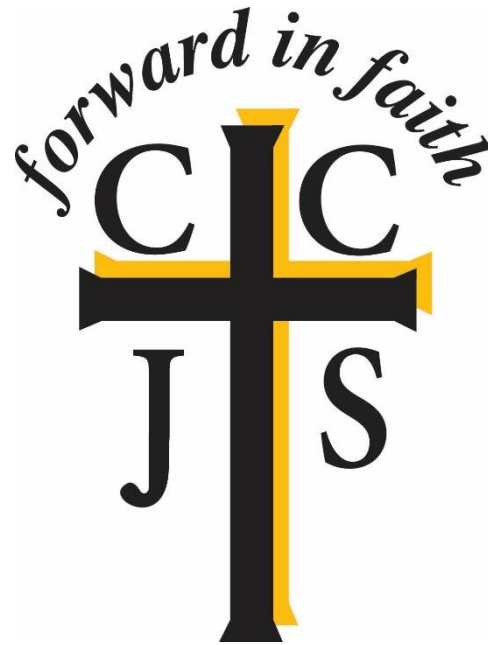


Cheadle Catholic Junior School

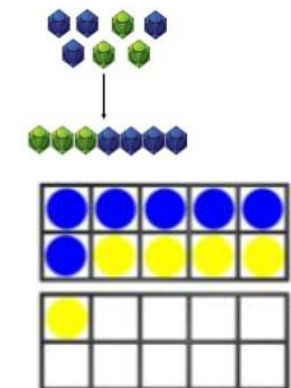
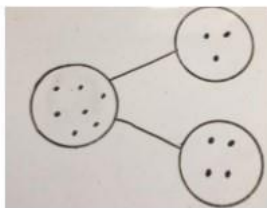
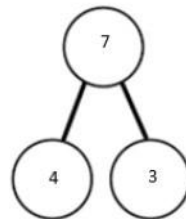
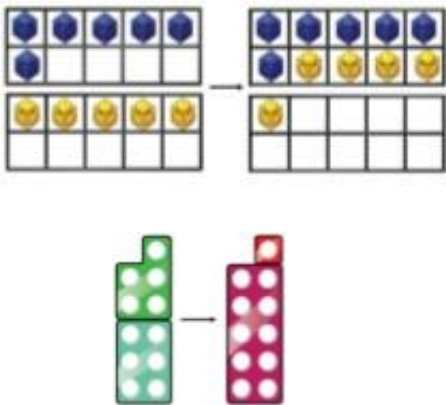
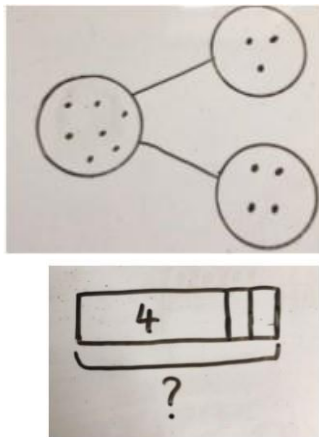
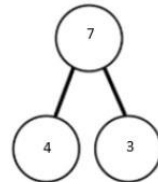
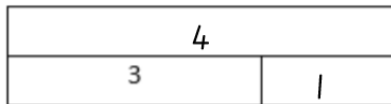
Calculation Policy

Adapted from White Rose



Calculation Policy- Addition

Key Language: sum, total, parts and whole, plus, add, altogether, more, is equal to, is the same as. (Addends)

Objectives	Concrete	Pictorial	Abstract
EYFS Adds and subtracts, using quantities and objects, 2 single-digit numbers, and counts on or back to find the answer (ELG) Finds the total number of items in two groups by counting all of them	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. 
Year 1 Read and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs Write mathematical statements involving addition (+), subtraction (-) and equals (=) signs Represent and use number bonds within 20 Add one-digit and two-digit numbers to 20, including zero	Use tens frames , counters and numicon. 	Part whole models and bar models. 	Part whole models $4 + 3 = 7$ Four is a part, 3 is a part and the whole is seven.  Bar models $3 + 1 = 4$ 

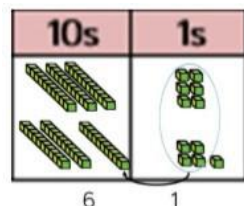
Year 2

I can solve problems with addition and subtraction including those involving numbers, quantities and measures by using objects or pictures

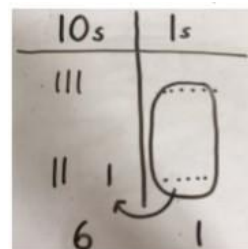
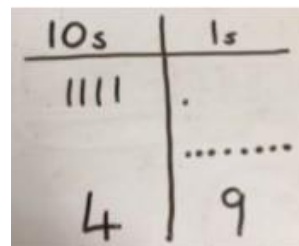
I can answer simple addition and subtraction questions in my head as well as by writing them down

I can add and subtract 2 two digit numbers mentally and when using objects, number lines and pictures

Use base 10

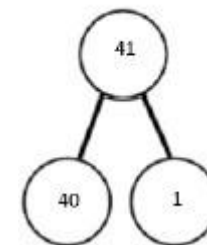


Draw tens and ones - lines and dots.



Part whole models and partitioning

$$41 + 8$$



$$1 + 8 = 9$$
$$40 + 9 = 49$$

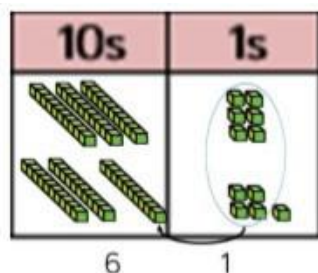
$$36 + 25 =$$
$$30 + 20 = 50$$
$$5 + 5 = 10$$
$$50 + 10 + 1 = 61$$

Year 3

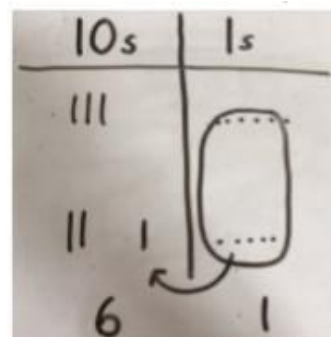
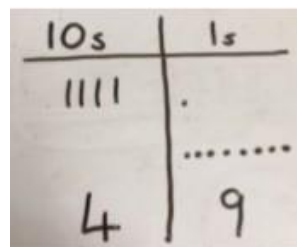
I can add numbers with up to three digits using formal column methods

I can solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Use base 10

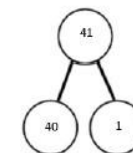


Draw tens and ones—lines and dots



Column method

$$41 + 8$$



$$1 + 8 = 9$$
$$40 + 9 = 49$$

	4	1
+		8
	4	9

Looking for ways to make 10.

$$36 + 25 =$$
$$30 + 20 = 50$$
$$5 + 5 = 10$$
$$50 + 10 + 1 = 61$$
$$36$$

Formal method:

$$\begin{array}{r} +25 \\ 36 \\ \hline 61 \\ 1 \end{array}$$

Year 4

I can add numbers with up to four digits using formal column methods

I can solve two step addition and subtraction problems using different methods and explain why I used them

Year 5

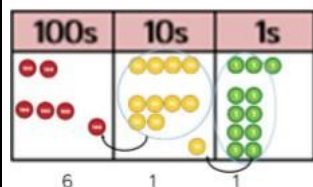
I can add and subtract numbers with more than 4 digits using written methods

I can solve addition and subtraction problems needing more than one step and can work out which operation and method is the most suitable.

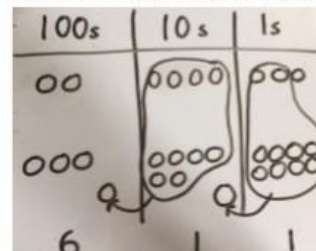
Year 6

I can mentally calculate using a mix of the four operations

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.



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



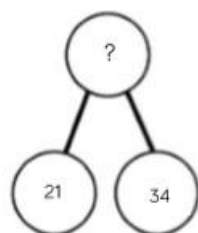
243

+368

611

1 1

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



?	
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

21

+34

$21 + 34 =$

 $= 21 + 34$

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

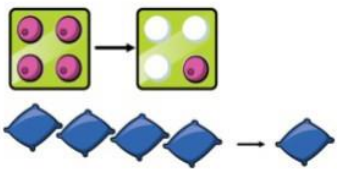
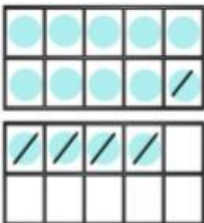
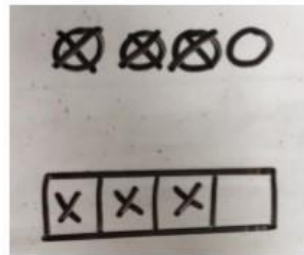
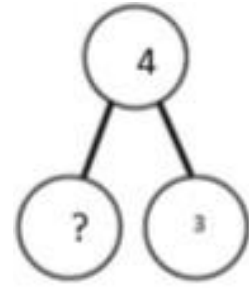
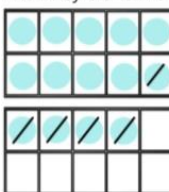
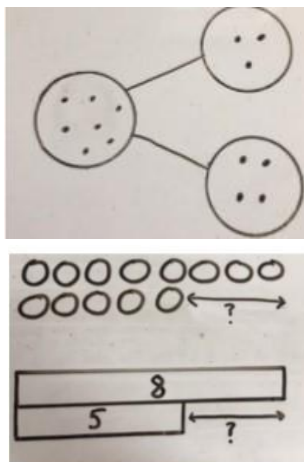
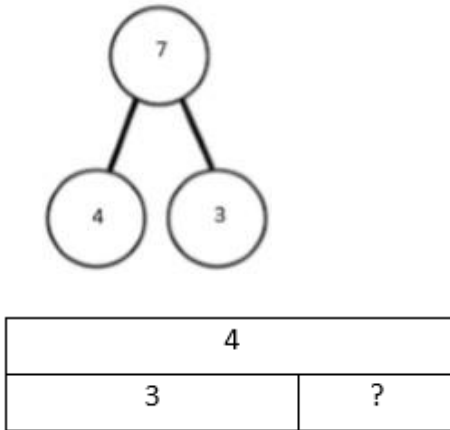


Missing digit problems:

10s	1s
● ●	●
● ● ●	?
?	5

Calculation Policy- Subtraction

Key Language: take away, less than, the difference, subtract, minus, fewer, decrease (Regrouping)

Objectives	Concrete	Pictorial	Abstract
EYFS Adds and subtracts, using quantities and objects, 2 single-digit numbers, and counts on or back to find the answer (ELG)	Physically take away objects. $4 - 3 = 1$  Use tens frames and counters 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	Part whole models 
Year 1 Read and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs Write mathematical statements involving addition (+), subtraction (-) and equals (=) signs I can use subtraction facts up to 20 I can subtract one digit and two digit numbers to 20	Use tens frames and counters. Children to present the ten frame pictorially and discuss what they did to make 10. 	Part whole models $7 - 3 = 4$ 	Part whole models and bar models $7 - 3 = 4$ 

Year 2

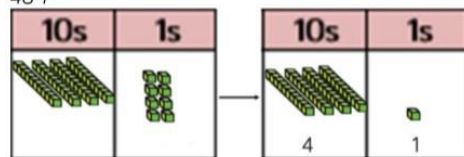
I can solve problems with addition and subtraction including those involving numbers, quantities and measures by using objects or pictures

I can answer simple addition and subtraction questions in my head as well as by writing them down

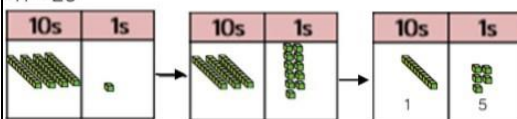
I can add and subtract 2 two digit numbers mentally and when using objects, number lines and pictures

Use base 10

Column method using base 10.
48-7

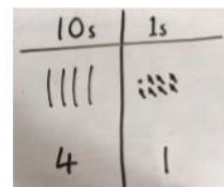


Column method using base 10 and having to exchange.
41-26

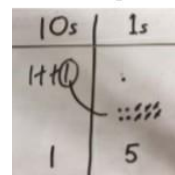


Draw tens and ones - lines and dots.

Children to represent the base 10 pictorially.



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



Part whole models and partitioning

Children to show how they can make 10 by partitioning the subtrahend.

$$14 - 5 = 9$$

$$14 - 4 = 10$$
$$10 - 1 = 9$$

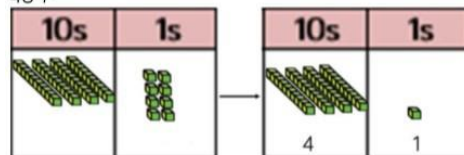
Year 3

I can add numbers with up to three digits using formal column methods

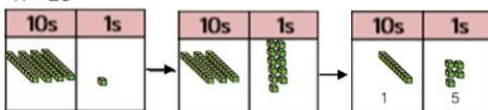
I can solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Use base 10

Column method using base 10.
48-7

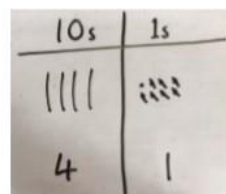


Column method using base 10 and having to exchange.
41-26

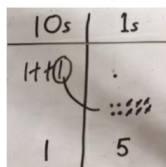


Draw tens and ones—lines and dots

Children to represent the base 10 pictorially.



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



Column method

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

	3	1
	4	1
-	2	6
	1	5

Year 4

I can add numbers with up to four digits using formal column methods

I can solve two step addition and subtraction problems using different methods and explain why I used them

Year 5

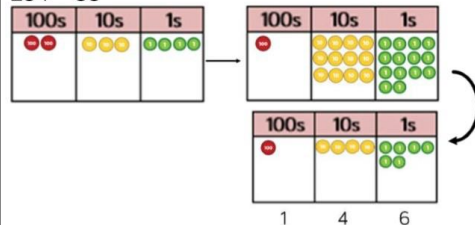
I can add and subtract numbers with more than 4 digits using written methods

I can solve addition and subtraction problems needing more than one step and can work out which operation and method is the most suitable.

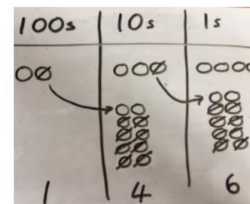
Year 6

I can mentally calculate using a mix of the four operations

Column method using place value counters.
234 - 88



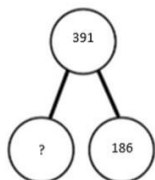
Represent the place value counters pictorially; remembering to show what has been exchanged.



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

$$\begin{array}{r} \overset{2}{2}\overset{1}{3}4 \\ - 88 \\ \hline 6 \end{array}$$

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.

$$\boxed{} = 391 - 186$$

$$\begin{array}{r} 391 \\ -186 \\ \hline \end{array}$$

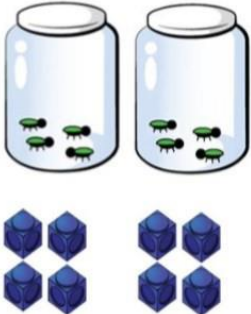
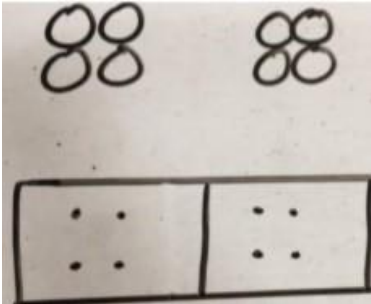
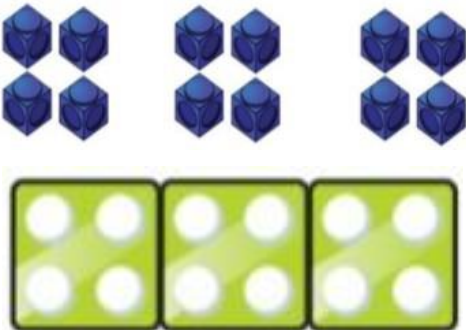
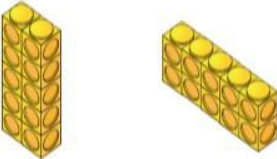
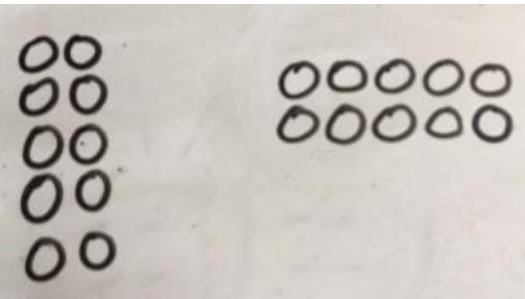
What is 186 less than 391?

Missing digit calculations

$$\begin{array}{r} 39\boxed{} \\ - \boxed{}\boxed{}6 \\ \hline \boxed{}05 \end{array}$$

Calculation Policy- Multiplication

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

Objectives	Concrete	Pictorial	Abstract
EYFS Solve problems, including doubling, halving and sharing Solve practical problems that involve combining groups of 2, 5 or 10, or sharing into equal groups (ELG Exc)	Doubling using objects 	Doubling using pictures 	Double 2 $2 + 2 = 4$
Year 1 Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	Repeated groups  Create arrays 	Draw arrays 	Write repeated additions $2 + 2 + 2 + 2 + 2 = 10$

Year 2

Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ($\times$), division ($\div$) and equals (=) signs

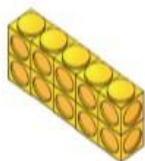
Solve problems involving multiplication and division, using arrays, repeated addition and multiplication and division facts, including problems in contexts e.g. knowing that $2 \times 7 = 14$ and $2 \times 8 = 16$, explains that making pairs of socks from 15 identical socks will give 7 pairs and one sock will be left

Create arrays

$$2 \times 5 = 5 \times 2$$

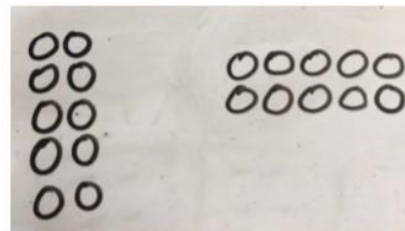


2 lots of 5

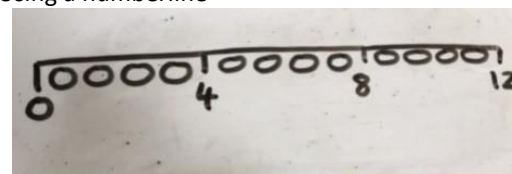


5 lots of 2

Children to represent the arrays pictorially.



Using a numberline



Children to be able to use an array to write a range of calculations e.g.

$$\begin{aligned} 10 &= 2 \times 5 \\ 5 \times 2 &= 10 \\ 2 + 2 + 2 + 2 + 2 &= 10 \\ 10 &= 5 + 5 \end{aligned}$$

Year 3

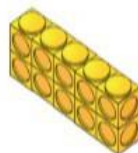
Write and calculate mathematical statements for multiplication and division using the multiplication tables that he/she knows, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

Create arrays

$$2 \times 5 = 5 \times 2$$

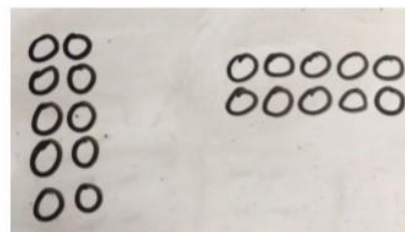


2 lots of 5

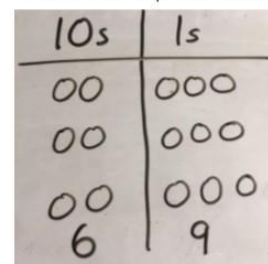


5 lots of 2

Children to represent the arrays pictorially.



Children to represent the counters pictorially.



Formal column method with place value counters (base 10 can also be used.) 3×23

10s	1s
6	9

Children to record what it is they are doing to show understanding.

$$\begin{array}{r} 3 \times 23 \\ \begin{array}{l} 20 \quad 3 \end{array} \end{array} \quad \begin{array}{l} 3 \times 20 = 60 \\ 3 \times 3 = 9 \\ 60 + 9 = 69 \end{array}$$

$$\begin{array}{r} 23 \\ \times 3 \\ \hline 69 \end{array}$$

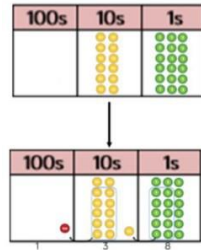
Year 4

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

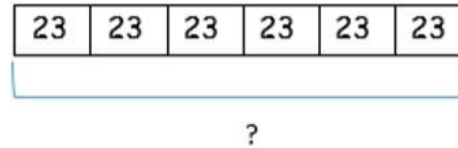
Year 5

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Formal column method with place value counters.
6 x 23



Draw bar model



Formal written method

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

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

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

Answer: 3224

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

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

With the counters, prove that $6 \times 23 = 138$

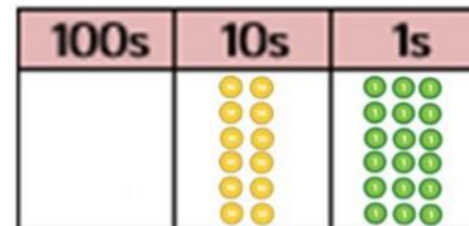
Find the product of 6 and 23

$$6 \times 23 =$$

$$\boxed{} = 6 \times 23$$

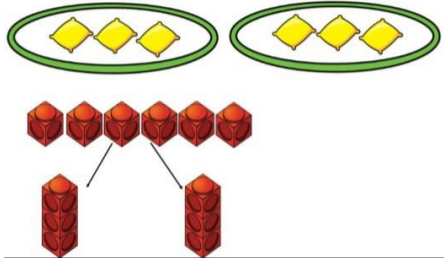
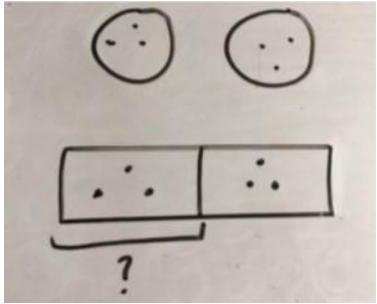
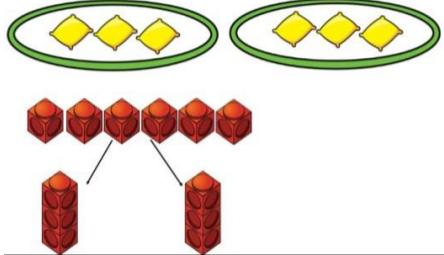
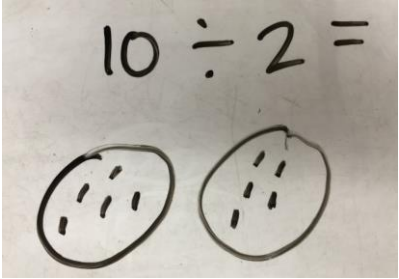
$$\begin{array}{r}
 6 \quad 23 \\
 \times 23 \quad \times 6 \\
 \hline
 \hline
 \end{array}$$

What is the calculation?
What is the product?



Calculation Policy- Division

Key Language: share, group, divide, divided by, half, dividend, divisor, quotient

Objectives	Concrete	Pictorial	Abstract
EYFS Solve problems, including doubling, halving and sharing Solve practical problems that involve combining groups of 2, 5 or 10, or sharing into equal groups (ELG Exc)	Halving using objects Sharing using a range of objects. $6 \div 2$ 	Halving using pictures 	Half of 6 
Year 1 Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	Sharing and grouping Sharing using a range of objects. $6 \div 2$ 	Sharing  Grouping	2 groups of 5 5 5 5 groups of 2 2 2 2 2 2

Year 2

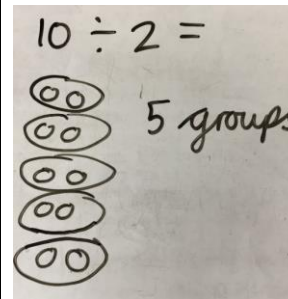
Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ($\times$), division ($\div$) and equals ($=$) signs

Solve problems involving multiplication and division, using arrays, repeated addition and multiplication and division facts, including problems in contexts e.g. knowing that $2 \times 7 = 14$ and $2 \times 8 = 16$, explains that making pairs of socks from 15 identical socks will give 7 pairs and one sock will be left

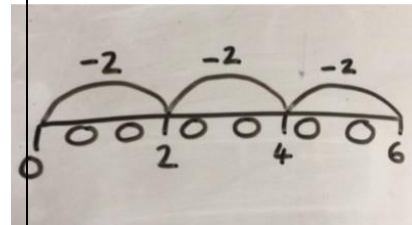
Grouping using equipment



Grouping



Number lines



Division number sentences

$$10 \div 2 = 5$$

$$10 \div 5 = 2$$

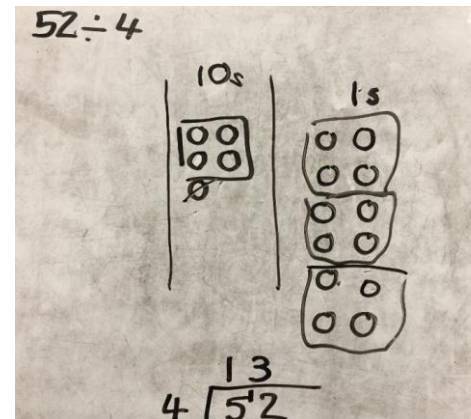
Year 3

Write and calculate mathematical statements for multiplication and division using the multiplication tables that he/she knows, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods

Step 1 Build the number			Step 2 Group the hundreds		
816 $\div$ 4			816 $\div$ 4		
H	T	O	H	T	O
100 100 100 100 100 100	10	1 1 1 1 1 1 1 1 1 1	100 100 100 100 100 100	10	1 1 1 1 1 1 1 1 1 1
			$\frac{2}{4} \overline{)816}$		
Step 3 Group the tens and ones					
816 $\div$ 4					
H	T	O			
100 100 100 100 100 100	10	1 1 1 1 1 1 1 1 1 1			
Exchange the ten for ten ones and then group the ones.					
$\frac{204}{4} \overline{)816}$					

Year 4

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout



Children to the calculation using the short division scaffold.

$$\begin{array}{r} 123 \\ 5 \overline{)615} \end{array}$$

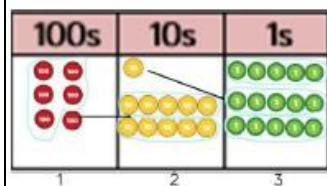
Year 5

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Year 6

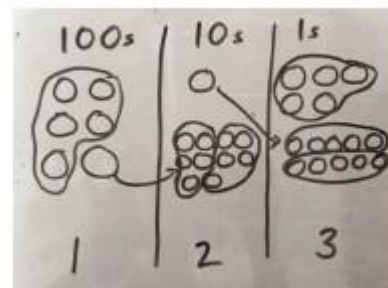
I can mentally calculate using a mix of the four operations

Short division using place value counters to group.
 $615 \div 5$



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.

$$5 \overline{) 123} \begin{matrix} 1 \\ 1 \\ 1 \end{matrix} \begin{matrix} 2 \\ 3 \\ 5 \end{matrix}$$

$$2544 \div 12 = \boxed{}$$

$$12 = 6 \times 2$$

$$\begin{array}{r} 1272 \\ 2 \overline{) 2544} \\ \underline{212} \\ 422 \\ \underline{420} \\ 20 \\ \underline{20} \\ 0 \end{array}$$

$$6 \overline{) 1272} \begin{matrix} 2 \\ 1 \\ 2 \end{matrix}$$

$$2544 \div 12 = 212$$

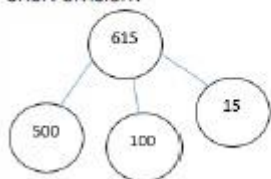
$$12 \overline{) 2544} \begin{matrix} 2 \\ 1 \\ 2 \end{matrix}$$

$$\begin{array}{l} 12 \times 1 \\ 24 \times 2 \\ 48 \times 4 \\ 96 \times 8 \end{array}$$

Use these related number facts to divide.

Conceptual variation; different ways to ask children to solve $615 \div 5$

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?

$$5 \overline{) 615}$$

$$615 \div 5 =$$

$$\boxed{} = 615 \div 5$$

What is the calculation?
What is the answer?

