FAIRCHILDES PRIMARY SCHOOL

Maths at Fairchildes Primary School

Our Ethos

Mathematics is an essential part of a balanced curriculum that is both challenging and reasonable. All learners should become fluent in the fundamentals of mathematics and should be able to reason mathematically and solve problems by the application of their mathematical understanding. Our intention for our maths curriculum is to unlock mathematical fluency so that all children are able to reason and solve problems and take this learning into the real world.

Teaching & Learning

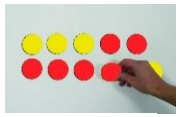
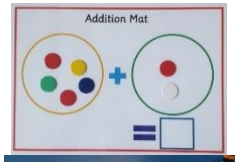
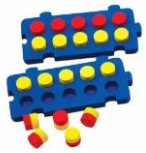
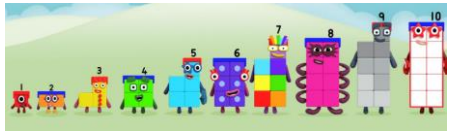
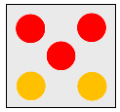
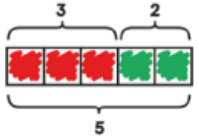
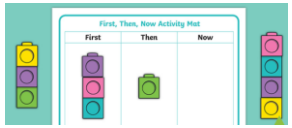
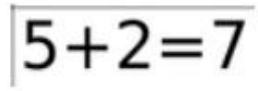
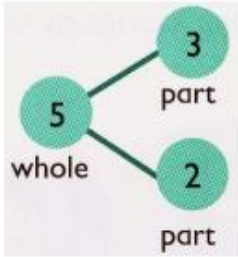
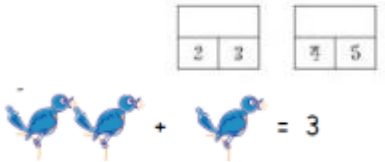
At Fairchildes, teachers draw on a range of resources we have available to create the best possible learning environment for our pupils, moving the children from the stages of concrete to pictorial and lastly to abstract (see below). Reasoning is a part of every lesson, and the use of mathematical talk and talk tasks, enables the children to verbalise and discuss their understanding. We pay particular attention to number and place value as we know that this is the basis of all mathematics teaching. We have designed a lesson structure that allows a more to and fro approach (ping-pong) so children are actively learning. We use stem sentences to help structure our thinking and remember key facts and also talk tasks as discussing maths is the most effective way to succeed.

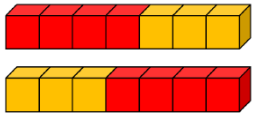
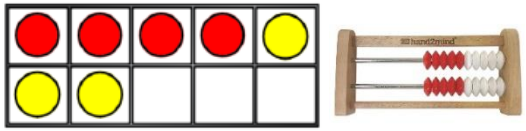
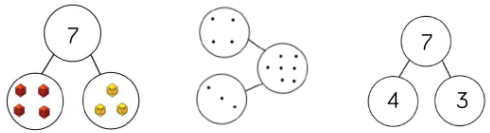
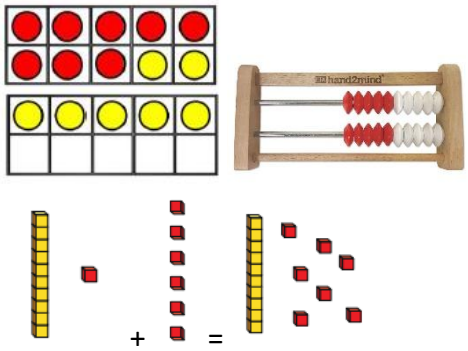
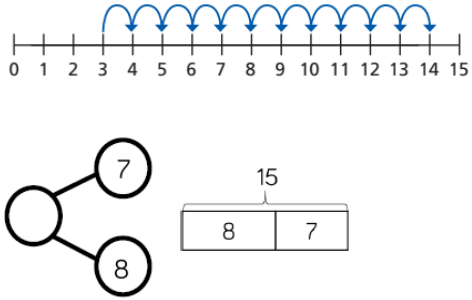
Concrete, Pictorial and Abstract

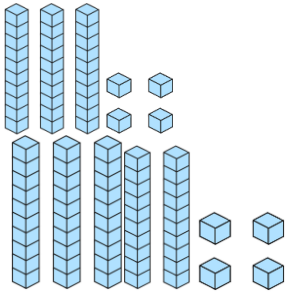
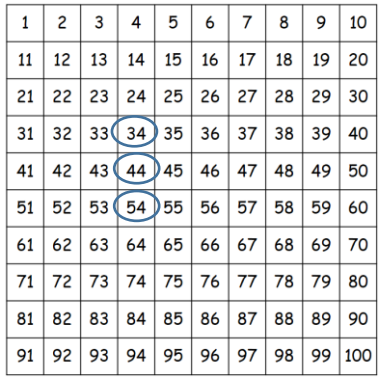
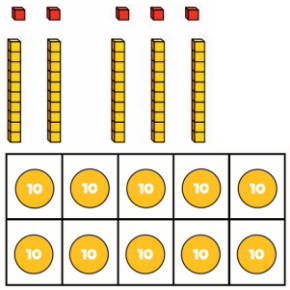
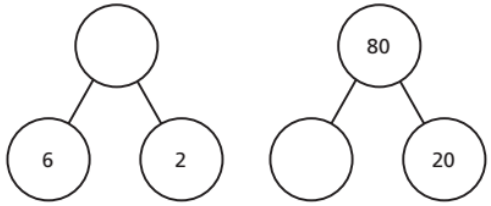
Concrete Pictorial Abstract (CPA) is a three step instructional approach that has been found to be highly effective in teaching math concepts. The first step is called the concrete stage. It is known as the “doing” stage and involves physically manipulating objects to solve a math problem. The pictorial (semi-concrete) stage is the next step. It is known as the “seeing” stage and involves using images to represent objects to solve a math problem. The final step in this approach is called the abstract stage. It is known as the “symbolic” stage and involves using only numbers and symbols to solve a math problem. CPA is a gradual systematic approach. Each stage builds on to the previous stage and therefore must be taught in sequence.

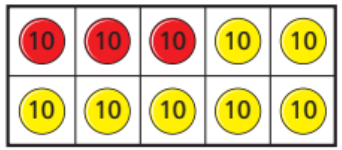
Internal Assessment

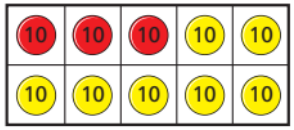
Assessment of National Curriculum objectives is carried out by the class teacher. Assessments are carried out at the end of each topic to ensure children have understood the key concepts. Additionally, evidence in books and from daily lessons, help to inform teacher’s decisions and to pinpoint gaps in children’s learning that then needs consolidation or further support.

EYFS			
Objective and Strategy	Concrete	Pictorial	Abstract
Have a deep understanding of number to 10, including the composition of each number Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally	 Use toys and general classroom resources for children to physically manipulate, group/regroup. Use specific maths resources such as counters, multilink and tens frames    Use visual supports such as ten frames, part part whole and addition mats, with the physical objects and resources that can be manipulated.   	Number blocks in varied orientation  Highlights odd/even structure of each number:  Hungarian dice patterns for subitising and doubling:   For showing composition of number:  Introduction to bar modelling  First, then, now 	Use of stem sentences: 4 is made of 2 and 2, double 2 is 4 5 and 2 more makes 7 altogether My […] is a part of me and the whole of me is [name]. Use of rhymes: “One, two, three, four, five, [‘Grow’ the fingers on your right hand as you say the numbers.] Once I caught a fish alive. Six, seven, eight, nine, ten, [Slowly say these numbers as you grow the fingers on your left hand, exposing the ‘5 and a bit’ structure of each number.]   

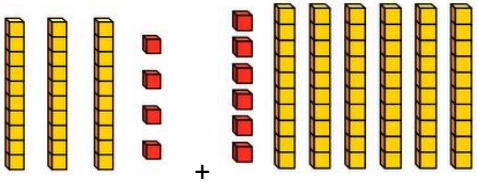
Addition			
Year 1			
Combining two parts to make a whole: part- whole model	 $7 = 4 + 3$ $7 = 3 + 4$  Use of place value counters, double sided counters, dienes, tens frames and rekenreks.	 $7 = 4 + 3$ $7 = 3 + 4$ $7 - 3 = 4$ $7 - 4 = 3$	**4 + 3 = 7** **10= 6 + 4** $2 = 1 + 1$ $2 + 3 = 4 + 1$ $3 + 4 = \square$ $\square = 3 + 4$ $3 + \square = 7$ $7 = \square + 4$
Represent and use number bonds within 20 Addition of one-digit and two-digit numbers to 20 including 0.		 Also, pictorial representations of the concrete.	$8 + 3 = 10 + \square$ $9 + 7 = 10 + \square$ $12 + 7 = \square$ b) $13 + 4 = \square$ $17 + 2 = \square$ $14 + 3 = \square$

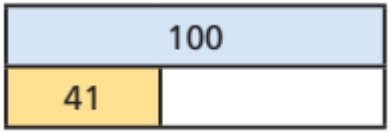
Addition - Year 2			
Adding multiples of 10	34 + 20 = 54 Tens: 10 10 10 10 10 Ones: 1 1 1 1 34 + 20 = 54 	 34 + 10 = 54 Tens: ○○ ○○ ○ Ones: ○○ ○○	34 + 20 = 54 54 = 34 + 20
Use known number facts including different combinations of tens & ones of any 2 digits (part, part, whole)	2 + 3 = 5 20 + 30 = 50 4 + 6 = 10 40 + 60 = 100 	 	a) 1 + 2 = 3 10 + 20 = ☐ d) 1 + 8 = ☐ ☐ + 10 = 90

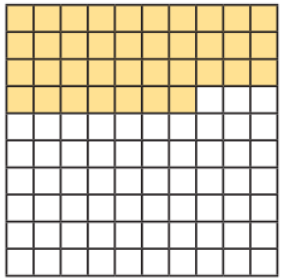
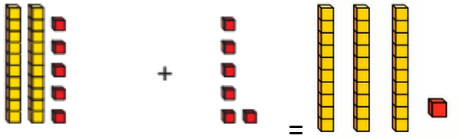
<table>
<tr>
<td rowspan="2">Number bonds to 100</td>
<td>(tens)
 

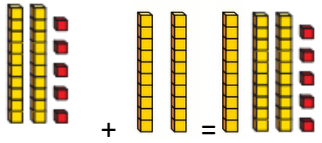
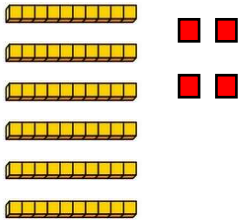
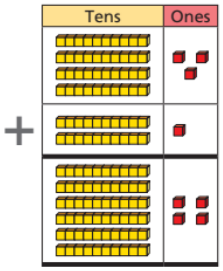
30 + 70 = 100</td>
<td> 
</td>
<td>30 + 70 = 100
? + 60 = 100
100 = 40 + 60

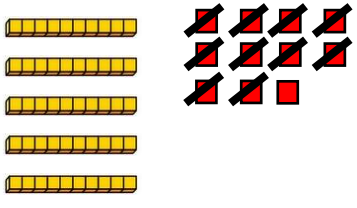
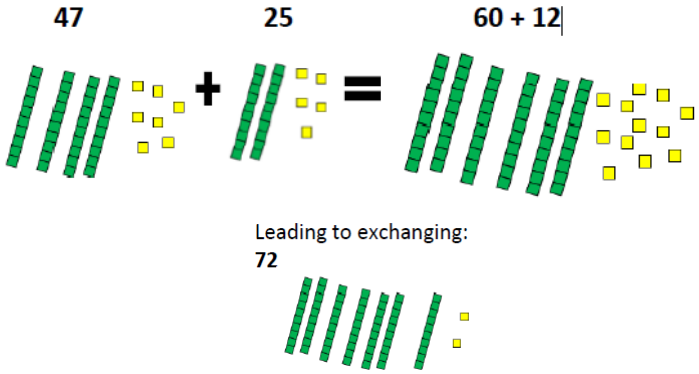
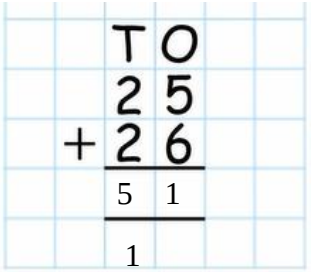
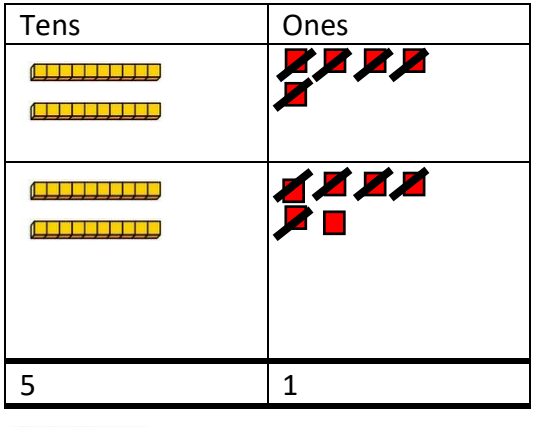
70 + 20 = ☐

90 = _0 + 7_</td>
</tr>
<tr>
<td>(tens and ones)
 

First exchanging 10 ones for 1 ten
Then exchanging 10 tens for 1 hundred</td>
<td> 

 
(shaded hundred square)</td>
<td>40 + ☐ = 100
☐ + 70 = 100
100 = ☐ + 72
100 = 28 + ☐</td>
</tr>
<tr>
<td>Add a two-digit number and ones</td>
<td>  </td>
<td>  </td>
<td>25 + 6 = 31</td>
</tr>
</table>

<table>
<tr>
<td>Add 2-digit numbers and tens</td>
<td>  </td>
<td>Pictorial representations of the concrete.</td>
<td>44 + 10 = 54</td>
</tr>
<tr>
<td rowspan="2">Add two 2-digit numbers</td>
<td>Without an exchange
43 + 21
  </td>
<td>  </td>
<td rowspan="2">Column method should only be used alongside concrete and pictorial representations. There should be no isolated column addition sums.</td>
</tr>
<tr>
<td>With an exchange

25 + 26 = 51
 
47+25
 
Leading to exchanging:
72
</td>
<td> 
 
  </td>
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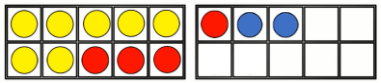
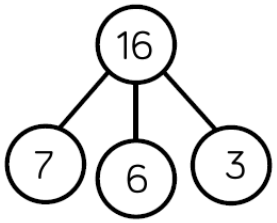
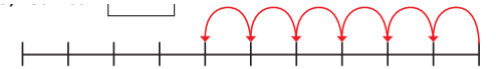
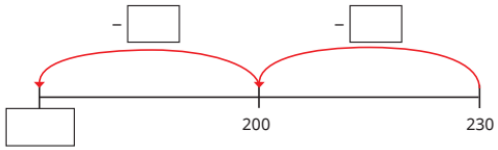
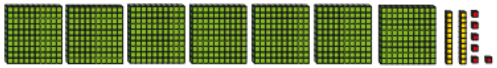
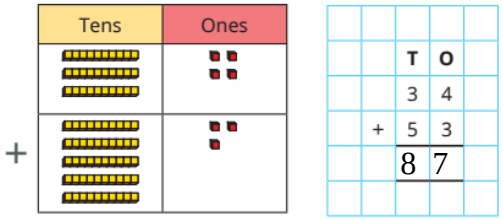
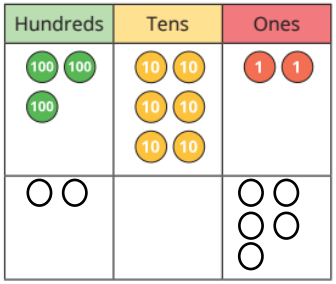
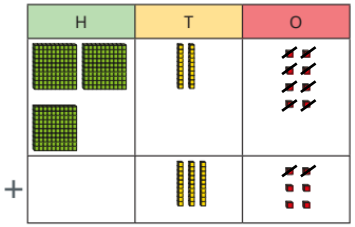
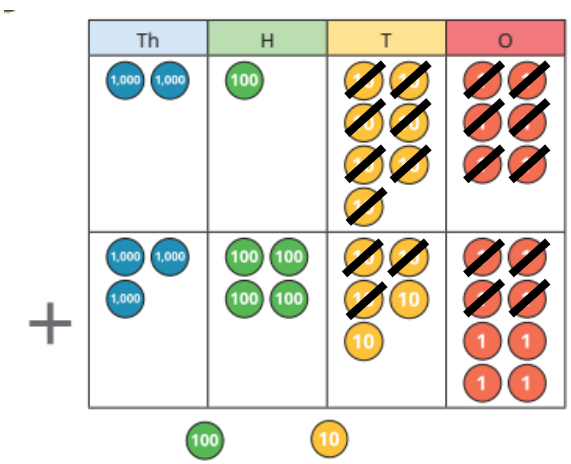
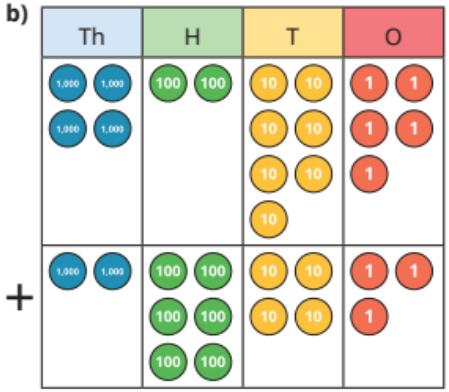
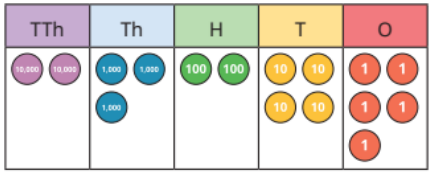
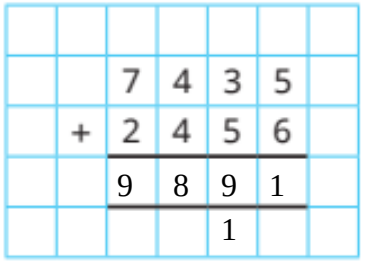
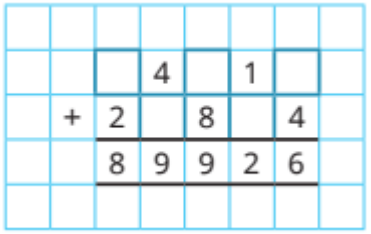
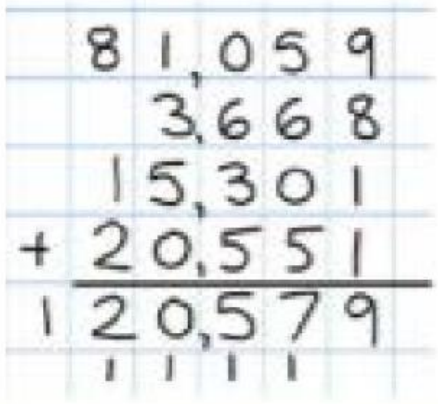
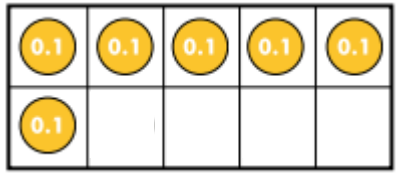
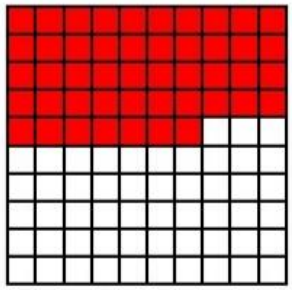
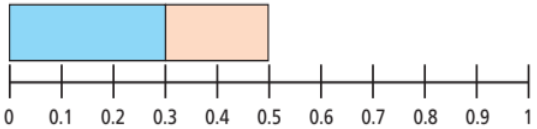
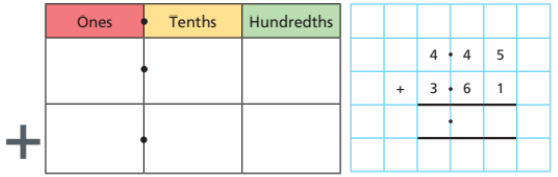
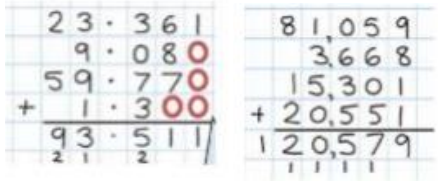
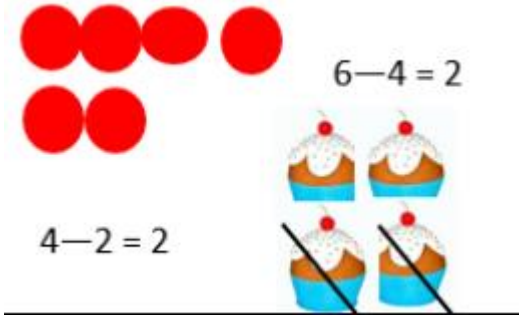
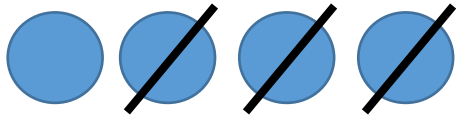
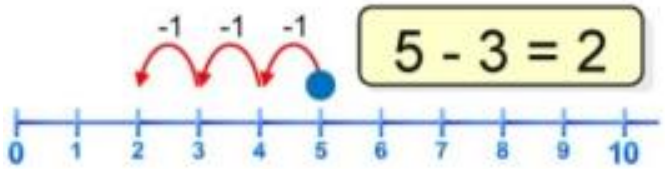
Add three 1-digit numbers	7 + 4 + 2 =13 		$7 + 6 + 3 = 16$ a) 5 + 9 + 1 = 7 + 5 + 3 b) 6 + 8 + 3 > 2 + 9 + 4 c) 1 + 7 + 5 > 3 + 4 + 5
Addition - Year 3			
add numbers mentally, including: ▯ a three-digit number and ones ▯ a three-digit number and tens ▯ a three-digit number and hundreds	N/A	    Cross out the hundreds to help you complete the number sentences. a) 726 − 100 = ☐ b) 726 − 200 = ☐ c) 726 − 400 = ☐ d) 726 − 700 = ☐	716 − 50 = ☐ ☐ = 528 − 90 ☐ − 900 = 24 ☐ + 400 = 849

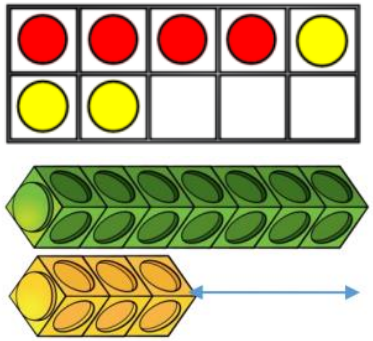
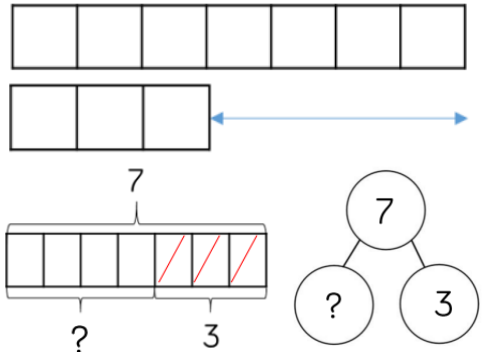
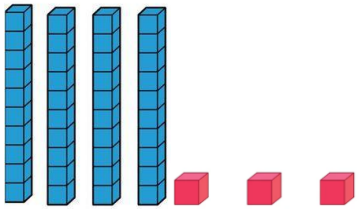
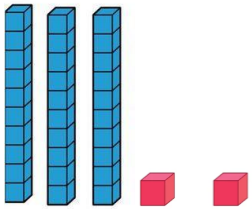
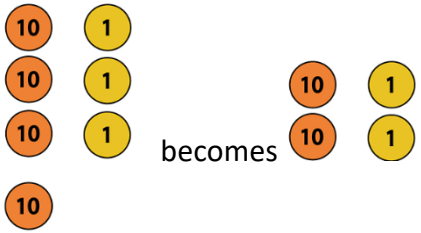
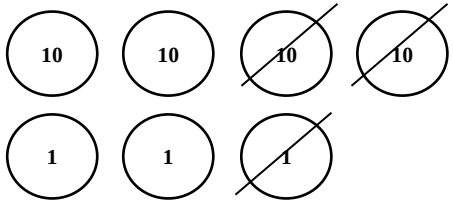
Column addition - no exchange	 T O 3 4 + 5 3 8 7	 H T O 3 6 2 + 2 0 5 5 6 7	H T O 4 0 5 + 3 6 1 7 6 6
Column addition - with one or more exchange	 3 2 8 + 3 6 3 6 4 1	754 + 66  7 5 4 + 6 6 8 2 0 1 1	5 7 2 + 4 5 6 1 7 1

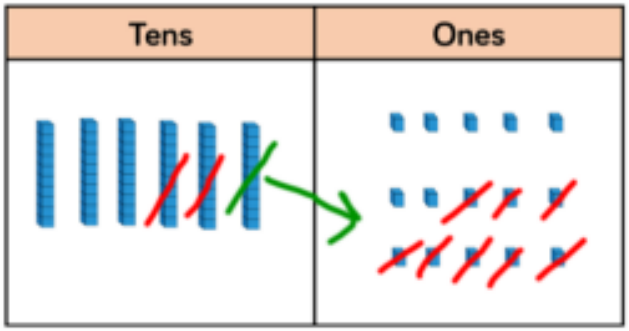
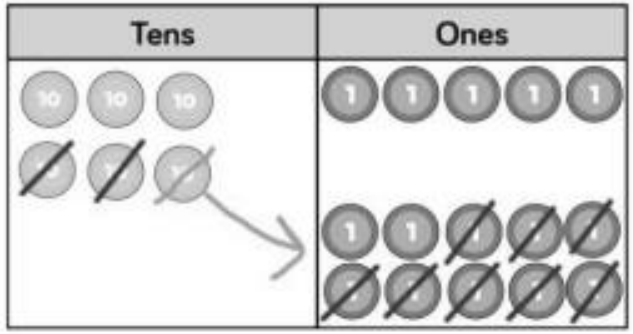
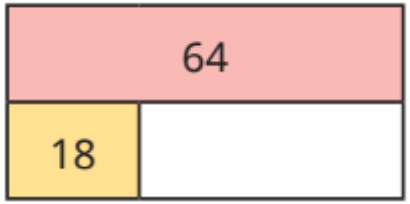
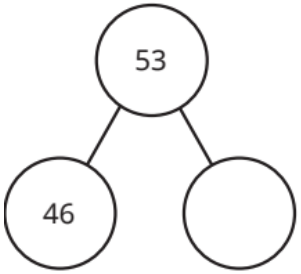
Addition - Year 4			
add numbers with up to four digits using the formal method of column addition one exchange → more than one exchange	Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.	 		Th	H	T	O	
---	---	---	---	---	---
	2	1	7	6	
+	3	4	5	8	
	5	6	3	4	
		1	1					Th	H	T	O	
---	---	---	---	---	---
	2	1	7	6	
+	3	4	5	8	
	5	6	3	4	
		1	1					Th	H	T	O	
---	---	---	---	---	---
	3	7		9	
+			8		
	6	9	2	5	

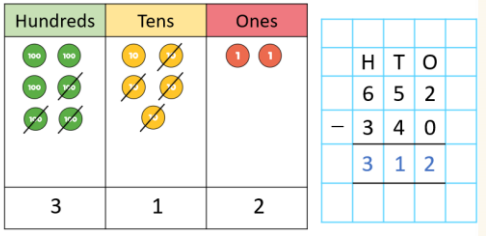
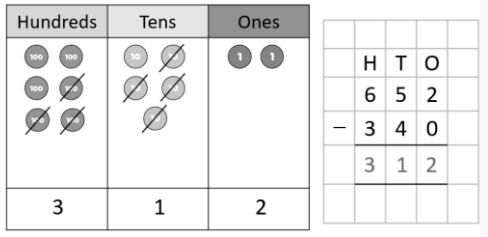
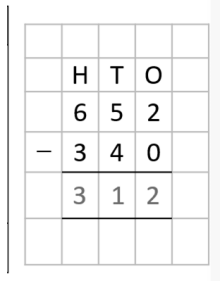
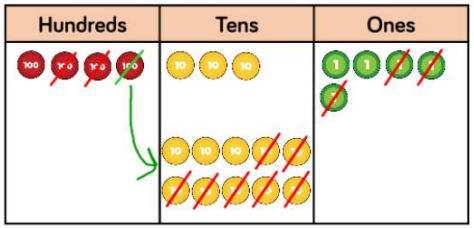
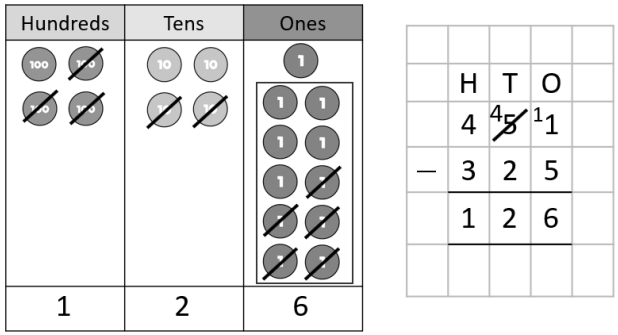
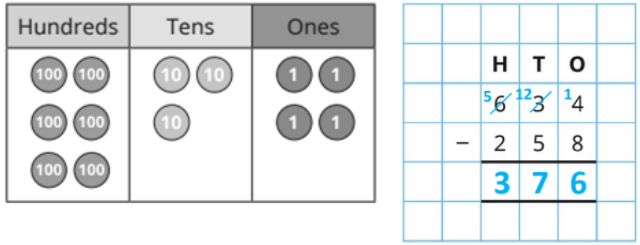
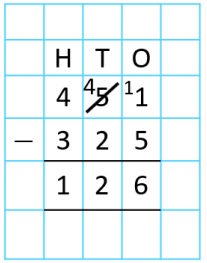
Addition - Year 5			
Add numbers with more than 4 digits	Children continue to use dienes or place value counters to add, exchanging ten ones for a ten and ten tens for a hundred and ten hundreds for a thousand.	Children will continue with the method of crossing off ten counters and exchanging them for one of the next place value heading and putting the exchanged counter underneath.  Complete the additions. Use the place value chart to help you.  a) 23,245 + 14,323 = ☐ b) 23,245 + 14,328 = ☐	 £36,000 + £19,420 40,720 g + 6,872 g £17,320 + £6,009 + £34,871  

Decimal complements to one	 1.0 = 0.6 + ___  1.0 = 0.47 + ___		0.4 + __ = 1.0 1 = 0.3 + __ 1.0 = 0.1 + 0.3 + __ = 0.56 + ___ 0.98 + __ = 1
Add decimals with 2 decimal places - including money			Children should continue to be supported by pictorial representations if needed. 
Addition - Year 6			
Column addition with more than 4 digits including adding several numbers of increasing complexity and including money, measure and with different numbers of decimal points			Children should have abstract supported by concrete or pictorial if needed 

Subtraction			
Subtraction - Year 1			
Subtract one-digit and two-digit numbers to 20 including 0.	Use physical objects to show how objects can be taken away  	Cross out drawn objects  4 – 3 = 1	7—4 = 3 16—9 = 7
Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. **13 – 4**   20 – 4 = 16	 Count back on a number line or track Start at the bigger number and count back the smaller number showing the jumps on the number line.	Put 13 in your head, count back 4. What number are you at? (Use your fingers to help you)

Finding the difference			$7 - 3 = 4$
Subtraction -Year 2			
Subtraction without exchanging	Use dienes and place value counters and remove from the groups.  becomes  	Children draw representations of dienes and cross off. 43 – 21 = 22  Children draw representations of place value counters and cross off 	43 – 21 = 22

Subtraction with an exchange	65-28 = 37  Can also be done with place value counters	65 – 28 = 37    	65 – 28 = 27

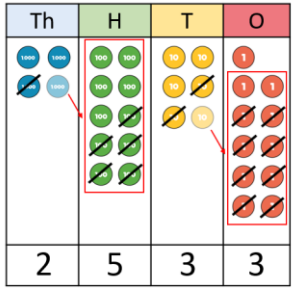
Subtraction -Year 3			
Column subtraction without exchanges	652 – 340 = 312 	652 – 340 = 312 	
Column subtraction with exchanges	Start with an exchange across a 10 and then move to an exchange across a 100. Then, to two exchanges 435 – 273 = 262 	451 – 325 =  634 – 258 = 376 	

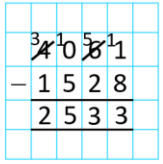
Subtraction - Year 4

Subtract numbers with up to 4 digits

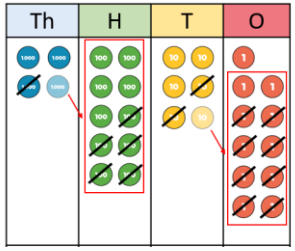
Taught in the following order: no exchange → one exchange → more than one exchange

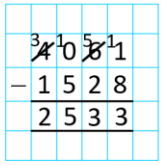
$$4{,}061 - 1{,}528 = 2{,}533$$

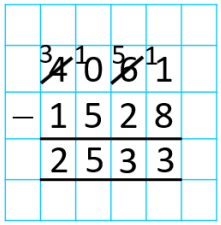




$$4{,}061 - 1{,}528 = 2{,}533$$

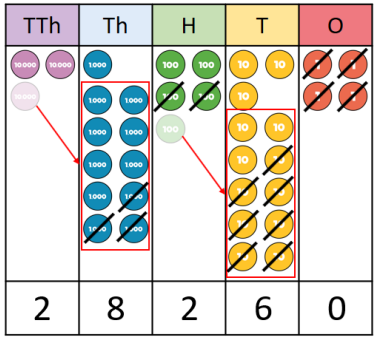


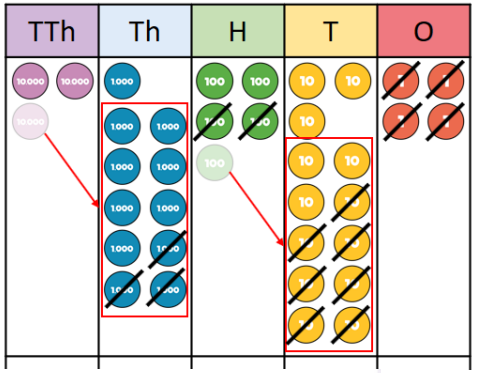


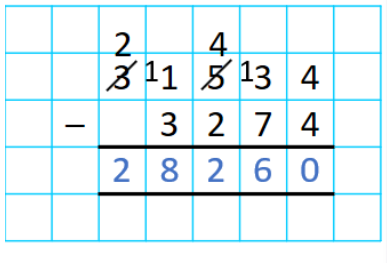


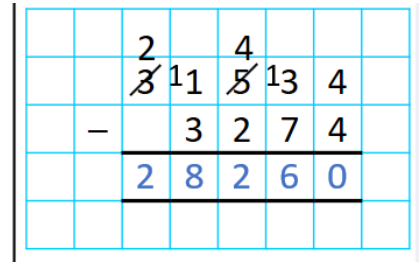
Subtraction - Years 5 and 6

Subtract with at least 4 digits



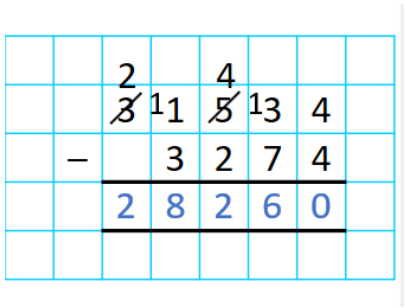
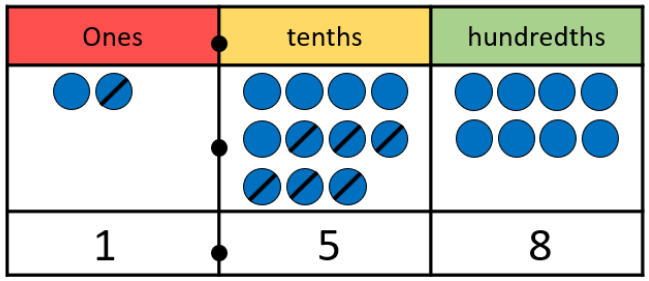
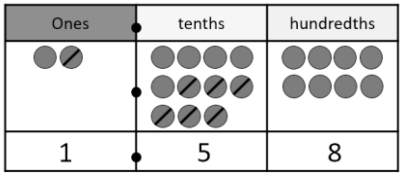
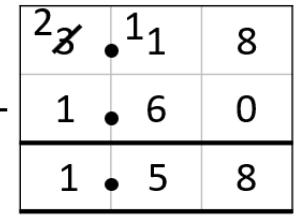


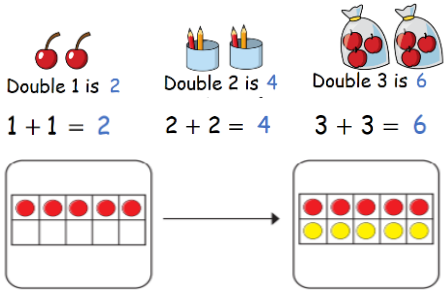
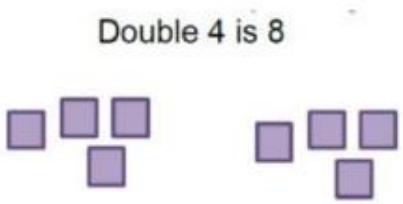
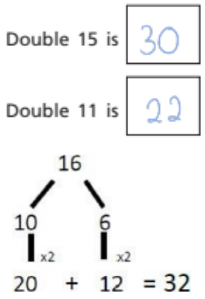
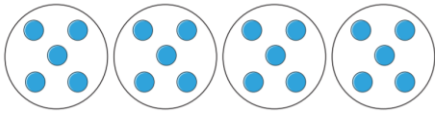
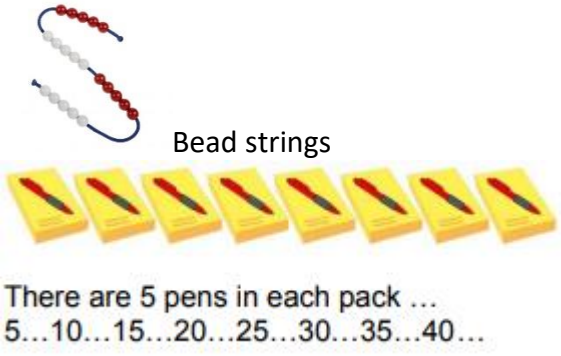
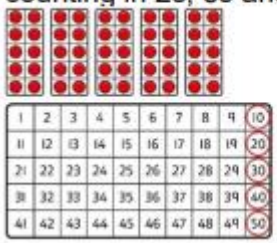
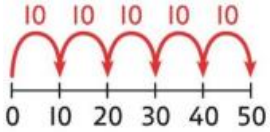


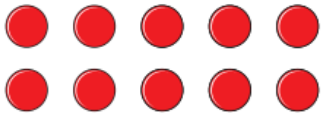
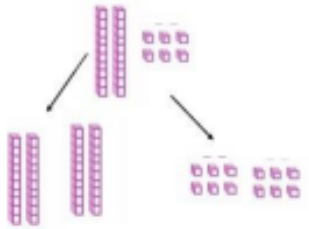
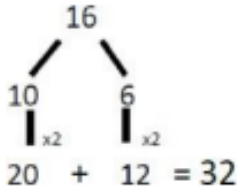
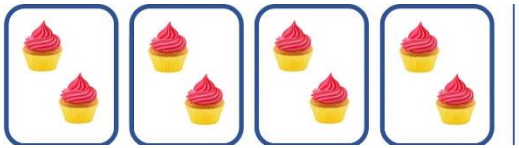
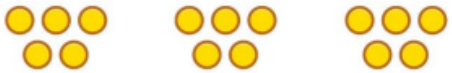


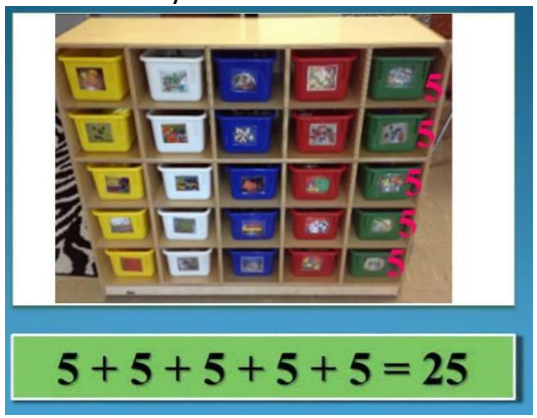
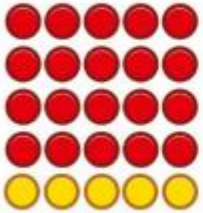
Write < > = to compare the calculation

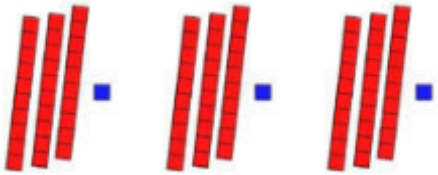
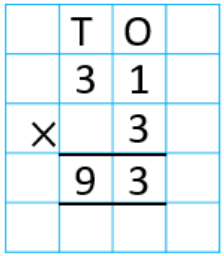
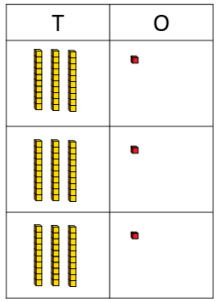
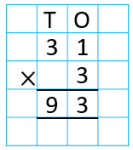
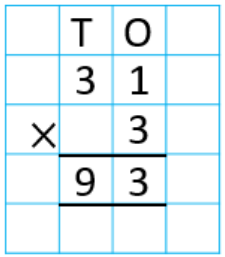
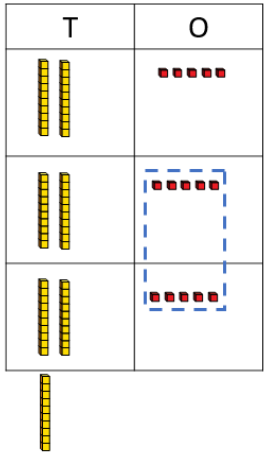
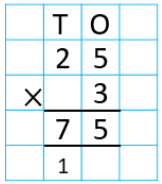
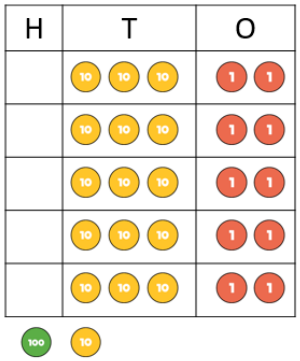
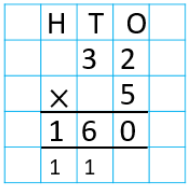
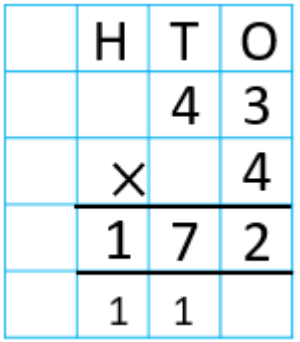
32,317 + 8,900 ? 39,400 + 3,4853

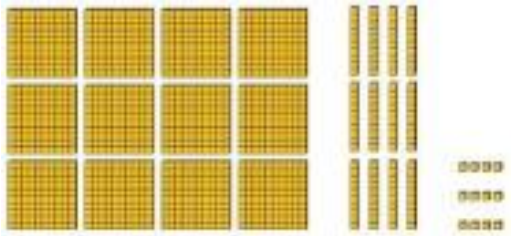
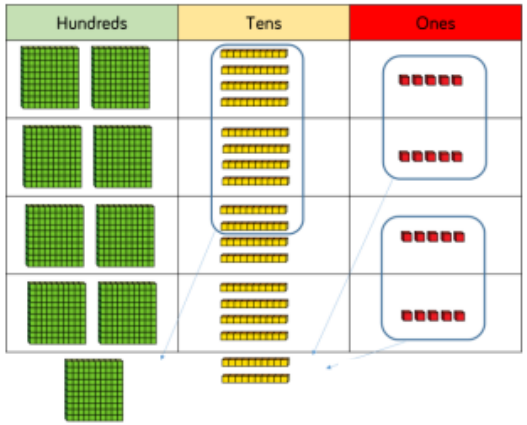
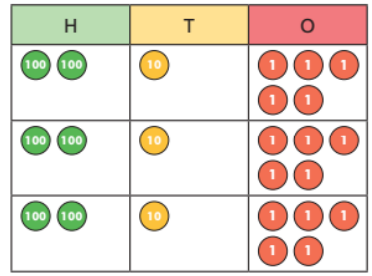
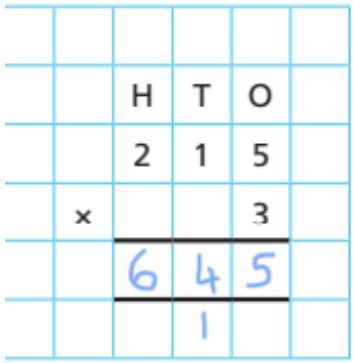
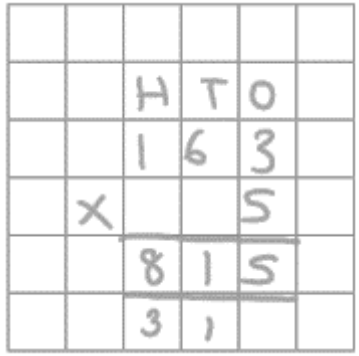
			
Subtract with decimal values, including mixtures of integers and decimals aligning the decimal (including mixture of measures)	3.18 – 1.6 = 	3.18 – 1.6 = 	Children should be made aware to fill in any spaces with place holders.  Y6 - Subtract with increasingly large, more complex, numbers and decimal values

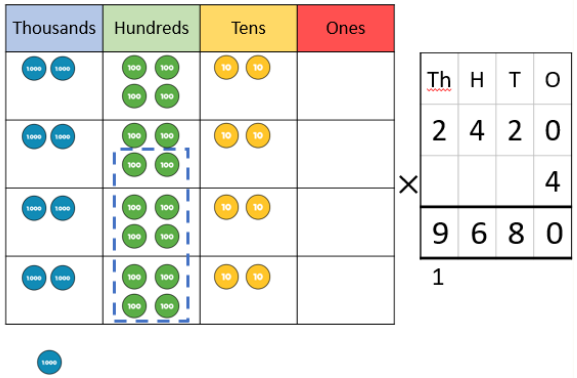
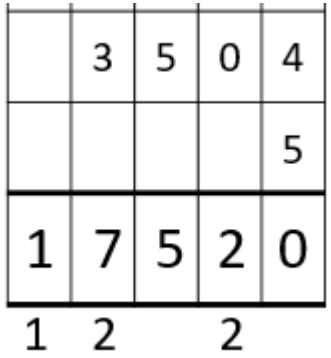
Multiplication			
Multiplication - Year 1			
Doubling numbers	Use of lots of real life objects  Doubles up to 10 use of tens frames	Draw pictures to show how to double numbers. 	Double 3 = 3+3 = 6 
Making equal groups	Children arrange objects in equal and unequal groups and understand how to recognise whether they are equal. 	 Children draw and represent equal and unequal groups.	Describe equal groups using words Three equal groups of 4. Four equal groups of 3.
Counting in multiples of 2,5 and 10 Seeing multiplication as repeated addition	Skip counting 	100 squares and ten frames support counting in 2s, 5s and 10s.  Use of arrays	Use a number line to support repeated addition through counting in 2s, 5s and 10s. 

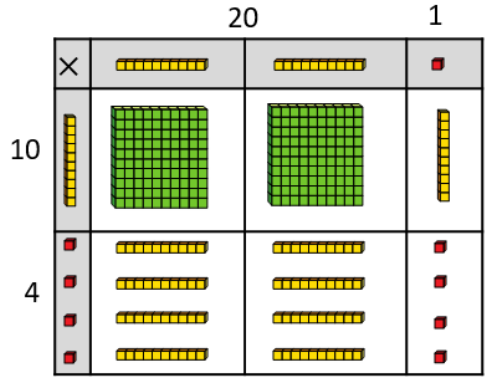
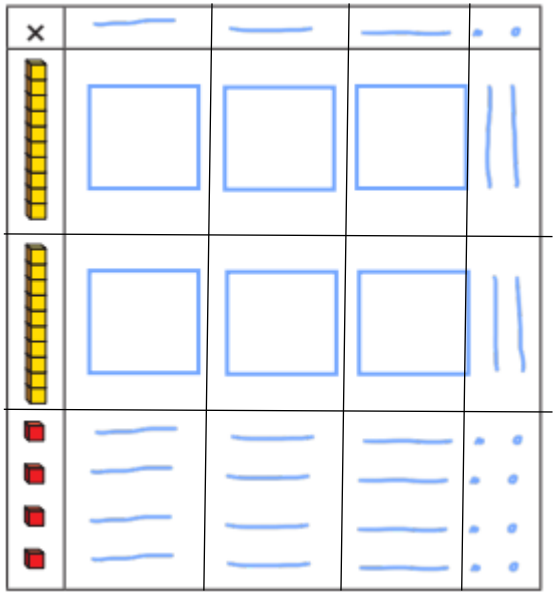
		 2 + 2 + 2 + 2 + 2 = 10 5 x 2 = 10 (5 lots of 2, 5 groups of 2)	
Multiplication - Year 2			
Doubling numbers	Model doubling using dienes and place value counters. Doubling 26 	Draw pictures and representations to demonstrate how to double numbers	Partition a number and then double each part before recombining it back together. 
Equal groups and repeated addition	Recognise equal groups and write as repeated addition and as multiplication.  2 + 2 + 2 + 2 = 8 4 x 2 = 8 (4 lots of 2)	Recognise equal groups using standard objects such as counters and write as repeated addition and multiplication.  *3 groups of 5* *15 in total*	5 + 5 + 5 = 15 3 × 5 = 15

Using arrays to represent multiplication and support understanding	Real life arrays  Create arrays using concrete apparatus	Understand the relationship between arrays, multiplication and repeated addition.  *4 groups of 5 … 5 groups of 5*	Understand the relationship between arrays, multiplication and repeated addition. 5 x 5 = 25
Recognising odd and even numbers	Use arrays to visualise commutativity.  I can see 5 groups of 3. I can see 3 groups of 5.	 *This is 2 groups of 6 and also 6 groups of 2.*	 Use arrays to visualise commutativity. 5 + 5 = 10 2 x 5 = 10 2 + 2 + 2 + 2 + 2 = 10 5 x 2 = 10

Multiplication - Year 3			
Two-digit numbers times one-digit numbers using mental and progressing to more formal written methods	No exchange   	31 x 3   	
	With an exchange 25 × 3   	Calculate 5 × 32   	

Multiplication - Year 4			
Multiplying by 10 and 100 including deriving facts 2x3=6 20x3=60	*Make 4 groups of 3 ones.*  *Make 4 groups of 3 tens.*  *What is the same?* *What is different?* 4 x 3 = 12 4 x 30 = 120	 *3 × 4 = 12* *3 × 40 = 120* *3 × 400 = 1,200*	4 × 7 = 28 4 × 70 = 280 40 × 7 = 280 4 × 700 = 2,800 400 × 7 = 2,800
multiply 2- and 3-digit numbers by one digit using a formal written layout	254 x 4 = 980  	  	

Multiplication - Year 5			
Column multiplication (3 and 4 digits by one digit)	Most children will be able to go to pictorial representations due to understanding built in previous years.		

<table>
<tr>
<td>Long multiplication (THTO x TO)</td>
<td>TO x TO taught through concrete and pictorial.
HTO x TO and THTO x TO taught just as written method.
14 × 21 = 294
 
</td>
<td>24 x 32 = 768
 
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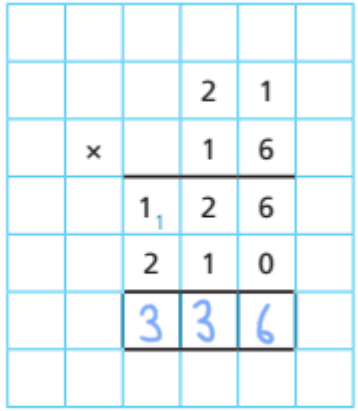
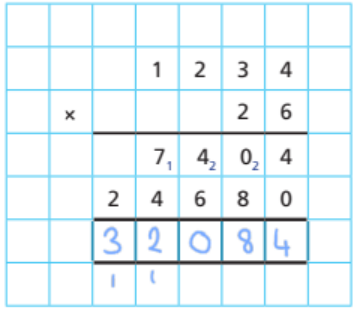
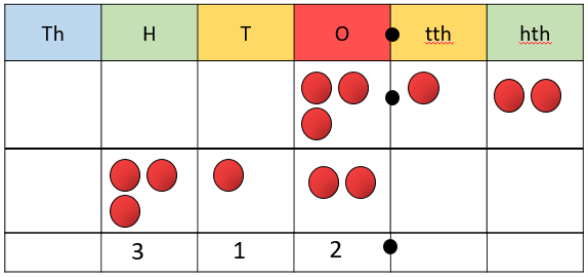
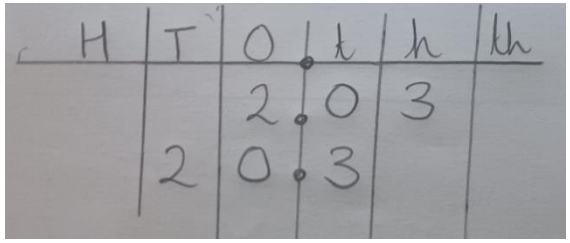
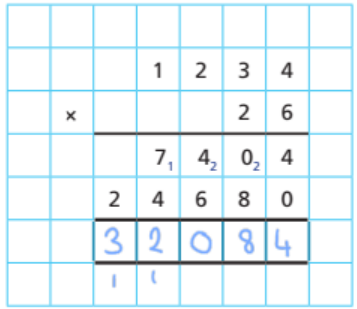
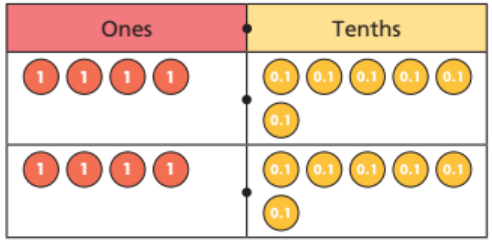
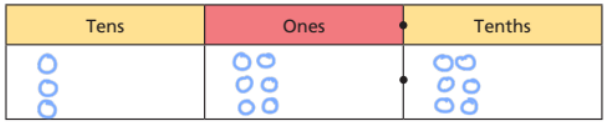
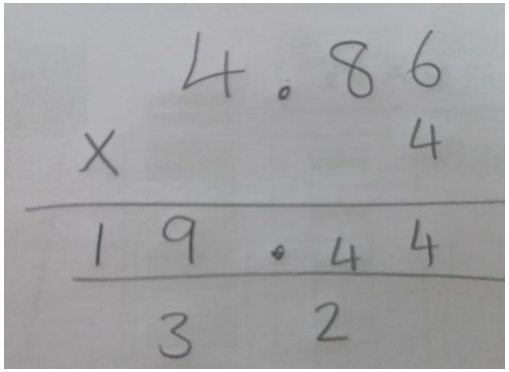
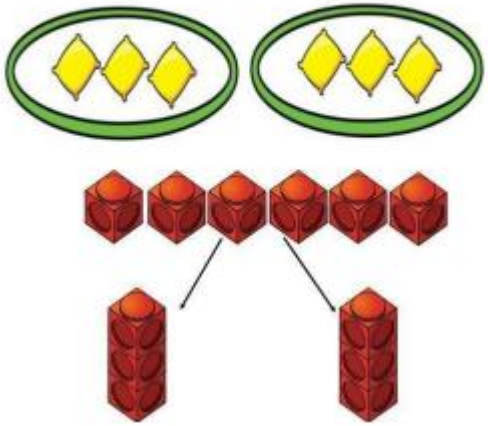
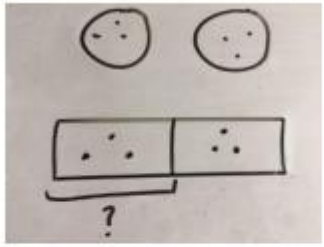
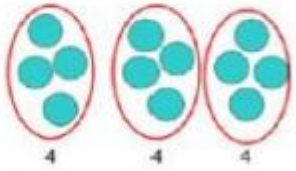
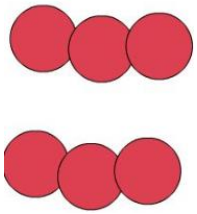
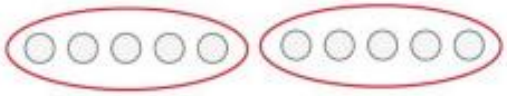
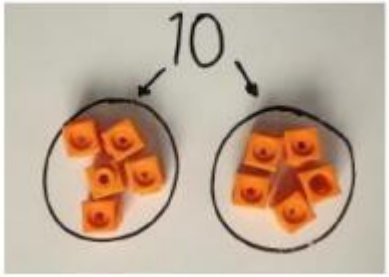
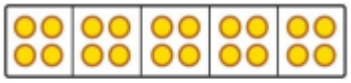
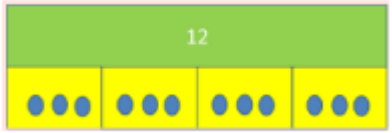
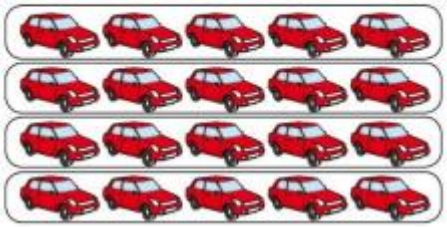
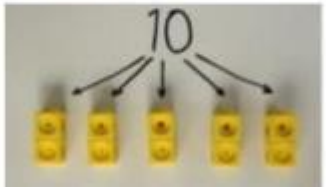
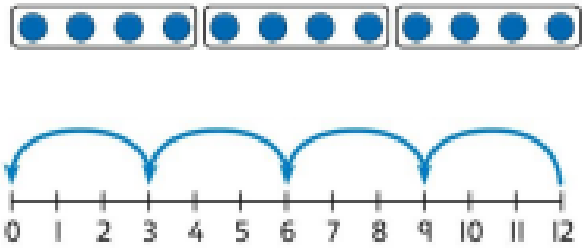
<td> 

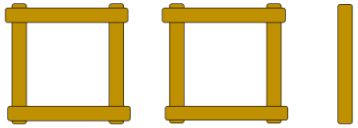
 
</td>
</tr>
<tr>
<td>Multiply whole numbers and those involving decimals by 10, 100 and 1,000</td>
<td>3.12 × 100 = 312
 
</td>
<td> 
</td>
<td>5.84 × 1,000 = 5,840
18.06 × 10 = 180.6</td>
</tr>
</table>

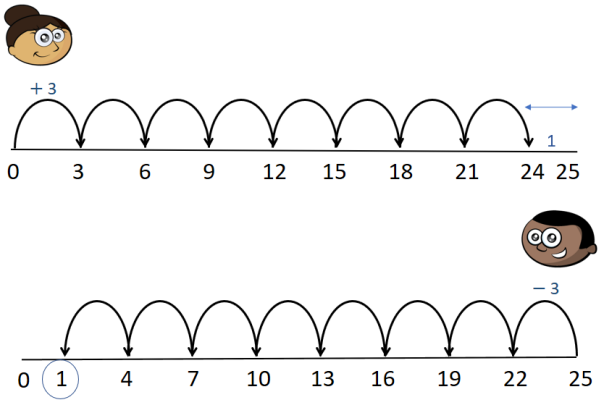
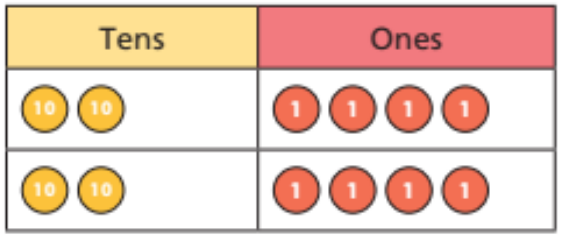
			7.7 × 100 = 770 195 × 10 = 1,950 11.5 × 10 = 115 1,000 × 11.5 = 11,500

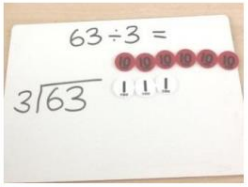
Multiplication - Year 6			
Column multiplication (THTO x TO)	Previously taught concrete and pictorial representations should be used if a child continues to need support with the formal method of multiplication		
multiplying decimals up to 2dp by one digit	Children know to exchange ten tenths for one whole. 4.6 × 2 = 9·2 	12.2 × 3 = 36·6 	

Division			
Division - Year 1			
Division as sharing	Sharing using a range of objects: 6 ÷ 2 = 	Use pictures or shapes to share quantities:  Sharing:  12 shared between 3 is 4	Children work through the concrete and pictorial at this stage. They can say and write the following alongside a representation: 6 shared between 3 is 2. 10 shared between 5 is 2.
Division as grouping	Use of any concrete resources and put into equal groups.  There are 6 in total. There are 3 in each group. There are 2 groups.	 *There are 10 in total.* *There are 5 in each group.* *There are 2 groups.*	Children work through the concrete and pictorial at this stage. They can say and write the following alongside a representation: There are 6 in total. There are 3 in each group. There are 2 groups.

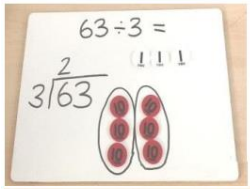
Division - Year 2			
Division as sharing	I have 10 cubes, can you share them into 2 equal groups? 	 *20 shared into 5 equal parts.* *There are 4 in each part.* 12 ÷ 4 = 3 	12 ÷ 3 = 4
Division as grouping	Understand the relationship between multiplication facts and division.  *4 groups of 5 cars is 20 cars in total.* *20 divided by 4 is 5.* Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding. 	12 ÷ 3 = 4 	Relate times-table knowledge directly to division. 1 × 10 = 10 2 × 10 = 20 3 × 10 = 30 4 × 10 = 40 5 × 10 = 50 6 × 10 = 60 7 × 10 = 70 8 × 10 = 80 I used the 10 times-table to help me. 3 × 10 = 30. *I know that 3 groups of 10 makes 30, so I know that 30 divided by 10 is 3.* *3 × 10 = 30 so 30 ÷ 10 = 3* 28 ÷ 7 = 4 Divide 28 into 7 groups. How many are in each group?

<table>
<tr><th colspan="4">Division - Year 3</th></tr>
<tr>
<td>Division with remainders</td>
<td>Mo has 9 lolly sticks.
What if Mo used his sticks to make squares?
 
Each square uses 4 sticks.
Mo can make 2 squares with 9 sticks.
There is one stick remaining.

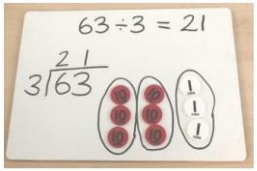
9 ÷ 4 = 2 remainder 1</td>
<td>25 ÷ 3 = 8 r 1
 
</td>
<td>23 ÷ 5 = 4 r 3</td>
</tr>
<tr>
<td>Division 2 digit by 1 digit using a place value grid</td>
<td>48 ÷ 2 = 22
 
</td>
<td>Divide 72 by 3
 
</td>
<td>48 ÷ 2 = 22
The calculation should only be done alongside a concrete or pictorial representation</td>
</tr>
</table>

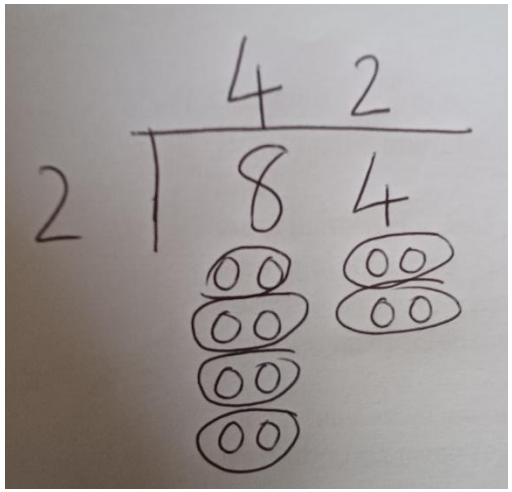
<table>
<tr>
<td>Use practical resources to support the short division method (no exchanges)</td>
<td>


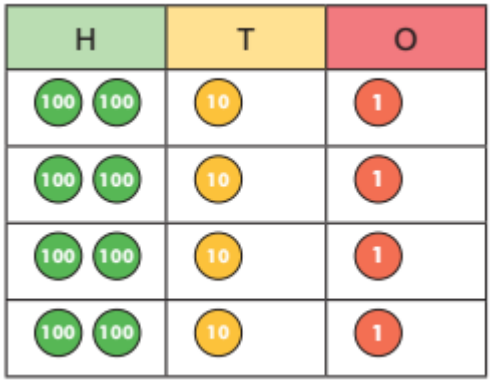
Create the dividend using Place Value counters.

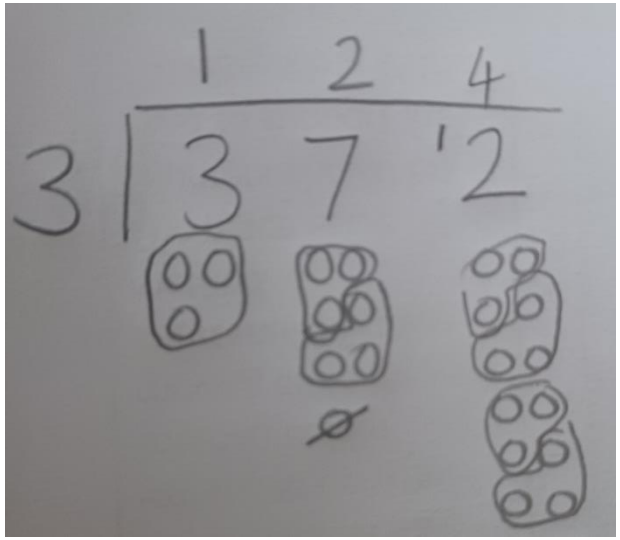


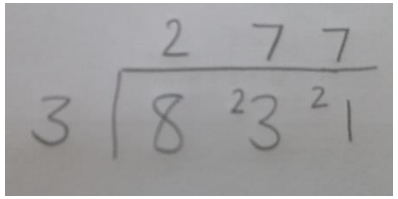
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.



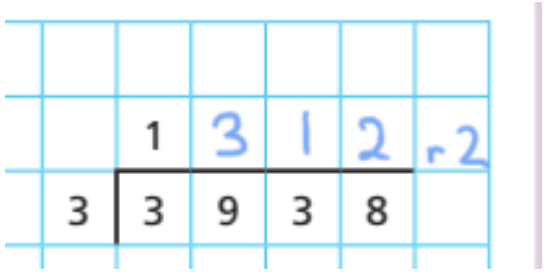
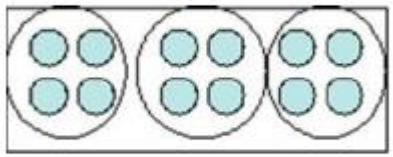
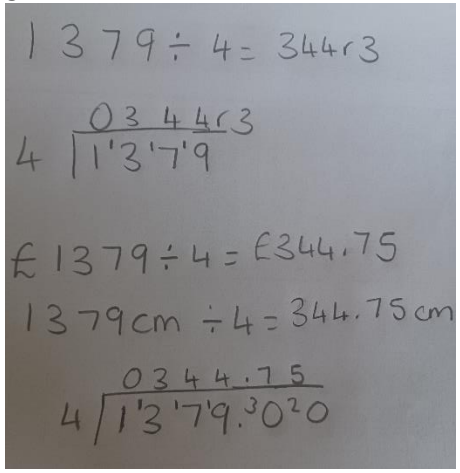
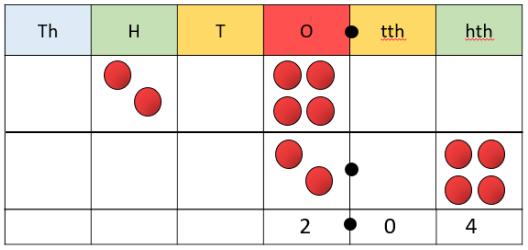
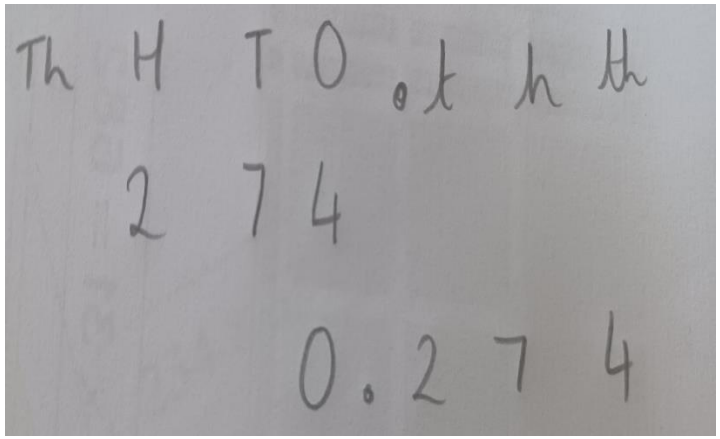
Group the tens counters according to the divisor and write the number of groups above the line in the tens column.
</td>
<td>


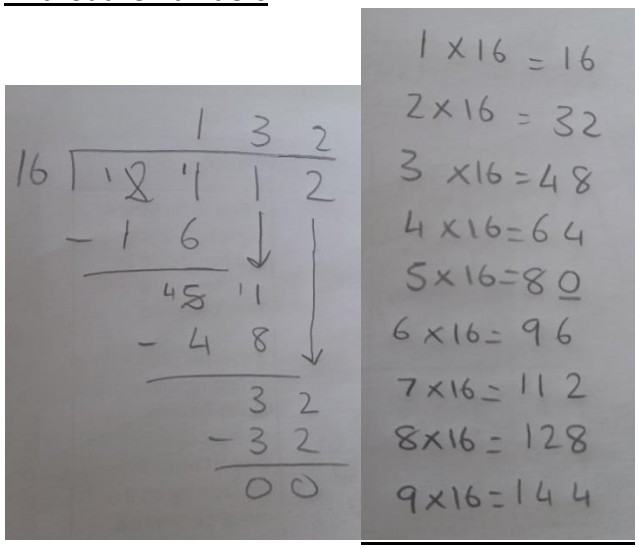
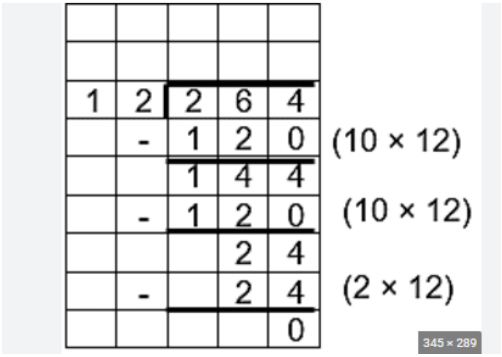
</td>
<td>N/A</td>
</tr>
<tr>
<td colspan="4">Division - Year 4</td>
</tr>
<tr>
<td>Short division 3-digit numbers by 1 digit number with no remainders</td>
<td>


844 ÷ 4 = 211
</td>
<td>


</td>
<td>


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

Division - Year 5			
Short division with a remainder Up to 4 digits by a 1 digit with remainders	 	Children can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups:  However, children should be encouraged to move towards counting in multiples to divide more efficiently.	0 5 5 6 7 | 3 ³8 ³9 ⁴2 Remainders should be written as r5 unless working with measure in which case remainders should be given as decimals 
divide whole numbers and those involving decimals by 10, 100 and 1,000	Use place value sliders (PPA Room) 204 ÷ 100 = 2.04 		147 ÷ 1,000 = 0·147 21 ÷ 10 = 2·1 1,799 ÷ 100 = 17.99 1,180 ÷ 100 = 11.8

Division - Year 6		
Long division- no remainder, with remainder, with decimal remainder	*Children write the multiples first before starting the calculation. They are reminded that multiplication is repeated addition to support. They are taught to look for efficient methods (e. + 20 + 1) and to spot patterns. When they hit 5x, they are reminded to use divisibility rules to check they are on the right track.*	
	<u>Without remainders</u>  Children who need more support with this method also learn long division with chunking.  	<u>With remainders</u> Remainders should be written as r5 unless working with measure in which case remainders should be given as decimals