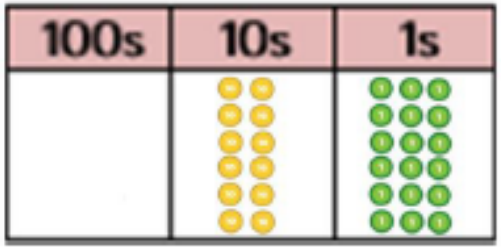
Find the product of 6 and 23

6 × 23 =

□ = 6 × 23

$$\begin{array}{r} 6 \\ \times\ 23 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 23 \\ \times\ 6 \\ \hline \\ \hline \end{array}$$

What is the calculation?
What is the product?



Other methods of Multiplication:

As well as short and long multiplication (see above), children may also use the Grid Method or the Italian Method as a written means of demonstrating this operation.

Grid Method:

Partition into grid method table

31 x 26 →

x	30	1
20		
6		

Use multiplication knowledge to solve

→

x	30	1
20	600	20
6	180	6

Add together the "middle

→ 600 + 180 + 20 + 6 = 806

Answer the question

→ 31 X 26 = 806

The Italian Method:

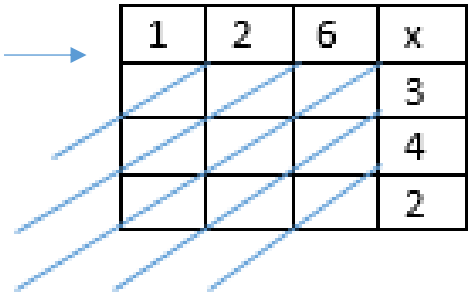
Place numbers into table

126 x 342 →

1	2	6	x
			3
			4
			2

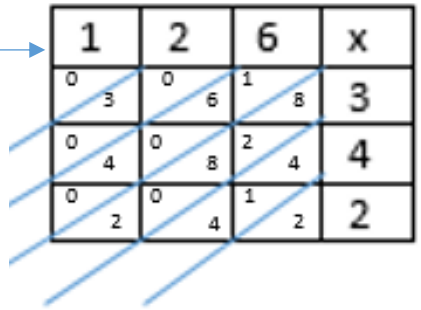
Draw diagonal lines in the grid, ensuring all boxes have been covered

→



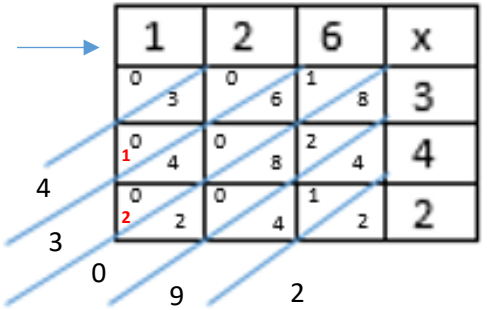
Complete each box with the multiplication, putting tens digit on top of ones digit

→



Pull digits down their diagonal lines, adding together as you go. Be careful with exchanging!

→



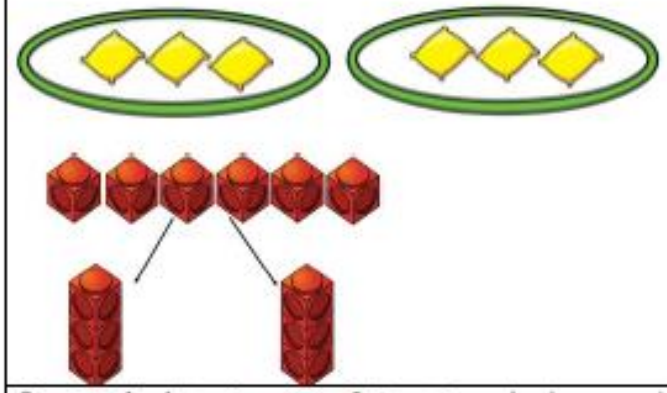
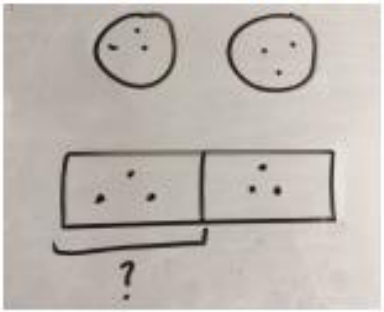
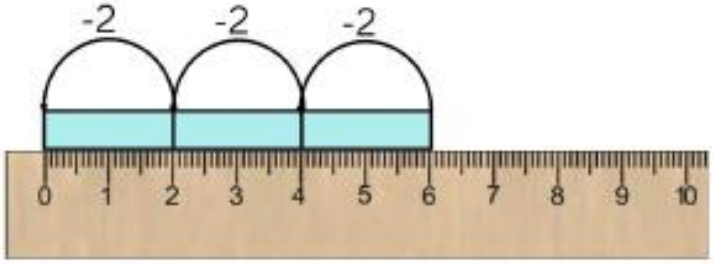
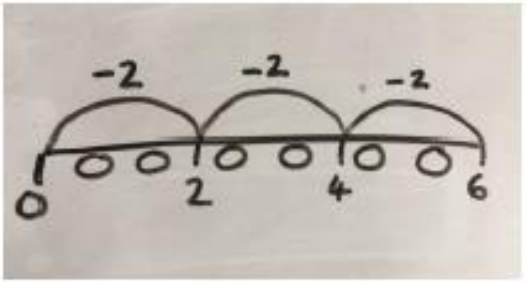
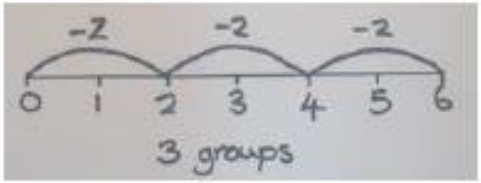
126 x 342 = 43, 092

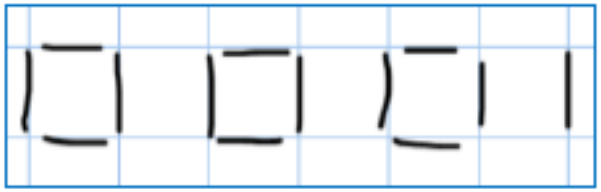
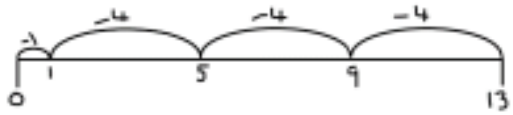
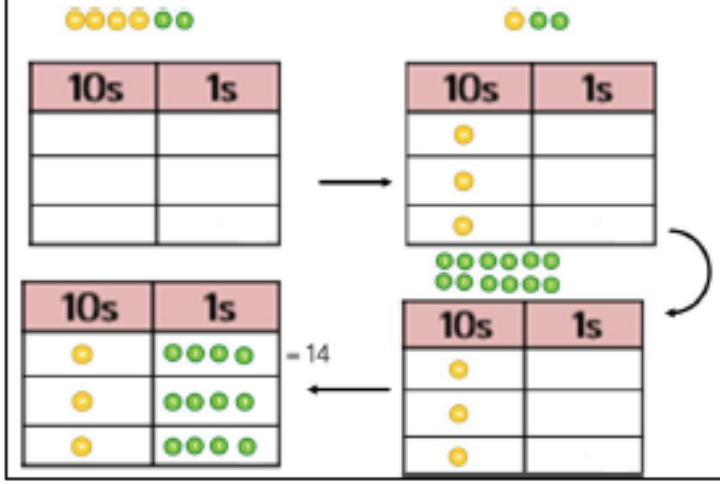
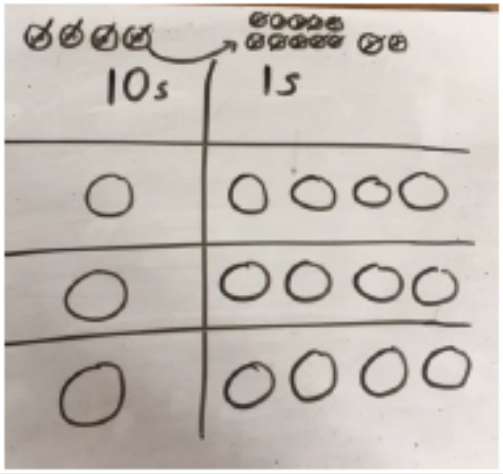
Division: Key Vocabulary and Resources

	Key Vocabulary	Additional Resources
EYFS	share, count, group, set, double, half, share out	NRICH EYFS: Maths Story Time NRICH: Lots of Biscuits http://www.taw.org.uk/lic/itp/grouping.html
Year 1	As above plus: share equally, one each, two each, etc..	
Year 2	As above plus: equal groups of, array, divide, divided into, division, grouping, left, left over	NRICH: Share Bears NRICH: Secret Number NRICH: Journeys in Numberland Videos: www.ncetm.org.uk/resources/43589
Year 3	As above plus: inverse, remainder, multiple	
Year 4	As above plus: divisible by, factor	NRICH: Table Patterns Go Wild! NRICH: Let's Divide Up! Videos: www.ncetm.org.uk/resources/43589
Year 5 & 6	As above plus: bus stop method, quotient, divisor, dividend, prime number, prime factors, composite numbers, square root	NRICH: Flashing Lights NRICH: Mystery Matrix NRICH: Factor Lines NRICH: Zios and Zepts NRICH: Andy's Marbles NRICH: Would you rather? NRICH: Forgot the Numbers Videos: www.ncetm.org.uk/resources/43589

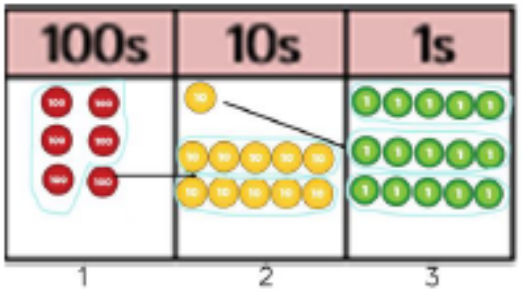
Calculation policy: Division

Key language: share, group, divide, divided by, half.

Concrete	Pictorial	Abstract
Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3  Children should also be encouraged to use their 2 times tables facts.
Repeated subtraction using Cuisenaire rods above a ruler. 6 ÷ 2  3 groups of 2	Children to represent repeated subtraction pictorially. 	Abstract number line to represent the equal groups that have been subtracted. 

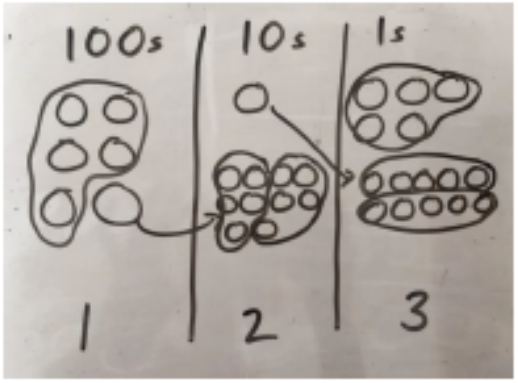
2d ÷ 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.  There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over.	13 ÷ 4 = 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over' 
Sharing using place value counters. 42 ÷ 3 = 14 	Children to represent the place value counters pictorially. 	Children to be able to make sense of the place value counters and write calculations to show the process. 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

Short division using place value counters to group.
615 ÷ 5



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Represent the place value counters pictorially.

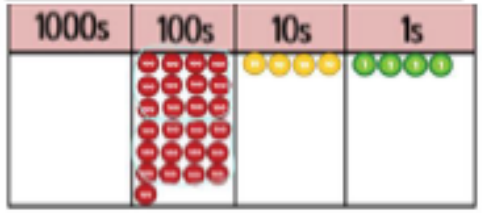


Children to the calculation using the short division scaffold.

$$5\overline{)615}\quad 123$$

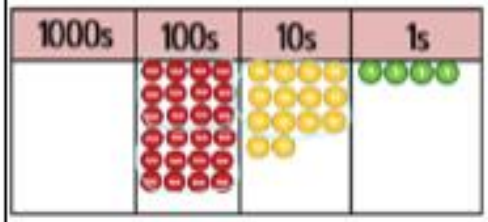
Long division using place value counters
2544 ÷ 12

We can't group 2 thousands into groups of 12 so will exchange them.



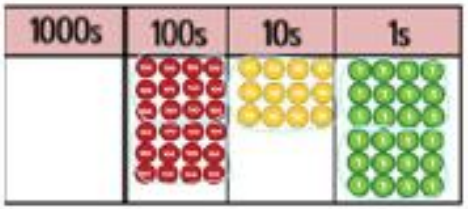
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$12\overline{)2544}\quad 02$$
$$24$$
$$1$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$$

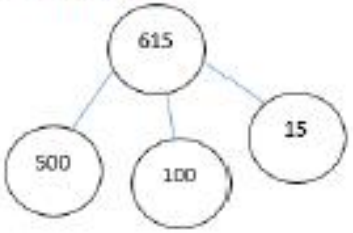


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

Conceptual variation; different ways to ask children to solve 615 ÷ 5

Using the part whole model below, how can you divide 615 by 5 without using short division?



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

$5\overline{)615}$

615 ÷ 5 =

□ = 615 ÷ 5

What is the calculation?
What is the answer?

Glossary

array - an organised collection of objects, counters or symbols, for example arranged in rows and columns 

bridging - the process of using a multiple of 10 or 100 as part of an addition or subtraction calculation, for example 45 + 13 can be thought of as 45 + 5 (50) + 8

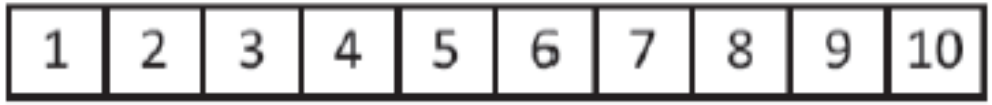
decomposition - the standard written method for subtraction

difference - the amount by which one number is greater than another - i.e. the result of a subtraction; the difference between 5 and 9 is 4

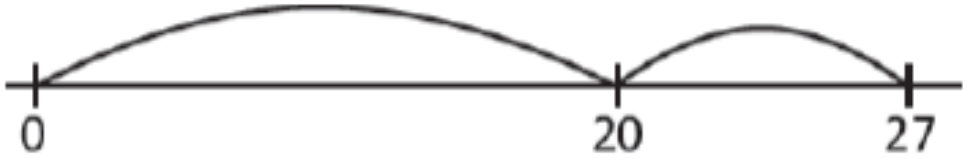
grid method - a method of calculating multiplication by separating the calculation into sections, each of which is easier than the whole

least significant digits - the digits with least value - usually the units

number track - a line of numbers used for counting or calculating, each section represents one number



number line - a line where numbers are represented by points on it; number lines always run from left to right



partitioning - separating a number into its different parts, eg 25 can be partitioned into 20 and 5

remainder - the amount left over in a division which cannot be grouped or shared equally