This policy has been largely adapted from the White Rose Maths Hub Calculation Policy with further material added. It is a working document and will be revised and amended as necessary.

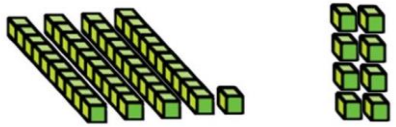
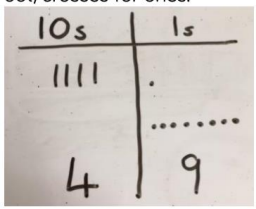
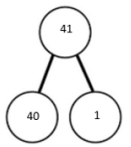
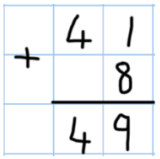
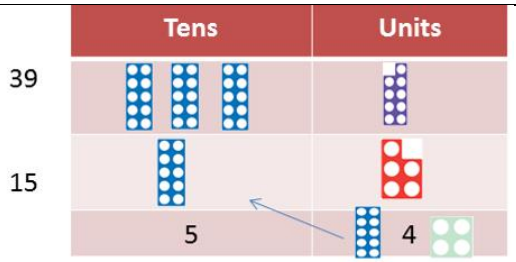
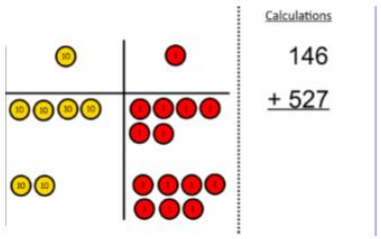
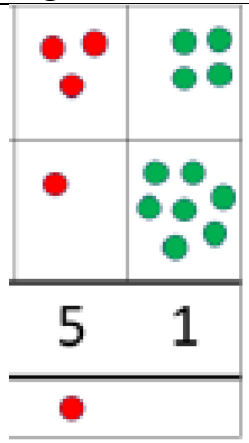
Part 1- calculation policy of the four operations

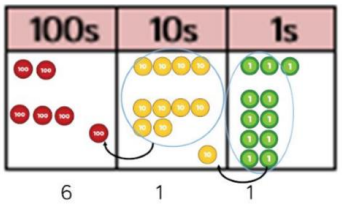
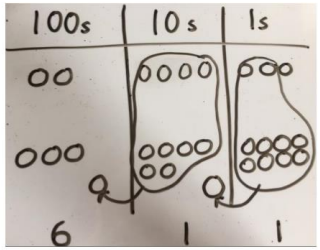
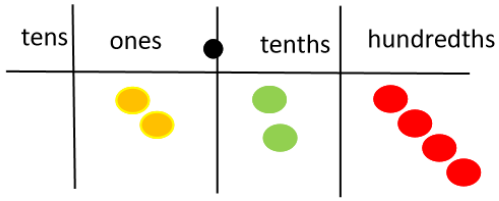
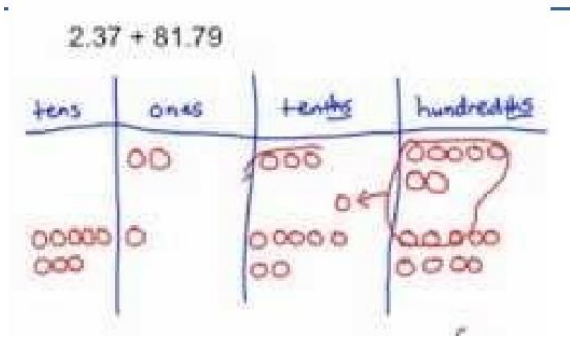
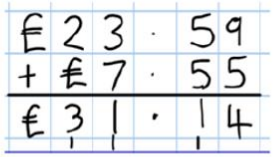
Part 2- conceptual variation of the four operations to support all children

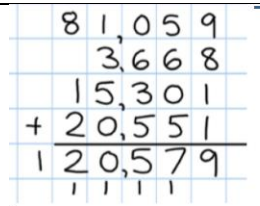
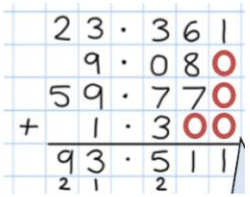
Note- Year 1 and Year 2 calculation policy can be found separately and should be used to support children when necessary.

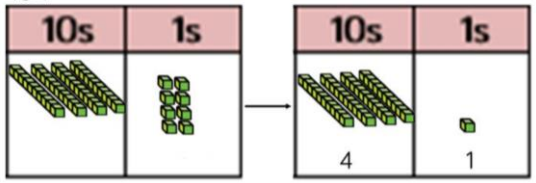
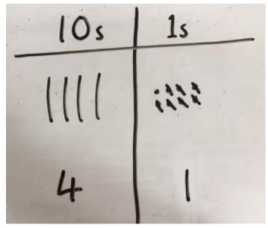
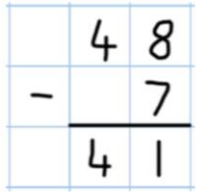
H Elderfield January 2024

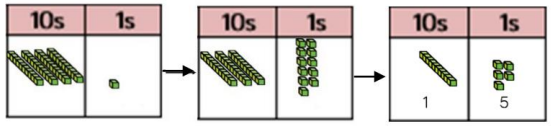
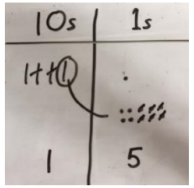
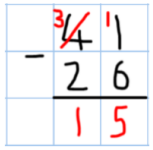
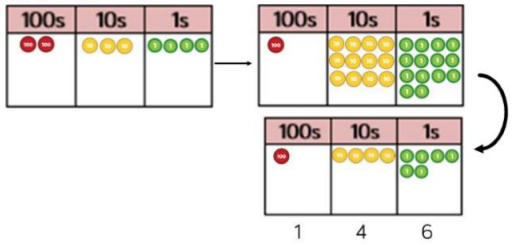
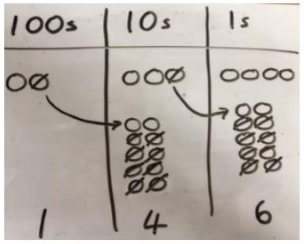
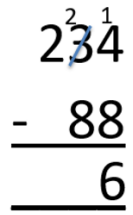
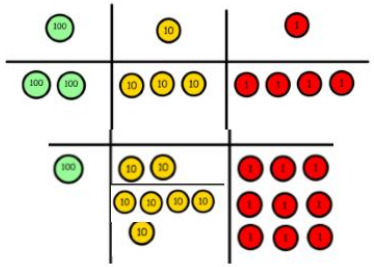
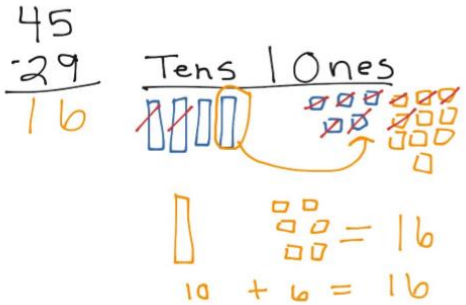
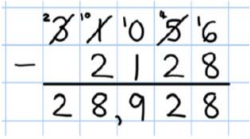
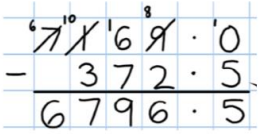
Part 1

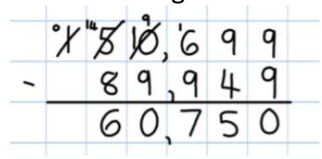
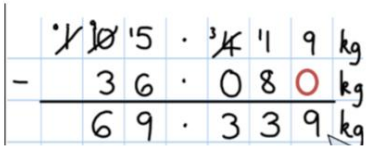
Addition Key language: sum, total, parts and wholes, plus, add, altogether, more, is equal to, is the same as.				
Year group	Objective and Strategy	Concrete	Pictorial	Abstract
Year 3	Addition column method- no regrouping (up to 3 digits).	**TO + O using base 10.** Continue to develop understanding of partitioning and place value. 41 + 8  Use dienes, counters etc to help children add up to 10.	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.  Simple bar modelling can be used to support and show each part adding together.	41 + 8  1 + 8 = 9 40 + 9 = 49  Part whole method and begin to introduce column method.
	Addition column method- regrouping (up to 3 digits).	 Exchange ten ones for a ten. Model using numicon and pv counters.  	 Children can draw a representation of the grid to further support their understanding, carrying the ten **underneath** the line	$20 + 5$ $40 + 8$ $60 + 13 = 73$ Start by partitioning the numbers before formal column to show the exchange. $\begin{array}{r} 536 \\ +\ 85 \\ \hline 621 \\ \hline 1\ 1 \end{array}$

Year 4	Addition column method- regrouping (up to 4 digits).	**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.  Place value counters or dienes can be used to show the place value of each column.	Chidren to represent the counters in a place value chart, circling when they make an exchange.  Ensure children start from the 1s to show how to carry correctly.	243 +368 611 1 1 Children are required to carry underneath the calculation
Year 5	Addition column method- regrouping (including decimals).	 Introduce decimal place value counters and model exchange for addition. Children can use any concrete manipulatives to add numbers together.	 Children use pictorial representation to show how much the total is when they add each place value together.	Children use column method to work out the answer but bar models can be used to support problem solving. 72.8 + 54.6 127.4 1 1 
Year 6	Addition column method- regrouping (with increasing difficulty including money, measurement, decimals etc).			Children use column method to work out the answer but bar models can be used to support problem solving.

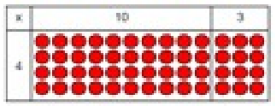
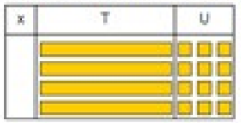
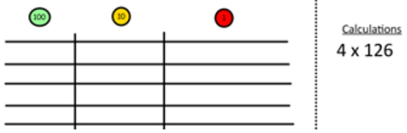
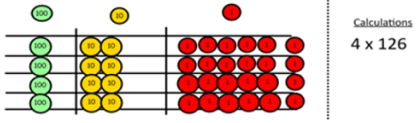
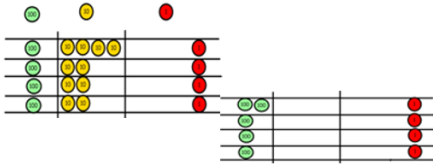
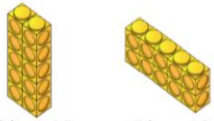
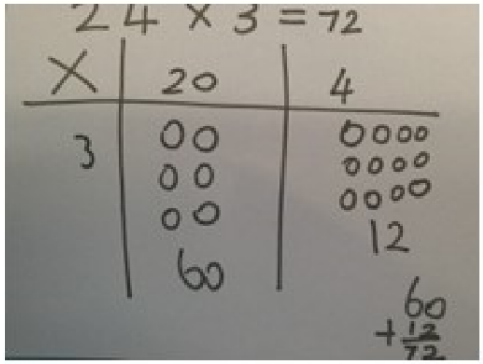
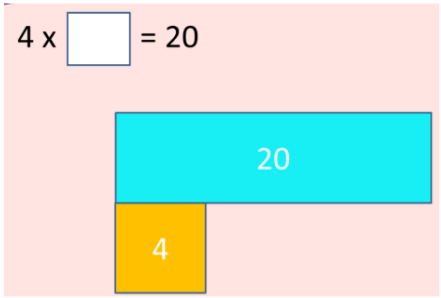
				 Insert zeros for place holders. 

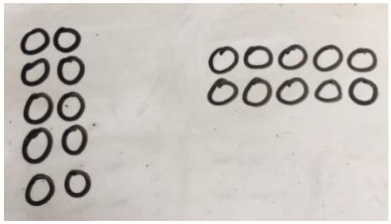
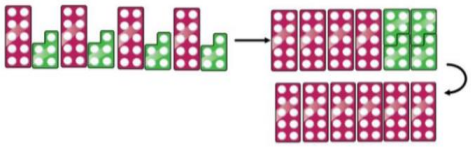
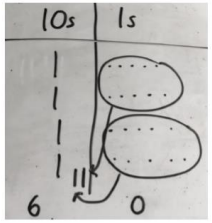
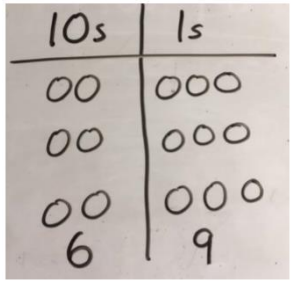
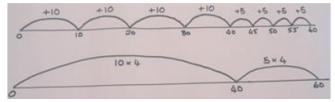
Subtraction Key language: take away, less than, the difference, subtract, minus, fewer, decrease				
Year group	Objective and Strategy	Concrete	Pictorial	Abstract
Year 3	Subtraction column method- without regrouping (up to 3 digits).	**Column method** using base 10. 48-7  Use concrete materials to subtract to show how we take them away.	Children to represent the base 10 pictorially.  Number lines can also be used to subtract.	Column method or children could count back 7. 

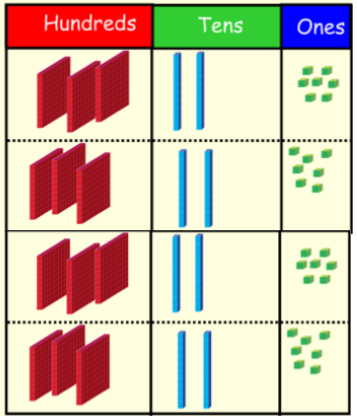
	Subtraction column method- with regrouping (up to 3 digits).	**Column method** using base 10 and having to exchange. 41 – 26  Show children that you need to change 1 ten into 10 ones to be able to subtract when you have none left.	Represent the base 10 pictorially, remembering to show the exchange.  Number lines can also be used to subtract.	Formal column method. Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11. 
Year 4	Subtraction column method- regrouping (up to 4 digits).	**Column method** using place value counters. 234 – 88  Remind children that they need to go to the next column when they cannot subtract anymore.	Represent the place value counters pictorially; remembering to show what has been exchanged.  Number lines can also be used to subtract.	Formal colum method. Children must understand what has happened when they have crossed out digits.  Make sure children exchange above in the biggest number.
Year 5	Subtraction column method- regrouping (including decimals).	234 - 179  Model process of exchange using Numicon, base ten and then move to PV counters.	 Children may draw base ten or PV counters and cross off.	Children use column method to work out the answer but bar models can be used to support problem solving.  Use zeros for place-holders. 

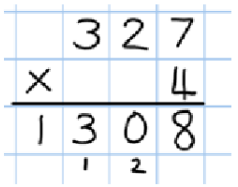
Year 6	Subtraction column method- regrouping (with increasing difficulty including money, measurement, decimals etc).			Children use column method to work out the answer but bar models can be used to support problem solving.  

Multiplication Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.				
Year group	Objective and Strategy	Concrete	Pictorial	Abstract

Year 3	Grid multiplication and arrays	Show the links with arrays to first introduce the grid method.  4 rows of 10 4 rows of 3 Move onto base ten to move towards a more compact method.  4 rows of 13 Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows  Calculations 4 x 126 Fill each row with 126  Calculations 4 x 126 Add up each column, starting with the ones making any exchanges needed  Then you have your answer. **Use arrays to illustrate commutativity** counters and other objects can also be used. $2 \times 5 = 5 \times 2$  2 lots of 5 5 lots of 2	Children can represent their work with place value counters in a way that they understand. They can draw the counters using colours to show different amounts or just use the circles in the different columns to show their thinking as shown below.  Bar model are used to explore missing numbers  	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. | ×	30	5
---	---	---
7	210	35 | **210 + 35 = 245** Moving forward, multiply by a 2 digit number showing the different rows within the grid method. |	10	8
---	---	---
10	100	80
3	30	24	 Children to be able to use an array to write a range of calculations e.g. $10 = 2 \times 5$ $5 \times 2 = 10$ $2 + 2 + 2 + 2 + 2 = 10$ $10 = 5 + 5$

			Children to represent the arrays pictorially. 	
Year 4	Column multiplication- 2 and 3 digits multiplied by 1 digit	**Partition to multiply** using Numicon, base 10 or Cuisenaire rods. 4 × 15  Explain to children we often refer to this as repeated addition as we are repeating the 15, 4 times and then adding the answers. **Formal column method** with place value counters (base 10 can also be used.) 3 × 23 	Children to represent the concrete manipulatives pictorially.  Showing each multiple by repeated addition- when a place value goes more than ten it must be moved into the next column along. Children to represent the counters pictorially. 	Children to be encouraged to show the steps they have taken. 4 × 15 10 5 10 × 4 = 40 5 × 4 = 20 40 + 20 = 60 A number line can also be used  Make sure children can explain what they are doing by showing the process expanded out. Children to record what it is they are doing to show understanding. 3 × 23 20 3 3 × 20 = 60 3 × 3 = 9 60 + 9 = 69 23 × 3 69

<table>
<tr>
<td>Year 5</td>
<td>Column multiplication- up to 4 digits multiplied by 1 digit</td>
<td>


It is important at this stage that they always multiply the ones first.
Children can continue to be supported by place value counters at the stage of multiplication. This initially done where there is no regrouping. 321 x 2 = 642
</td>
<td>
<table>
<tr><td>x</td><td>300</td><td>20</td><td>7</td></tr>
<tr><td>4</td><td>1200</td><td>80</td><td>28</td></tr>
</table>
Grid multiplication that leads to expanded short multiplication
</td>
<td>
327
x 4
28
80
1200
1308

This will lead to a compact method.
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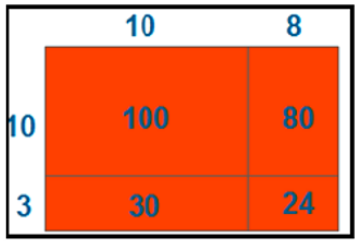
</tr>
<tr>
<td>Year 6</td>
<td>Column multiplication- multi-digit up to 4 digits by a 2 digit number</td>
<td></td>
<td>


Continue to use bar modelling to support problem solving
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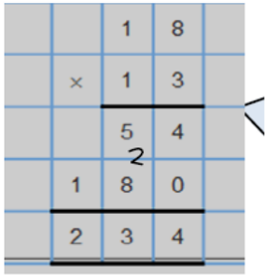
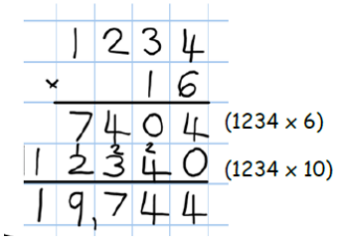
<td>

18 x 3 on the first row
(8 x 3 =24, carrying the 2 for 20, then 1 x 3)
18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in units first


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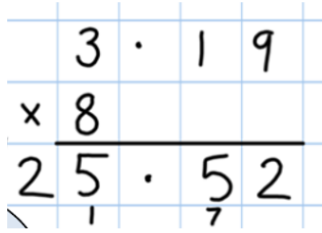
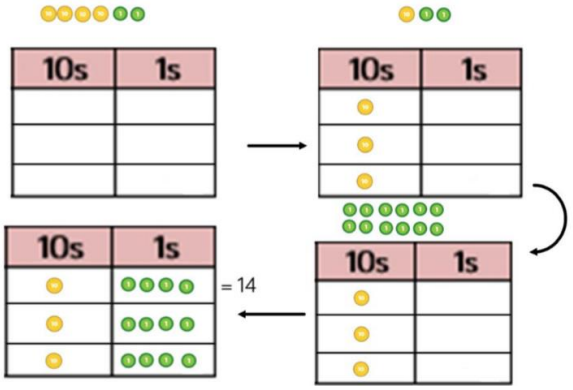
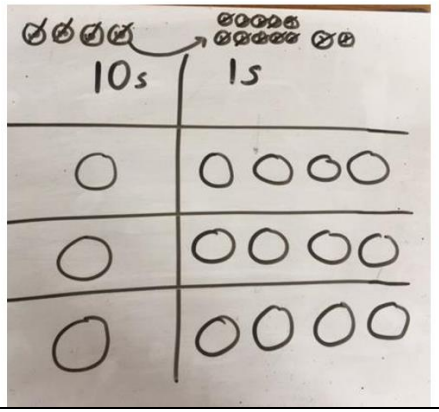
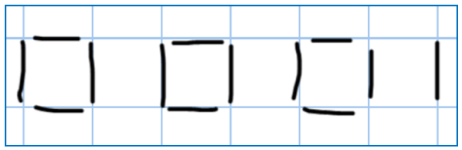
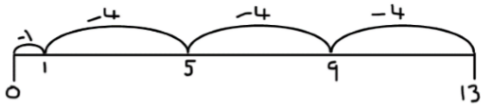
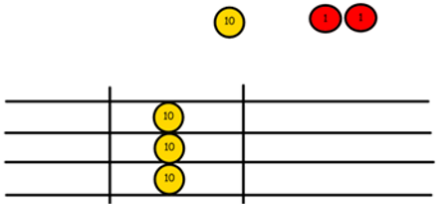
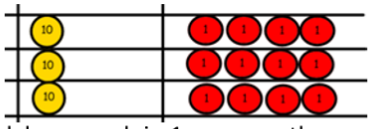
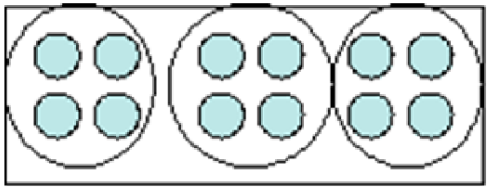
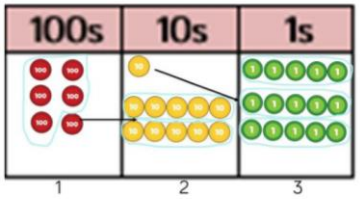
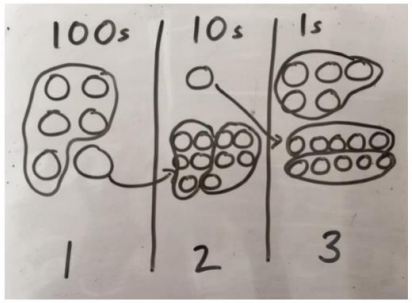
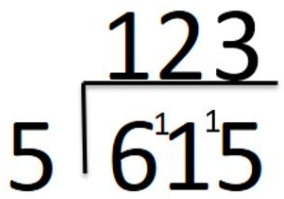
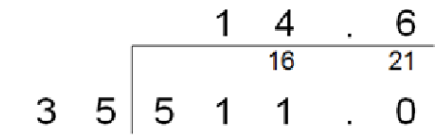
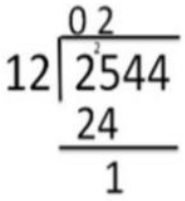
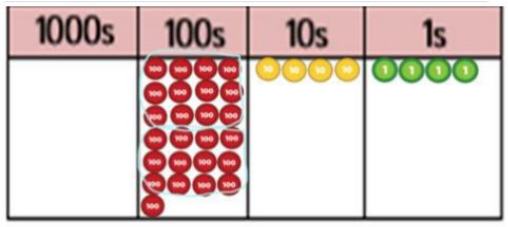
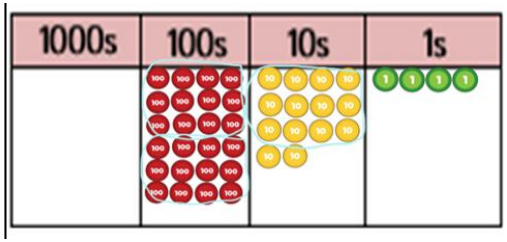
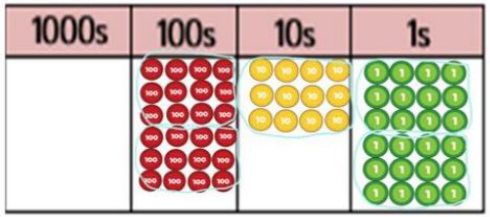
</tr>
</table>

				Remind children that the single digit belongs in the units column. Line up the decimal points in the question and the answer. 

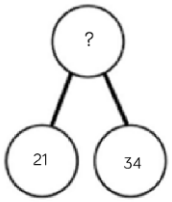
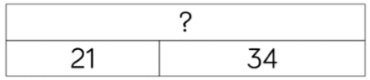
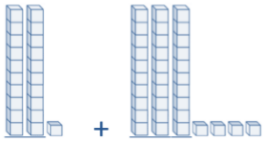
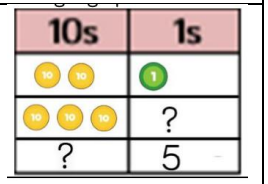
Division Key language: share, divided by, divide, half				
Year group	Objective and Strategy	Concrete	Pictorial	Abstract
Year 3	Division with arrays and groupings	Sharing using place value counters. 42 ÷ 3 = 14 	Children to represent the place value counters pictorially. 	Children to be able to make sense of the place value counters and write calculations to show the process. 42 ÷ 3 42 = 30 + 12 30 ÷ 3 = 10 12 ÷ 3 = 4 10 + 4 = 14

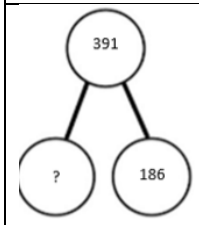
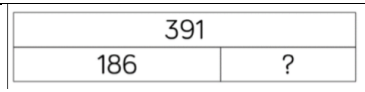
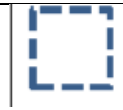
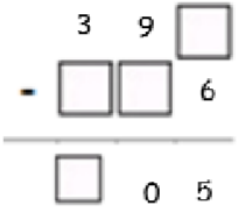
	Division with remainders	**2d ÷ 1d with remainders** using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 ÷ 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4.  There are 3 whole squares, with 1 left over. Children need to use concrete manipulatives to count out the objects and find what the remainder will be.	Children to represent the lollipop sticks pictorially.  There are 3 whole squares, with 1 left over. Children can also draw them in arrays and groupings (see year 4 below).	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' 
Year 4	Short division – up to 3 digits by 1 digit	42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.  We exchange this ten for ten ones and then share the ones equally among the groups.  We look how much in 1 group so the answer is 14.	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.  Encourage them to move towards counting in multiples to divide more efficiently.	

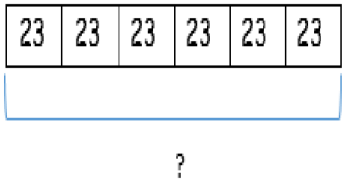
Year 5	Short division- up to 4 digits by a 1 digit including remainders	**Short division** using place value counters to group. 615 ÷ 5  1. Make 615 with place value counters. 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens. 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones. 6. How many groups of 5 ones can you make with 15 ones?	Represent the place value counters pictorially.  When converting the tens must go into ones. Then they can be grouped into the dividend.	Children must be able to use the correct vocabulary to describe the numbers in the calculation Divisor Dividend Quotient Children to the calculation using the short division scaffold. 
Year 6	Short division – exchanging into tenths and hundredths			Finally move into decimal places to divide the total accurately.  The place holders must be filled with zeros and children go up to three decimal places.
	Long division- up to 4 digits by a 2 digit number		 We can't group 2 thousands into groups of 12 so we will exchange	

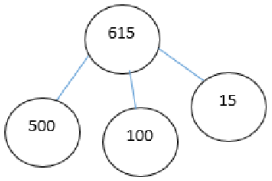
			them.  We can group 24 hundreds into groups of 12 which leaves with 1 hundred.  After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.  After exchanging the 2 tens, we have 24 ones. We can groups 24 ones into 2 groups of 12 which leaves no remainders.	021 12 2544 24 14 12 2 0212 12 2544 24 14 12 24 24 0 Ensure children use the steps of how many times, subtract and then drop down the next digit. Children are required to write the remainder as a remainder unless they ask to convert to decimal equivalent.

Part 2

Conceptual variation of addition- different ways to ask children 21 + 34						
Part whole method	Bar model	Prove it	Reordering the question	Dienes	Worded problems	Place value counters
		21 + 34 = 55. Prove it	 = 21 + 34		Word problems: In year 3, there are 21 children and in year 4, there are 34 children. How many children in total?	

Conceptual variation of subtraction- different ways to ask children 391 – 186				
Part whole method	Bar model	Worded problem	Reordering the question	Missing gap calculation
		Raj spent £391, Timmy spent £186. How much more did Raj spend?	 = 391 – 186	

Conceptual variation of multiplication - different ways to ask children 6 x 23			
Bar model	Commutativity	Inverse	Worded problem
	6 × 23 =  = 6 × 23 6 × 23 23 × 6	What is the calculation? What is the product? 	Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?

Conceptual variation- different ways to ask children 615 divided by 5			
Part whole model	**Worded problem**	**Reordering the question**	**Inverse**
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?	$615 \div 5 =$ $\square = 615 \div 5$	What is the calculation? What is the answer?