Jubilee School

inspiring imaginations

CALCULATION POLICY

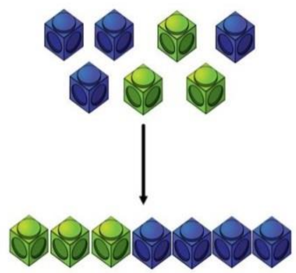
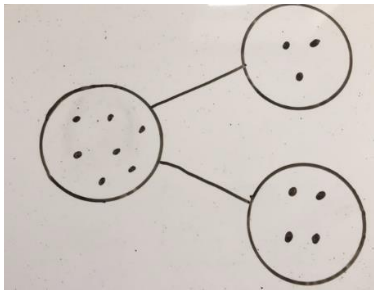
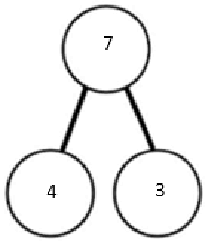
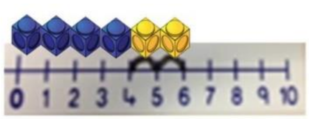
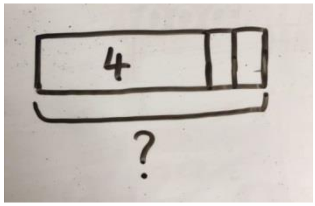
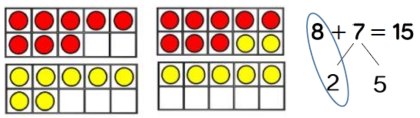
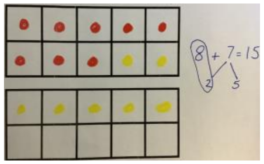
Calculation policy: Guidance

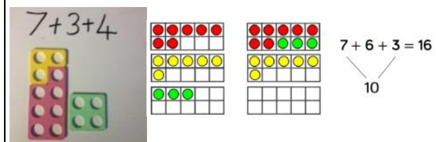
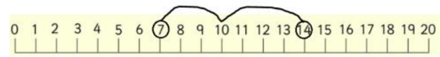
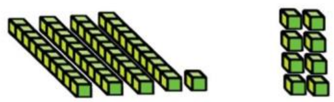
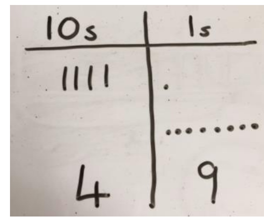
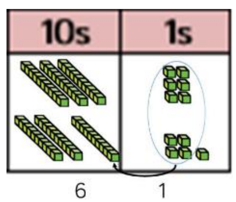
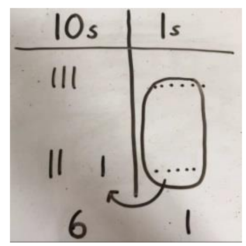
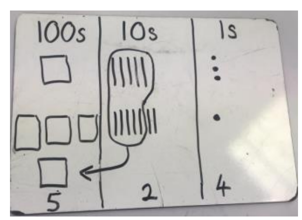
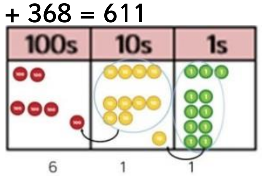
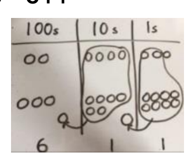
See White Rose planning documents for WAGBA's and a more detailed breakdown of calculation progression.

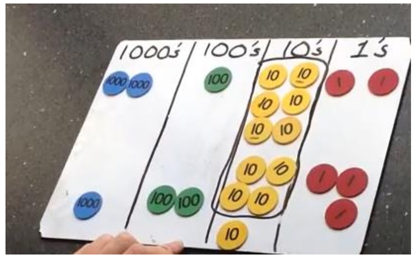
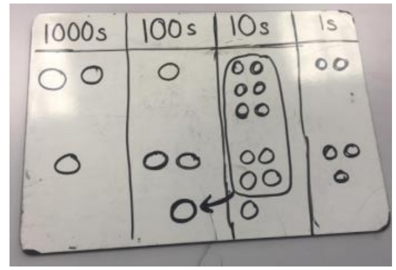
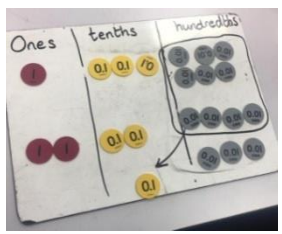
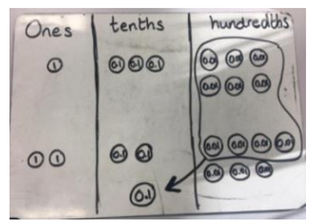
Addition

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

EYFS / Year 1

Progression	Concrete	Pictorial	Abstract
1.1 Combining two parts to make a whole.		4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 	4 + 3 = 7 Four is a part, 3 is a part and the whole is seven. 
1.2 Starting at the bigger number and counting on	Counting on using number lines, cubes or Numicon.   4 5 6	A bar model which encourages the children to count on, rather than count all. 	The abstract number line: 4 + 2 = 6 
1.3 Addition bridging 10. Using ten frames or Numicon.	8 + 7 	Children to draw the ten frame and counters/cubes. 	Children to develop an understanding of equality e.g. 8+□=15 8+7=7+□ 8+7=□ +4

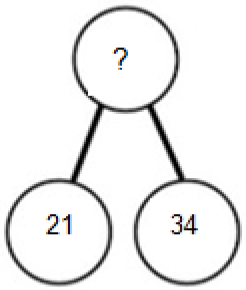
Year 2	2.1 Adding three single digits.	Using Numicon or ten frames.  	Using pictures of ten frames or number line. 7 + 3 + 4 	Use number bonds to make ten. 6 + 7 + 4 = 6 + 4 + 7 = 17
	2.2 Use dienes to add two numbers. (2 digit + 1 digit and 2 digit + 2 digit)	Continue to develop understanding of partitioning and place value. 41 + 8 	Children to represent the dienes e.g. lines for tens and dot/crosses for ones.  	41 + 8 Add the ones: 1 + 8 = 9 Add the tens: 40 + 9 = 49
	2.3 Addition with exchanging using dienes (2 digit + 1 digit and 2 digit + 2 digit)	36 + 25 (exchanging the ones)  	36 + 25  	Introduce formal column method: 36 +25 61 1
Year 3	3.1 Column method- exchanging (up to 3 digits). Using dienes.	153 + 371 = 524  	153 + 371 = 524  	Introduce formal column method: 153 + 371 524 1
	3.2 Column method - exchanging (up to 3 digits). Using place value counters.	243 + 368 = 611  	243 + 368 =611  	243 +368 611 1 1

Year 4	4.1 Column method- exchanging (up to 4 digits). Using place value counters.	2162 + 1253 	2162 + 1253 	2162 + 1253 3515 1
Year 5	5.1 Column method- exchanging with more than 4 digits	See Year 4 if required.	See Year 4 if required.	1720cm 750cm + 1500cm 3970cm 1
	5.2 Column method – decimals (up to 2 d.p.). Use place value counters.	1.36 + 2.37 	1.36 + 2.37 	£1.36 + £2.37 £3.73 1
Year 6	6. 1 Column method- exchanging with more than 4 digits	See Year 4 if required.	See Year 4 if required.	1720cm 750cm + 1500cm 3970cm 1
	6.2 Column method – decimals (up to 2 d.p.). Use place value counters.	See Year 5 if required.	See Year 5 if required.	£1.36 + £2.37 £3.73 1

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

Visual representations:

Part-part-whole diagrams and bar models.



?	
21	34

Word problems:

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

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

Different forms of equations:

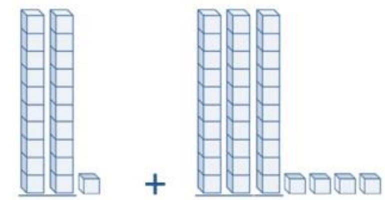
$$\begin{array}{r} 21 \\ \underline{+34} \\ \underline{} \end{array}$$

21 + 34 =

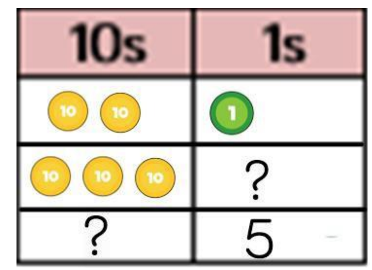
$\square$ = 21 + 34

21 + 34 = 55. Prove it

Concrete representations:



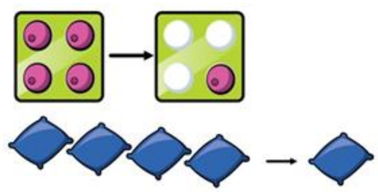
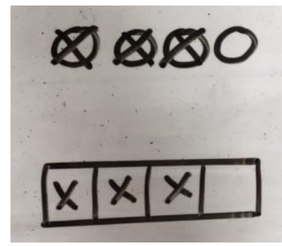
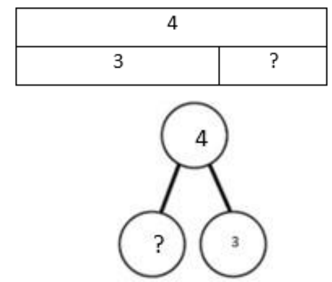
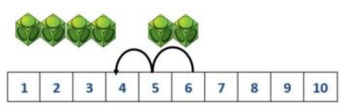
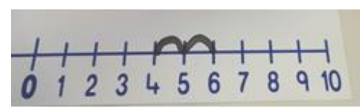
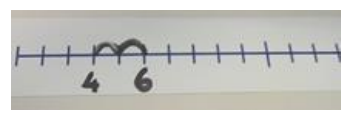
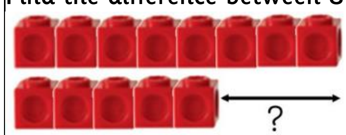
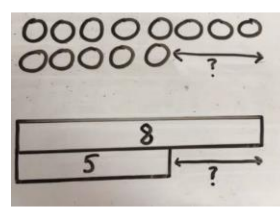
Missing digit problems:

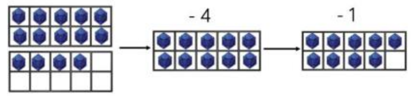
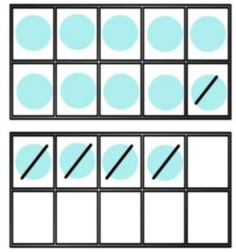
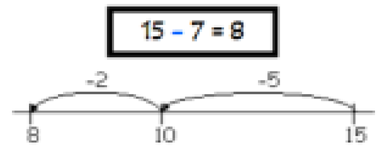
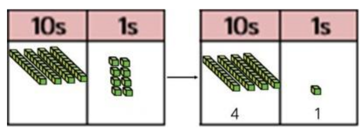
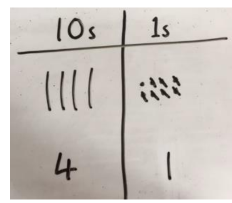
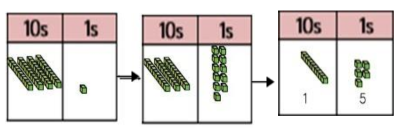
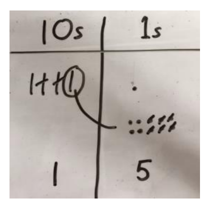
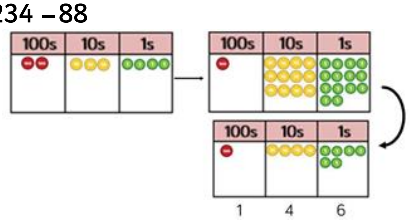
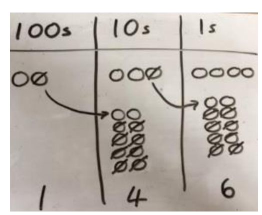


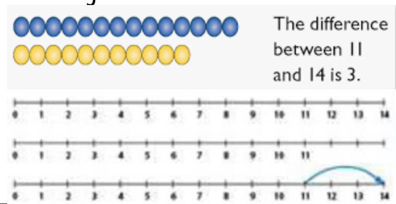
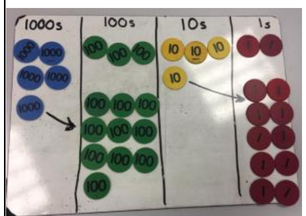
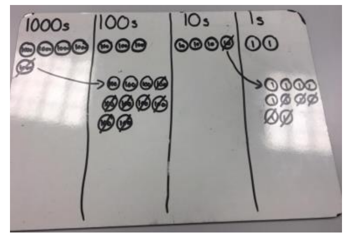
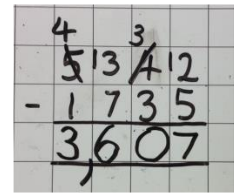
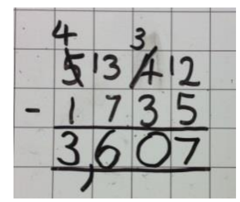
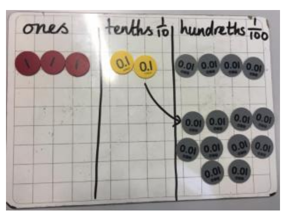
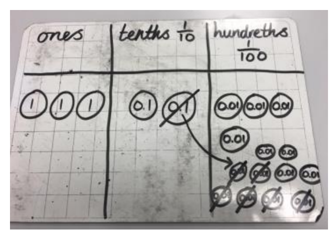
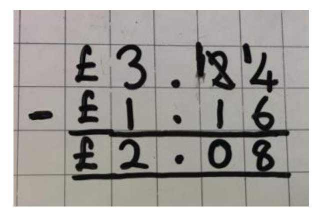
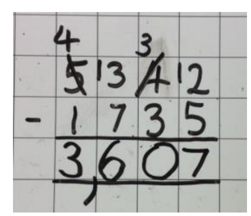
Subtraction

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

EYFS / Year 1

Progression	Concrete	Pictorial	Abstract
1.4 Taking away ones from a whole.	Physically taking away objects from a whole. 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 = $\boxed{}$ $\boxed{}$ = 4 – 3 
1.5 Counting back using a number line.	Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 – 2 = 4 	6 – 2 = 4 	6 – 2 = 4
1.6 Find the difference by counting on.	Finding the difference (using cubes, Numicon or Cuisenaire rods). Find the difference between 8 and 5. 	Children to draw the concrete resources they have used or used a bar model to illustrate what they need to calculate. 	Find the difference between 8 and 5. 5 + 3 = 8

	[1.7 Make 10 using the ten frame](#)	Making 10 using a ten frame. 14 - 5 	Children to present the ten frame pictorially and discuss what they did to make ten. 	Children to show how they can make ten by partitioning the smaller number. 14 - 5 = 9 4 1 14 – 4 = 10 10 – 1 = 9
Year 2	[2.4 Counting back using a number line.](#)	15 - 7 		15 – 7 = 8
	[2.5 Use dienes to subtract numbers up to 2 digits (without exchanging).](#)	Column method using dienes. 48 - 7 	Children to represent dienes pictorially. 	48 – 7 = 41
	[2.6 Subtraction with exchanging using dienes](#) (2 digit - 1 digit and 2 digit - 2 digit)	Column method using dienes. 41 – 26 	41-26 	Introduce formal column method: 3 $\cancel{4}\,{}^{1}1$ - 26 15
Year 3	[3.3 Column method with exchanging](#). Using place value counters and dienes up to 3 digits.	Column method using place value counters. 234 – 88 	234-88 	Formal column method. 2 1 $2\cancel{3}4$ - 88 6

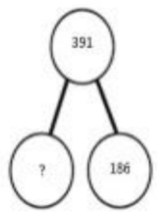
	3.4 Finding the difference	Begin to find the difference by counting on or back. 	74 – 47 = 27 	74 - 47 = 27
Year 4	[4.2 Column method with regrouping (including regrouping thousands, hundreds, tens and ones).]() Up to 4 digits using place value counters.	5342 – 1735 	5342 – 1735 	5342 – 1735 
Year 5	[5.3 Abstract column method with regrouping (including numbers with more than 4 digits).]()	See Year 4 if required.	See Year 4 if required.	5342 – 1735 
	[5.4 Column method for decimals up to 2 decimal places with place value counters.]()	3.24 – 1.16 	3.24 – 1.16 	
Year 6	[6.3 Abstract column method with regrouping (including numbers with more than 4 digits).]()	See Year 4 if required.	See Year 4 if required.	

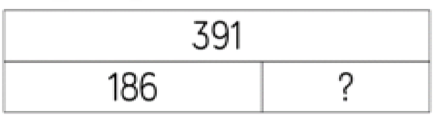
	6.4 Column method for decimals up to 2 decimal places with place value counters	See Year 5 if required.	See Year 5 if required.	See Year 5 if required.

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

Visual representations:

Part-part-whole diagrams and bar models.





Word problems:

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

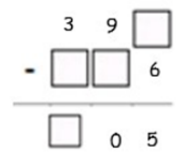
Calculate the difference between 391 and 186.

Different forms of equations:

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

What is 186 less than 391?

Missing digit calculations



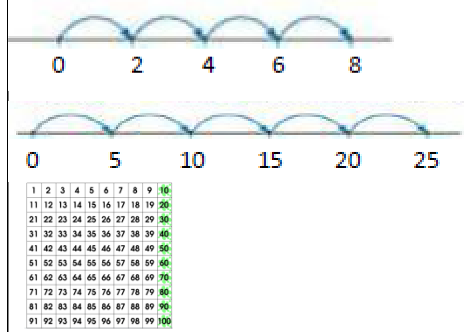
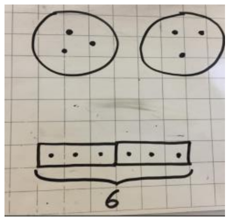
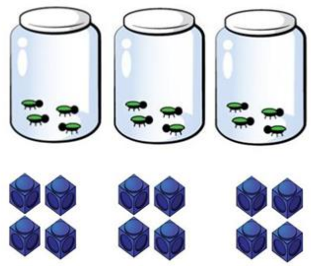
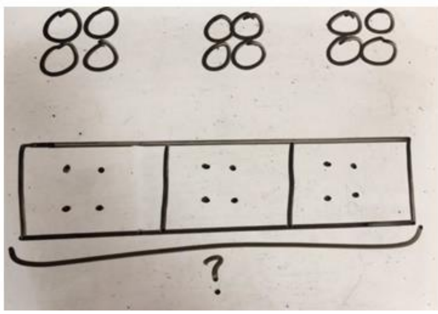
$\square$ = 391 – 186

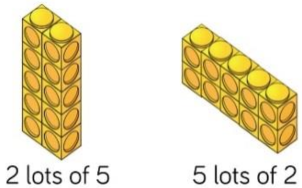
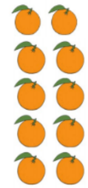
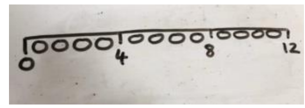
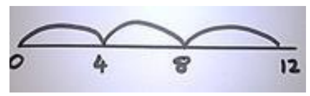
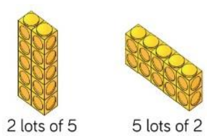
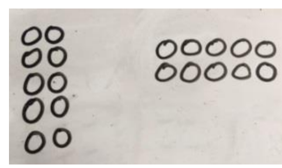
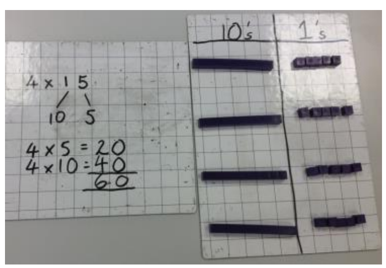
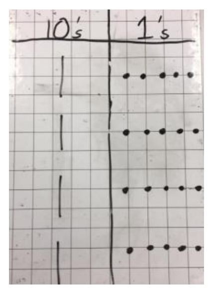
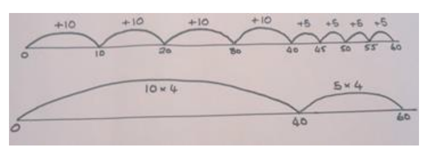
Concrete representations:

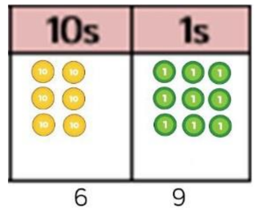
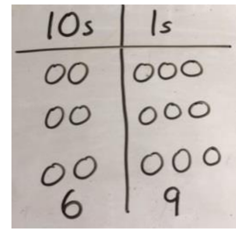
Multiplication

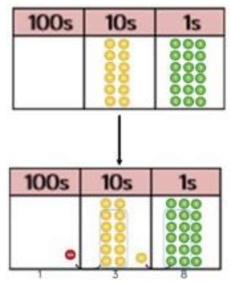
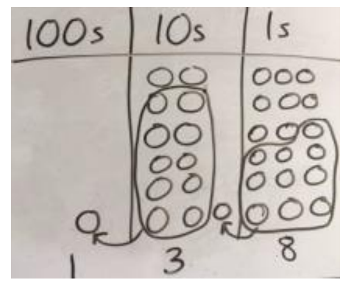
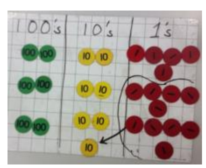
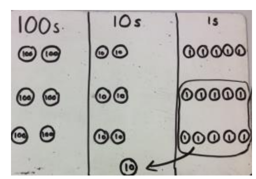
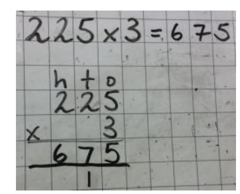
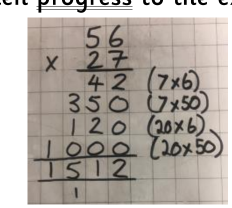
Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups, factors, multiples and exchange.

Year 1/ EYFS

Progression	Concrete	Pictorial	Abstract
1.8 Counting in multiples (skip count in 2's, 5's and 10's)			"5, 10, 15, 20, 25…"
1.9 Doubling			3 + 3 = 6
1.10 Repeated addition.	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

Year 2	1.11 Arrays	Putting objects into arrays. 2 × 5 = 5 × 2 	Children describe arrays in different ways. 2 groups of 5 5 groups of 2  	Children to be able to use an array to write a range of calculations e.g. 5 x 2 =10 2 x 5 = 10
Year 2	2.7 Number line to show repeated addition	Number lines to show repeated groups. E.g. 3 × 4   Cuisenaire rods and Numicon can be used too.	Represent this pictorially alongside a number line  	4 + 4 + 4 = 12 3 × 4 = 12
Year 2	2.8 Arrays - showing commutative multiplication	Use arrays to illustrate commutativity counters and pegs can be used. 2 × 5 = 5 × 2 	Children to represent the arrays pictorially. 2 x 5 5 x 2 	Children to be able to use an array to write a range of calculations e.g. 10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5
Year 3	3.5 Multiplication by partitioning 2d × 1d using dienes	Partition to multiply using dienes of Numicon. 	4 X 15  A number line should also be used 	Children to be encouraged to show the steps they have taken. 4 x 15 10 5 4 X 5 = 20 4 X 10 = 40 60

<table>
<tr>
<td></td>
<td>3.6 Short multiplication
(2 digit X 1 digit)</td>
<td>Short multiplication method.
Use counters or dienes.
3 X 23

</td>
<td>3 X 23

</td>
<td>Children to be encouraged to show the steps they have taken.
3 X 3 = 9
3 X 20 = 60
69

23
x 3
69</td>
</tr>
<tr>
<td></td>
<td>3.7 Short multiplication with regrouping (2 digit X 1 digit)</td>
<td>Formal column method with place value counters.
6 x23

</td>
<td>6 X 23

</td>
<td>Formal written method
6 x 23 =
23
x 6
138
1 1</td>
</tr>
<tr>
<td rowspan="2">Year 4</td>
<td>4.3 Short multiplication- place value counters.
(2 and 3 digit X 1 digit)</td>
<td>225 X 3 = 675

</td>
<td>225 X 3 = 675

</td>
<td>
</td>
</tr>
<tr>
<td>4.4 Grid method to expanded method.
(for 2- digit X 2-digit)</td>
<td>Use abstract methods.</td>
<td>Use abstract methods.</td>
<td>First introduce children to the grid method.
56 x 27= 1512
<table>
<tr><td>x</td><td>20</td><td>7</td><td></td></tr>
<tr><td>50</td><td>1000</td><td>350</td><td>1350</td></tr>
<tr><td>6</td><td>120</td><td>42</td><td>162</td></tr>
<tr><td></td><td></td><td></td><td>1512</td></tr>
<tr><td></td><td></td><td></td><td>1</td></tr>
</table>
Then progress to the expanded method.

</td>
</tr>
</table>

Year 5	5.5 Short multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit X 1 digit)	See Year 4 if required	See Year 4 if required	2741 X 6 16446 4 2
	5.6 Long multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit X 2 digits)	See year 4 if required.	See year 4 if required.	132 x 56 792 (132 x 6) 6600 (132 x 50) 7392
Year 6	6.5 Long multiplication Abstract method (up to 4 digits by a 2 digit number)	See year 4 if required.	See year 4 if required.	132 x 56 792 (132 x 6) 6600 (132 x 50) 7392

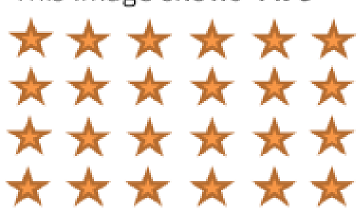
Conceptual variation; different ways to ask children to solve 6 × 23

Visual representations:

23	23	23	23	23	23

?

This image shows **4 x 6**



*Change the image to show **4 x 7***

Word problems:

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

Using place value counters, prove
prove that 6 x 23 = 138

Different forms of equation:

Find the product of 6 and 23

$\square$ = 6 × 23

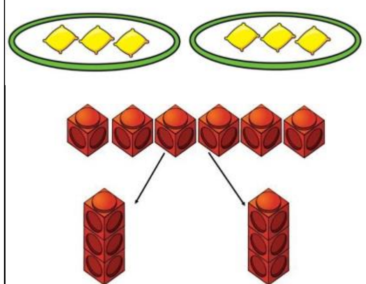
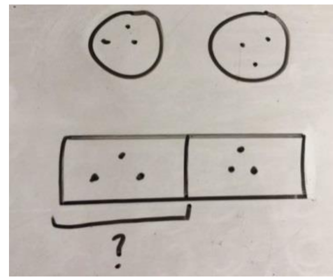
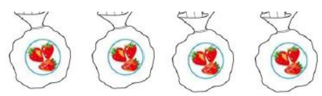
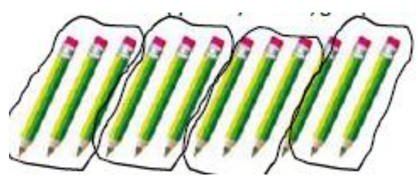
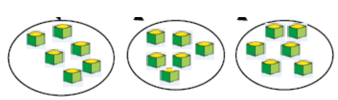
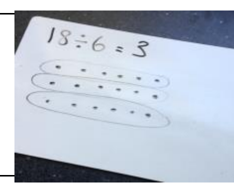
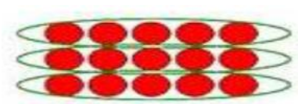
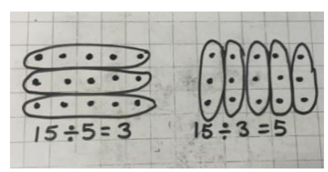
$$\begin{array}{r} 6 \\ \times\ \underline{23} \\ \underline{} \end{array} \qquad \begin{array}{r} 23 \\ \times\ \underline{6} \\ \underline{} \end{array}$$

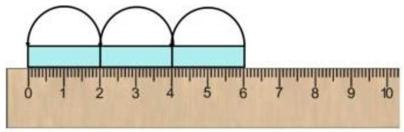
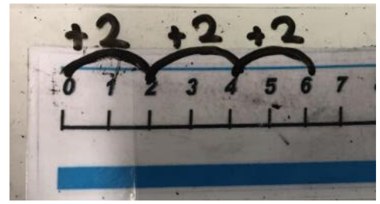
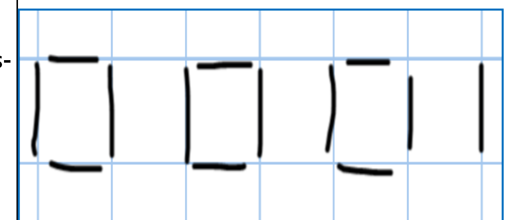
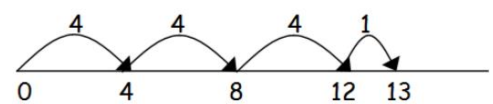
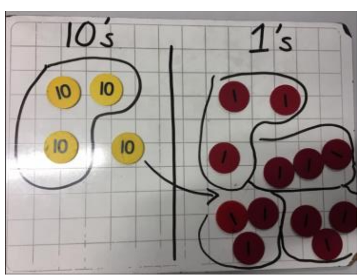
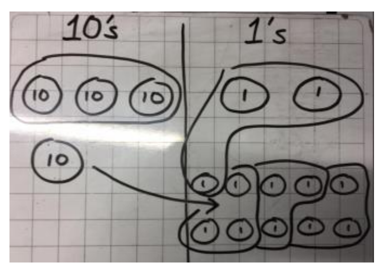
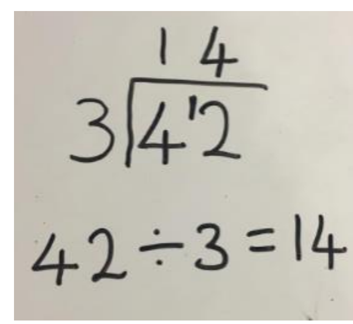
Concrete representations:

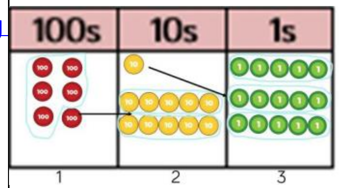
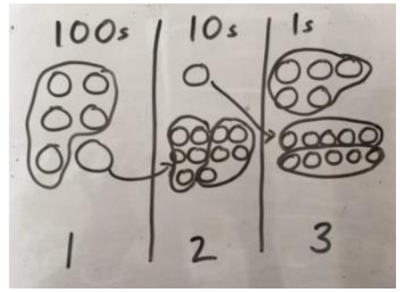
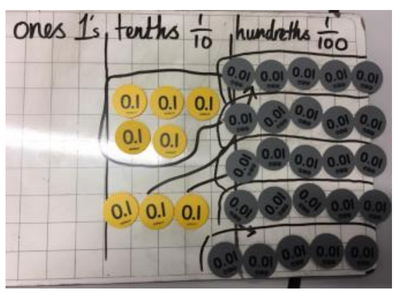
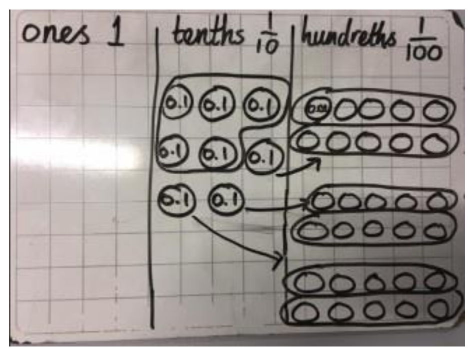
What is the calculation?
What is the product?

Division

Key language: share, group, groups of, lots of, regroup, divide, divided by, remainder divisor, dividend.

	Progression	Concrete	Pictorial	Abstract
EYFS / Year 1	1.12 Division by sharing objects into groups.	Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3 | 3 | 3 |
	1.13 Division by making groups.	 I have 12 strawberries and put them in groups of 3, how many groups?	Pictures of objects Each pot needs three pencils in. How many pots do we need? 	12 ÷ 3 = 4
Year 2	2.9 Division by making groups.	18 in groups of 6. 		There are 3 groups of 6 in 18. 18 ÷ 6 = 3
	2.10 Division within arrays- linking to multiplication. (Sharing and grouping)	15 shared between 3. 15 in groups of 5. 		15 ÷ 5 = 3 15 ÷ 3 = 5

	2.11 Division as counting up	How many groups of 2 in 6? Use number line or Cuisenaire rods on a ruler. 6 ÷ 2  3 groups of 2	Children to represent division by counting up  	$6 \div 2 = 3$
Year 3	3.8 To divide a two digit number by a one digit number with and without remainders.	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 remainder. Use of numicon. How many groups of 3 in 20? 20 ÷ 3 	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over.	$13 \div 4 = 3$ 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' 13 ÷ 4 = 3 r 1 
	3.9 Short Division To divide a two digit number by a one digit number with regrouping of tens and ones (no remainders)	Short division using place value counters and dienes to group. $42 \div 3 = 14$  	Children to represent the place value counters/dienes pictorially. $42 \div 3 = 14$  	

Year 4	[4.5 Short division To divide a 3 digit number by a 1 digit number with regrouping in hundreds, tens and ones]	Short division using place value counters to <u>group</u>. 615 ÷ 5  How many groups of 5 hundreds can you make with 6 hundred counters?	Represent the place value counters pictorially.  	Children progress to the calculation using the short division scaffold. $\begin{array}{r} 123 \\ 5\overline{)6\,{}^{1}1\,{}^{1}5} \end{array}$
Year 5	[5.7 Short division Dividing a 4 digit number by a 1 digit number including remainders]	See Year 4 if required.	See Year 4 if required.	$\begin{array}{r} 0\;6\;5\;8. \\ 4\overline{)\,2\;{}^{2}6\;{}^{2}3\;{}^{3}4} \end{array}$ Remainder 2
	[5.8 Short division Division problems with decimal numbers (up to 2 d.p)]	0.8 ÷ 5  	0.8 ÷ 5  	$\begin{array}{r} 0.16 \\ 5\overline{)0.8\,{}^{3}0} \end{array}$
Year 6	[6.6 Short division]	See Year 4 if required.	See Year 4 if required.	$\begin{array}{r} 0\;6\;5\;8. \\ 4\overline{)\,2\;{}^{2}6\;{}^{2}3\;{}^{3}4} \end{array}$

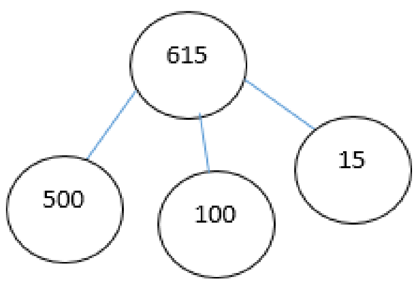
<table>
<tr><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td>6.7 Long division/ chunking method (up to 4 digit by a 2 digit number)</td><td></td><td></td><td>

$$\begin{array}{r|l} & 203 \\ 14 & 2842 \\ & \underline{2800} - (200 \times 14) \\ & 0042 \\ & \underline{0042} - (3 \times 14) \\ & 0000 \end{array}$$

Help Box
1x14 = 14
2x14 = 28
3x14 = 42
4x14 = 56
5x14 = 70
6x14 = 84
7x14 = 98
8x14 = 112
9x14 = 126
10x14 =140

</td></tr>
</table>

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

Visual representations:	Word problems:	Different forms of equation:	Concrete representations:
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 = $\square$ = 615 ÷ 5	What is the calculation? What is the answer?