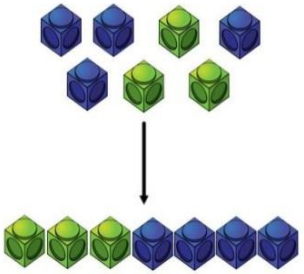
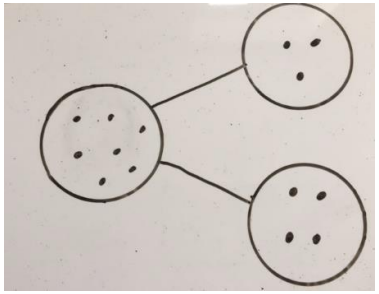
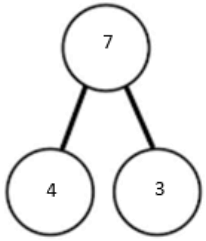
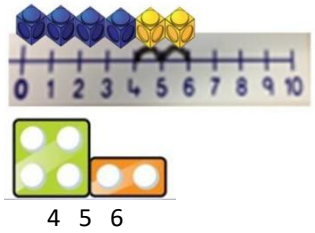
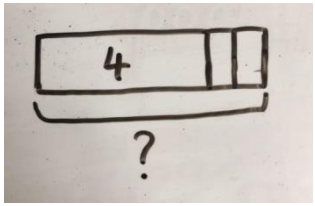
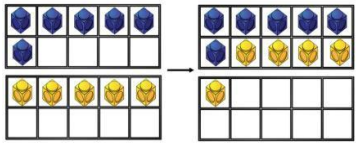
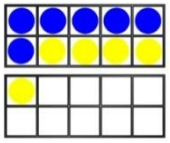
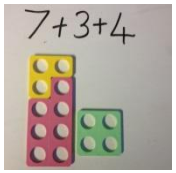
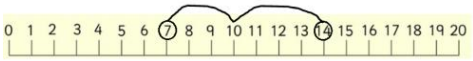
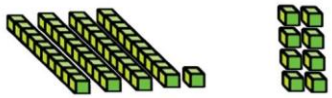
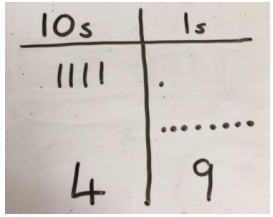
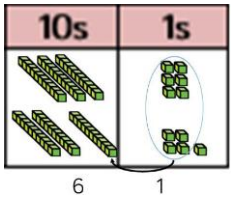
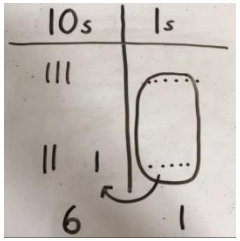
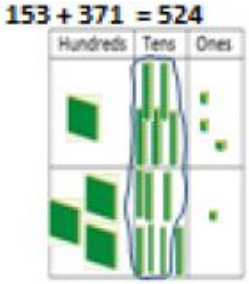
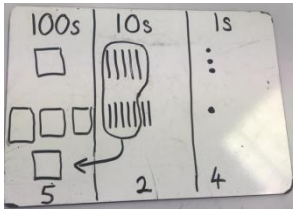
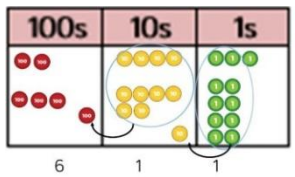
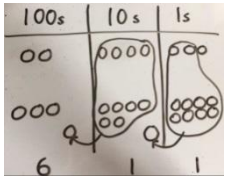
Calculation progression map

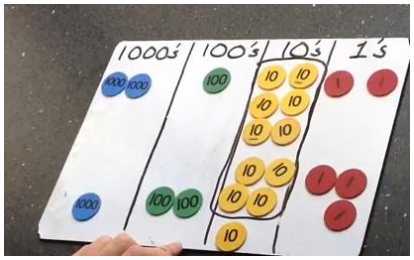
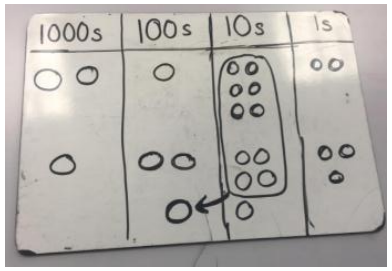
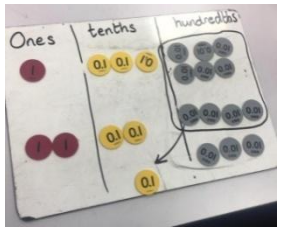
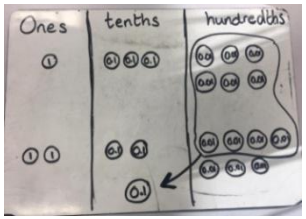
See White Rose Version 3 year group planning documents for a further detailed breakdown of calculation progression in each year group

Addition

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

	Progression	Concrete	Pictorial	Abstract
EYFS / Year 1	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. 	A bar model which encourages the children to count on, rather than count all. 	The abstract numberline: 4+2 = 6 
	1.3 Regrouping to make 10. Using ten frames and Numicon.	6 + 5 	Children to draw the ten frame and counters/cubes. 	Children to develop an understanding of equality e.g. **6+□=11** **6+5 =5+□** **6+5= □ +4**

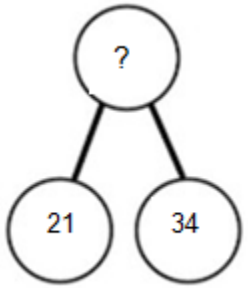
Year 2	**2.1** Adding three single digits.	Using Numicon or ten frames. 	Using pictures of ten frames or number line. 7 + 3 + 4 	Using number bonds to make ten **6** + 7 + **4** = 6 + 4 + 7 = 17
	2.2 Use dienes to add two numbers. (2 digit + 1 digit and 2 digit + 2 digit)	Continue to develop understanding 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 Use dienes to add two numbers with regrouping. (2 digit + 1 digit and digit + 2 digit)	36+25 (regrouping in the ones) 	36 + 25 	Expanded method: 36 + 25 Add the ones: 6 + 5 = 11 Add the tens: 30 + 20 = 50 50 + 11 = 61
Year 3	3.1 Column method- regrouping (up to 3 digits). Using dienes.		153 + 371 = 524 	Introduce formal written method: 153 + 371 524 1
	3.2 Column method- regrouping (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- regrouping (up to 4 digits). Using place value counters.	2162 + 1253 	2162 + 1253 	2162 + 1253 3515 1
Year 5	5.1 Column method- regrouping 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- regrouping 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:

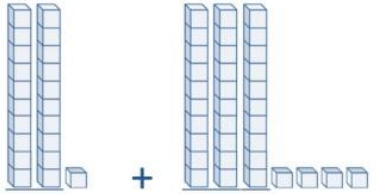
21
+34
____

21 + 34 =

☐ = 21 + 34

21 + 34 = 55. Prove it

Concrete representations:



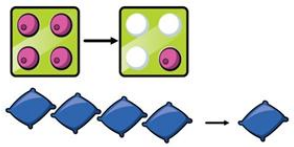
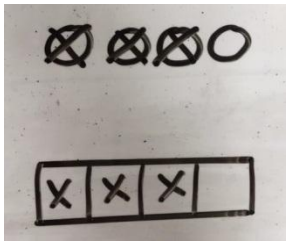
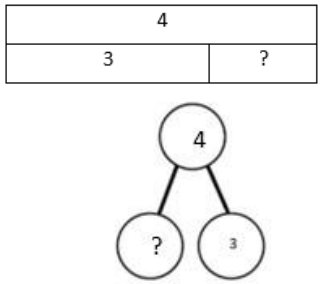
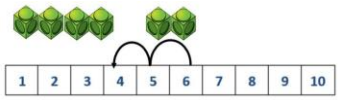
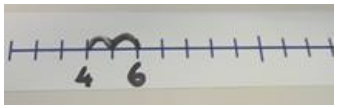
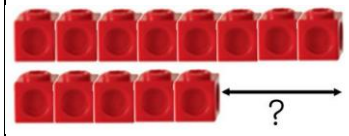
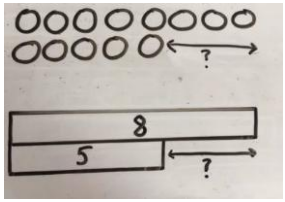
Missing digit problems:

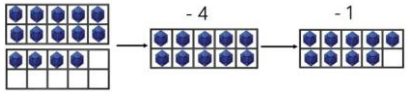
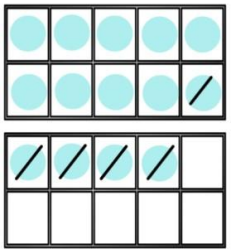
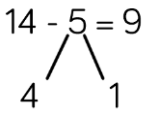
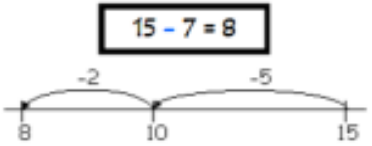
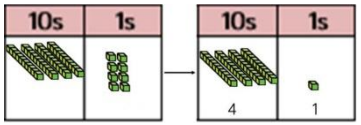
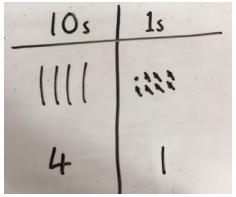
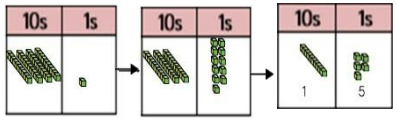
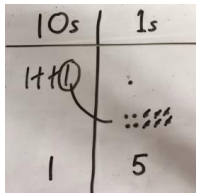
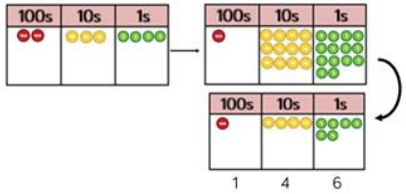
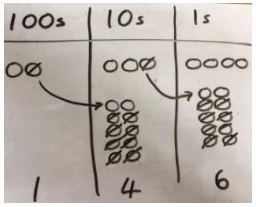
10s	1s
10 10	1
10 10 10	?
?	5

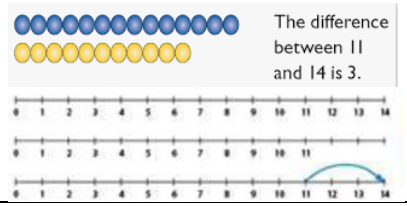
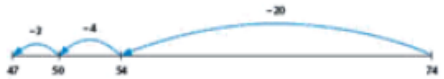
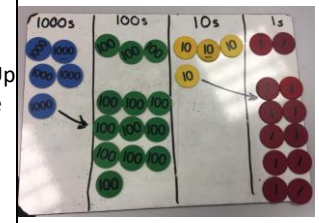
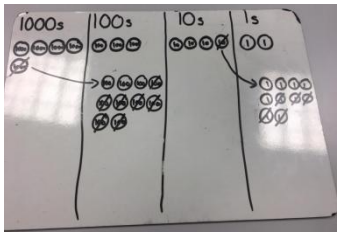
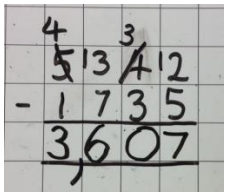
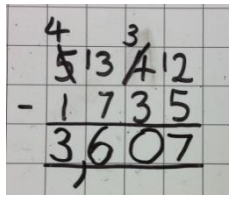
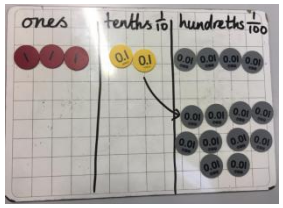
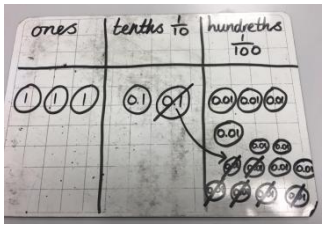
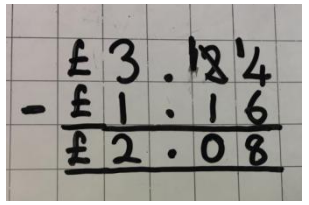
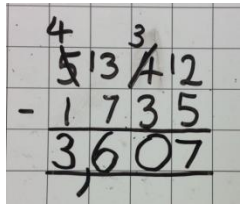
Subtraction

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

EYFS / Year 1

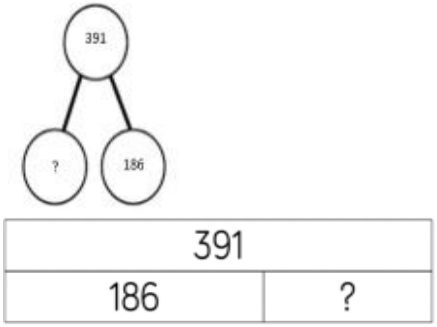
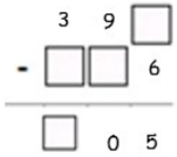
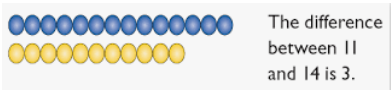
Progression	Concrete	Pictorial	Abstract
1.4 Taking away ones from a whole.	Physically taking away objects from a whole. 4 - 3 = 1 	Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used. 	**4 – 3 =** ☐ ☐ **= 4 – 3** 
1.5 Counting back using 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 – 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 regrouping).	Column method using dienes. 48 - 7 	Children to represent dienes pictorially. 	48 – 7 = 41
	2.6 Use dienes to subtract numbers up to 2 digits (with regrouping). h	Column method using dienes. 41–26 	41-26 	41 – 26 = 15
Year 3	3.3 Column method with regrouping. Using place value counters and dienes up to 3 digits.	**Column method** using place value counters. 234 –88 	234-88 	Formal column written method. $\begin{array}{r} {}^{2}\not{2}\,{}^{1}\not{3}4 \\ -\ 88 \\ \hline 6 \end{array}$

	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.	

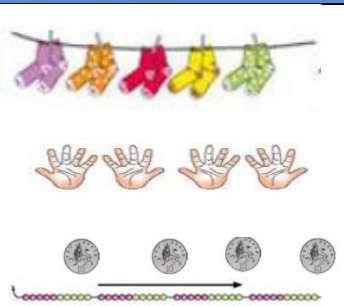
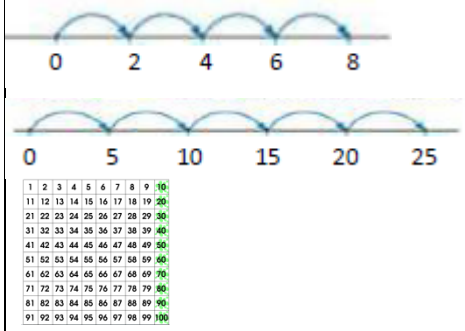
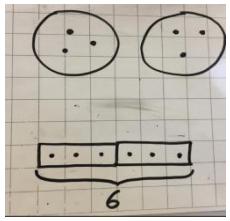
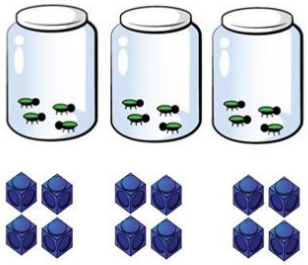
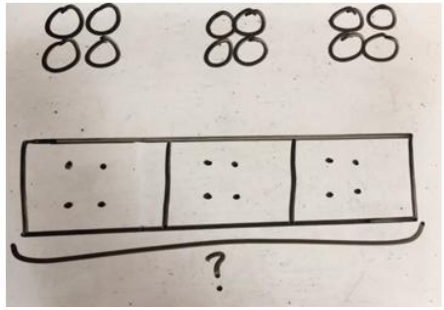
	6.4 Column method for decimals up to 2 decimal places with place value counters	See Year 5 if required.	See Year 5 if required.	See Year 5 if required.

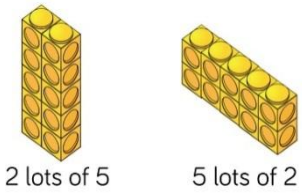
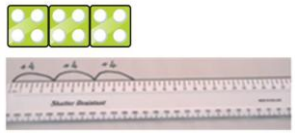
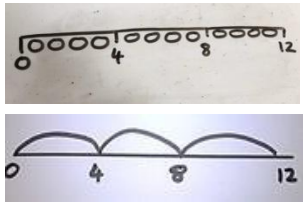
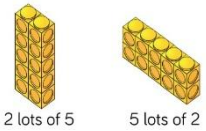
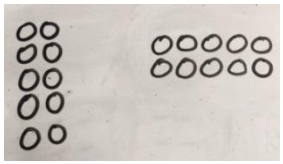
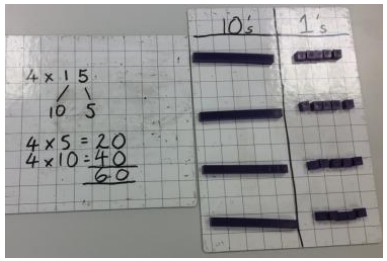
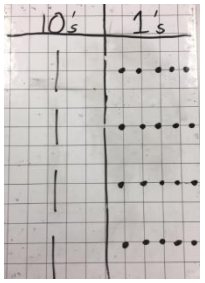
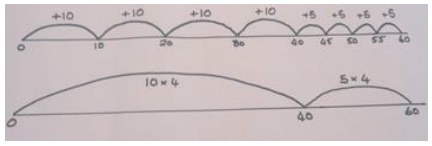
Conceptual variation - different ways to ask children to solve 391 – 186

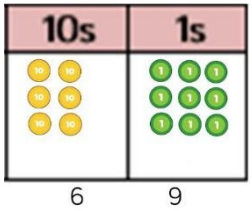
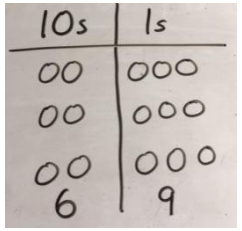
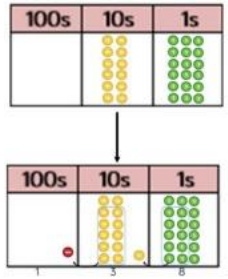
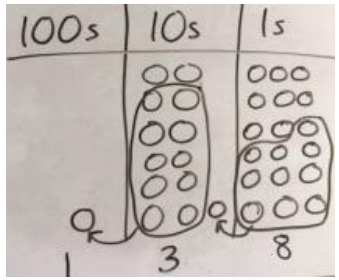
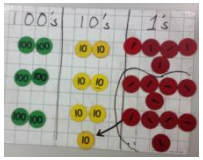
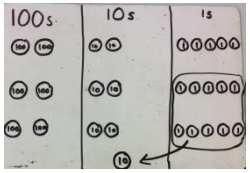
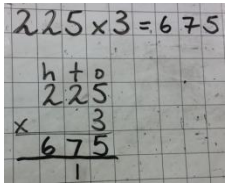
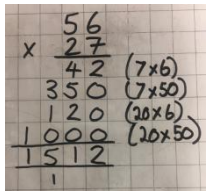
Visual representations:	Word problems:	Different forms of equations:	Concrete representations:
Part-part-whole diagrams and bar models. 	Raj spent £391, Timmy spent £186. How much more did Raj spend? Calculate the difference between 391 and 186.	391 -186 ___ What is 186 less than 391? Missing digit calculations  391 – 186	

Multiplication

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

	Progression	Concrete	Pictorial	Abstract
Year 1/ EYFS	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

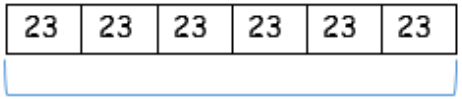
	1.11 Arrays	**Putting objects into arrays.** 2 × 5 = 5 × 2  2 lots of 5 5 lots of 2	Children describe arrays in different ways. 2 groups of 5 5 groups of 2 	Children to be able to use an array to write a range of calculations e.g. 5 × 2 =10 2 x 5 = 10 10 = 2 x 5 10 = 5 x 2
Year 2	**2.7 Number line to 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
	2.8 Arrays - showing commutative multiplication	Use arrays to illustrate commutativity counters and pegs can be used. 2 × 5 = 5 × 2  2 lots of 5 5 lots of 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

	3.6 Short multiplication (2 digit X 1 digit)	Short multiplication method. Use counters or dienes. 3 X 23 	3 X 23 	Children to be encouraged to show the steps they have taken. 3 X 3 = 9 3 X 20 = 60 69 23 × 3 69
	3.7 Short multiplication with regrouping (2 digit X 1 digit)	**Formal column method** with place value counters. 6 x23 	6 X 23 	Formal written method 6 x 23 = 23 × 6 138 1 1
Year 4	4.3 Short multiplication- place value counters. (2 and 3 digit X 1 digit)	225 X 3 = 675 	225 X 3 = 675 	
	4.4 Grid method to expanded method. (for 2- digit X 2-digit)	Use abstract methods.	Use abstract methods.	First introduce children to the grid method. **56 x 27= 1512** × 20 7 50 1000 350 1350 6 120 42 162 1512 1 Then progress to the expanded method. 

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 × 56 792 (132 × 6) 6600 (132 × 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 × 56 792 (132 × 6) 6600 (132 × 50) 7392

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

Visual representations:



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

□ 6 × 23

6 × 23 = ___

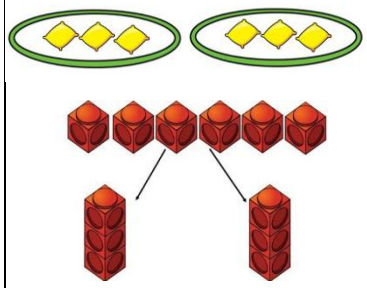
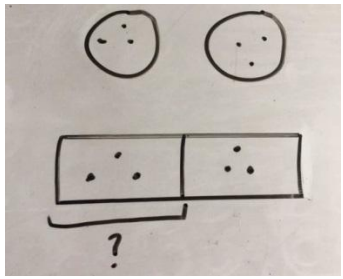
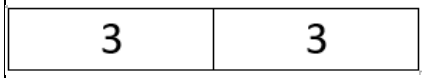
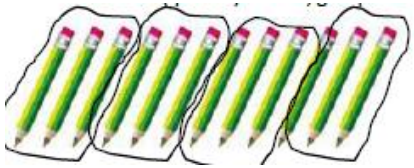
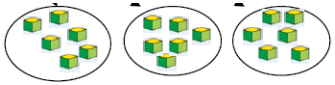
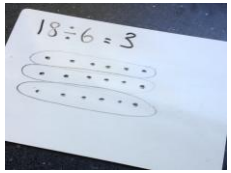
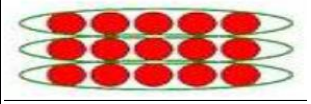
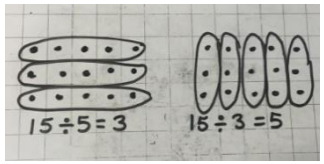
23 × 6 = ___

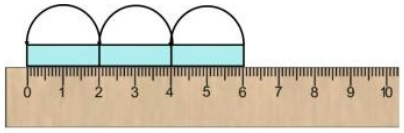
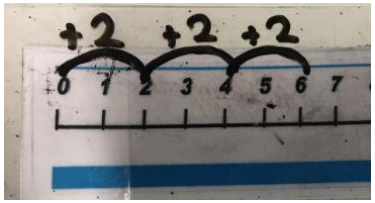
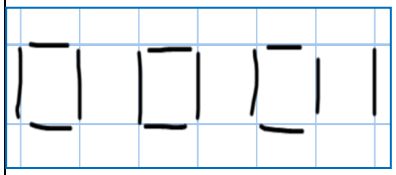
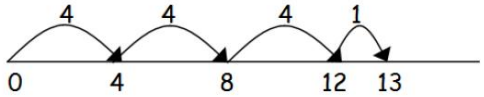
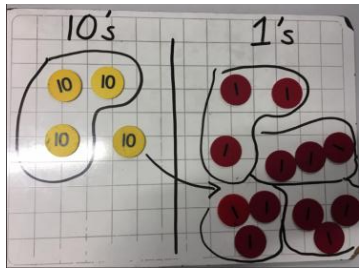
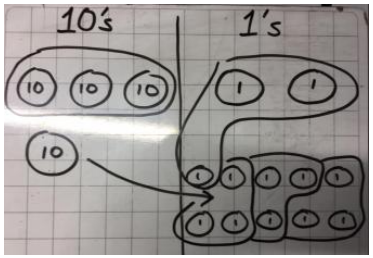
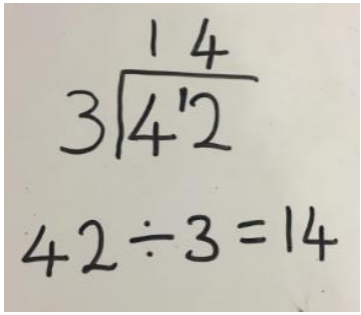
Concrete representations:

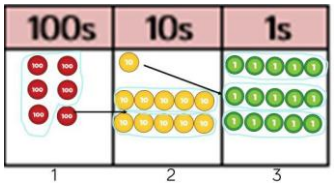
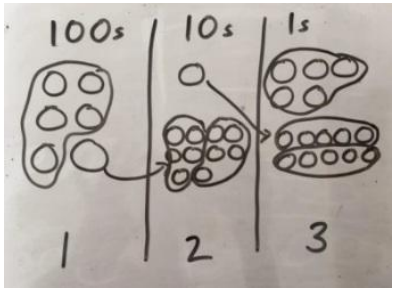
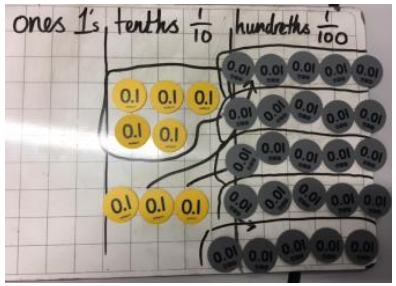
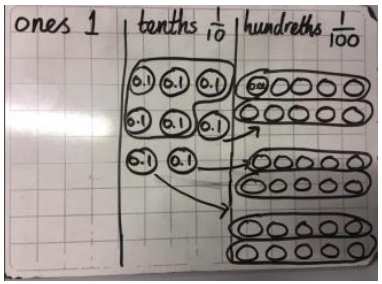
What is the calculation? What is the product?

Division

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

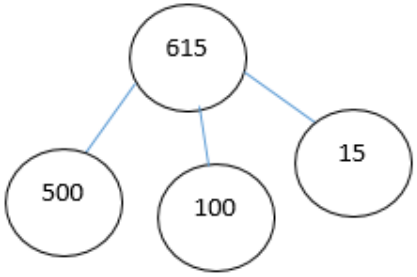
	Progression	Concrete	Pictorial	Abstract
EYFS / Year 1	1.12 Division by sharing objects into groups.	Sharing using a range of objects. 6 ÷ 2 	Represent the sharing pictorially. 	6 ÷ 2 = 3 
EYFS / Year 1	1.13 Division by making groups.	 I have 12 strawberries and put them in groups of 3, how many groups?	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
Year 2	**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 ÷ 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 ÷ 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 ÷ 3 = 14  	Children to represent the place value counters/dienes pictorially. 42 ÷ 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 group. 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. $5\overline{)615}$ = 123
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.	$4\overline{)2634}$ = 0658. Remainder 2
	5.8 Short division Division problems with decimal numbers (up to 2 d.p)	0.8 ÷ 5  	0.8 ÷ 5  	$5\overline{)0.80}$ = 0.16
Year 6	6.6 Short division	See Year 4 if required.	See Year 4 if required.	$4\overline{)2634}$ = 0658.

	6.7 Long division/ chunking method (up to 4 digit by a 2 digit number)			203 14 ⟌ 2842 2800 - (200 × 14) 0042 0042 - (3 × 14) 0000	**Help Box** 1x14 = 14 2x14 = 28 3x14 = 42 4x14 = 56 5x14 = 70 6x14 = 84 7x14 = 98 8x14 = 112 9x14 = 126 10x14 =140

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 = ☐ = 615 ÷ 5	What is the calculation? What is the answer?