



Enriching Lives: Unlocking Potential

High Expectations. Integrity. Nurturing. Always Learning. Working Together. Taking Responsibility –
No Excuses

Rationale

This policy is intended to demonstrate how we teach different forms of calculation and the progression within calculation at Moor Green. This policy is designed to help teachers and staff members at the school ensure that calculation is taught consistently across the school and to aid them in helping children who may need extra support or challenges.

It is organised by objectives and then gives examples of how to use the CPA approach to teach these methods. Maths No Problem is used to help children catch up and has an emphasis on CPA. For each year group's methods below, there is references to how Maths No Problem presents the method. These are examples; there are more throughout the Maths No Problem resources. In the KS2 tests at the end of year 6, children are expected to use written formal methods for all four operations (addition, subtraction, multiplication and division).

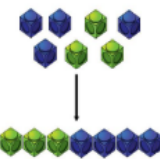
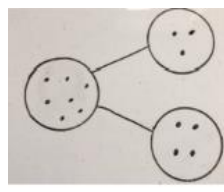
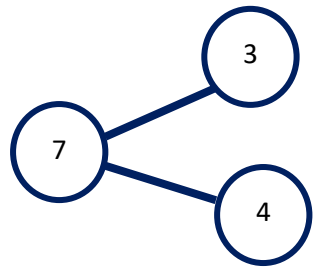

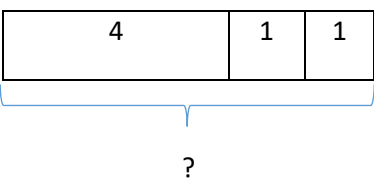
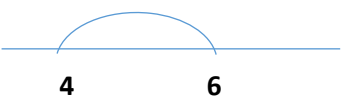
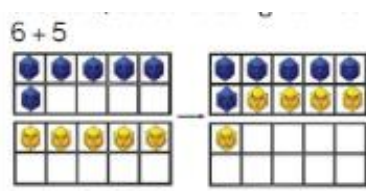
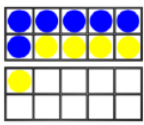


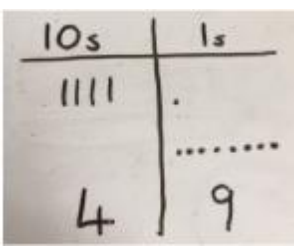
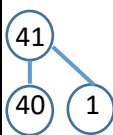
Objectives by year group

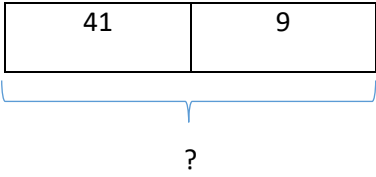
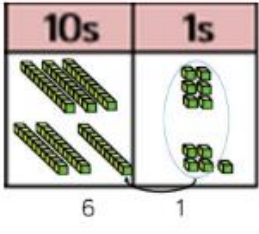
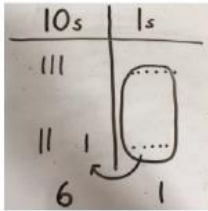
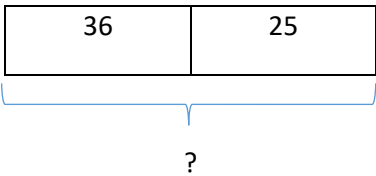
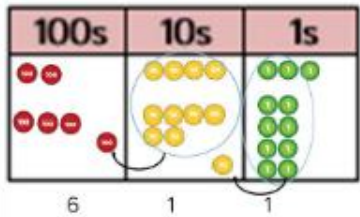
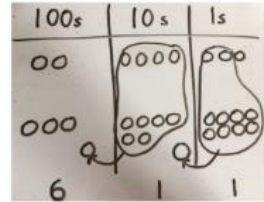
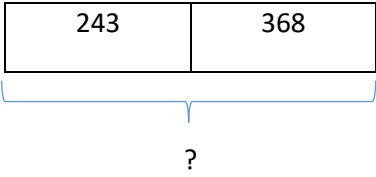
	<u>EYFS/Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
<u>Addition</u>	<p>Combining two parts to make a whole (Part whole model) within 20 MNP Book 1A, Chapter 3 Addition within 10, lesson 1.</p> <p>Starting at the bigger number and counting on within 20 MNP Book 1A, Chapter 3 Addition within 10, lesson 2.</p> <p>Regrouping to make 10 MNP Book 1A, Chapter 7 Addition and subtraction within 20, lesson 2.</p>	<p>Add 3 single digit numbers MNP Book 2A, Chapter 2 Addition and Subtraction, lesson 13</p> <p>Combine 2 numbers (two 2 digit numbers within 100) using base 10 MNP Book 2A, Chapter 2 Addition and Subtraction, lesson 4</p>	<p>Use place value columns to add ones, tens and hundreds to 3 digit numbers MNP Book 3A, Chapter 2 Addition and Subtraction, lesson 7</p> <p>Column method with regrouping MNP Book 3A, Chapter 2 Addition and Subtraction, lesson 8.</p>	<p>Column method with regrouping (up to 4 digits) MNP Book 4A, Chapter 2 Addition and Subtraction, lesson 5</p>	<p>Column method with regrouping (including decimals) MNP Book 5B, Chapter 7 Decimals, lesson 11</p>	<p>Column method with regrouping (including decimals) MNP Book 6A, Chapter 6 Worded problems, lesson 7</p>
<u>Subtraction</u>	<p>Take away ones MNP Book 1A, Chapter 4 Subtraction within 10, lesson 4.</p> <p>Counting back MNP Book 1A, Chapter 4 Subtraction within 10, lesson 3.</p>	<p>Counting back MNP Book 2A, Chapter 2 Addition and Subtraction, lesson 7</p>	<p>Use place value columns to subtract ones, tens and hundreds to 3 digit numbers MNP Book 3A, Chapter 2 Addition and</p>	<p>Column method with regrouping (up to 4 digits) MNP Book 4A, Chapter 2 Addition and Subtraction, lesson 11</p>	<p>Column method with regrouping (including decimals) MNP Book 5B, Chapter 7 Decimals, lesson 11</p>	<p>Column method with regrouping (including decimals) MNP Book 6A, Chapter 6 Worded problems, lesson 7</p>

	<p>Find the difference</p> <p>Part whole model MNP Book 1A, Chapter 4 Subtraction within 10, lesson 2.</p> <p>Make 10 MNP Book 1A, Chapter 7 Addition and Subtraction within 20, lesson 6.</p>		<p>Subtraction, lesson 13</p> <p>Column method with regrouping MNP Book 3A, Chapter 2 Addition and Subtraction, lesson 16.</p>			
<u>Multiplication</u>	<p>Recognising and making equal groups MNP Book 1B, Chapter 12 Multiplication, lesson 1.</p> <p>Doubling MNP Book 1B, Chapter 12 Multiplication, lesson 4.</p> <p>Counting in multiples MNP Book 1B, Chapter 12 Multiplication, lesson 2.</p>	<p>Repeated addition MNP Book 2A, Chapter 3 Multiplication and Division, lesson 3</p> <p>Use arrays MNP Book 2A, Chapter 3 Multiplication and Division, lesson 7</p>	<p>Arrays MNP Book 3A, Chapter 3 Multiplication and Division, lesson 4</p> <p>2 digit by 1 digit MNP Book 3A, Chapter 4 Further Multiplication and Division, lesson 2</p>	<p>Multiplication by partitioning MNP Book 4A, Chapter 4 Further Multiplication, lesson 9</p> <p>Column multiplication- 2 and 3 digit by 1 MNP Book 4A, Chapter 4 Further Multiplication, lesson 11</p>	<p>Column multiplication- up to 4 digit by 1 and 2 digit MNP Book 5A, Chapter 3 Multiplication and Division, lesson 15</p>	<p>Column multiplication MNP Book 6A, Chapter 2 Four Operations, lesson 7</p>
<u>Division</u>	<p>Sharing objects MNP Book 1B, Chapter 13 Division, lesson 2.</p> <p>Division as grouping MNP Book 1B, Chapter 13 Division, lesson 1.</p>	<p>Repeated subtraction</p> <p>Division as grouping MNP Book 2A, Chapter 4 Multiplication and Division, lesson 1</p> <p>Division with arrays (link to multiplication)</p>	<p>Repeated subtraction to divide with a remainder - 2 digit by 1 digit</p>	<p>Short division (with remainder) - up to 3 digit by 1 digit MNP Book 4A, Chapter 4 Further Multiplication, lesson 16</p>	<p>Short division (with remainder) - up to 4 digit by 1 digit MNP Book 5A, Chapter 3 Multiplication and Division, lesson 19</p>	<p>Short division (exchanging into tenths and hundredths columns)</p> <p>Long division MNP Book 6A, Chapter 2 Four Operations, lesson 15</p>

Addition

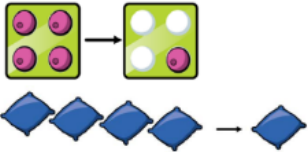
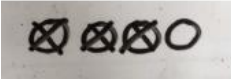

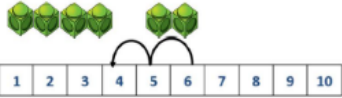

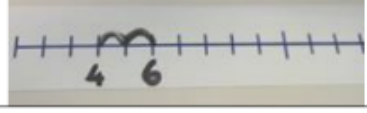
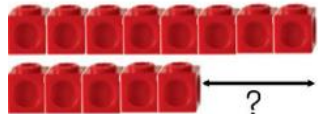
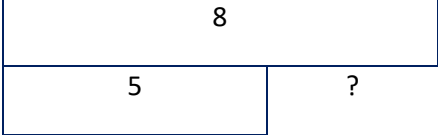
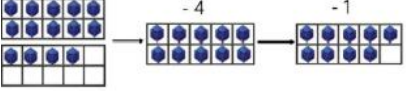

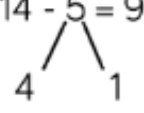
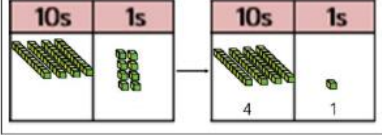
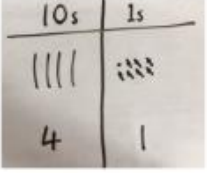
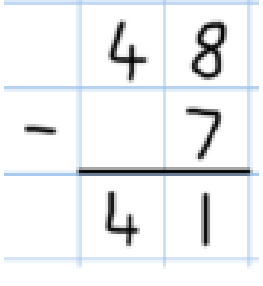
Key vocabulary: language total, parts and wholes, plus, add, altogether, more, 'is equal to', 'is the same as'

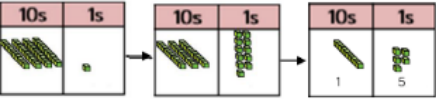
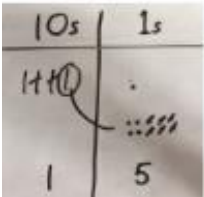
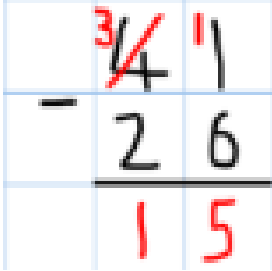
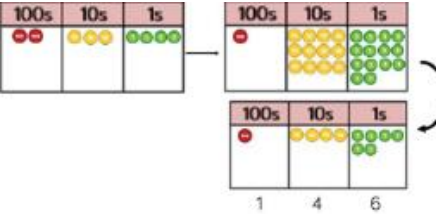
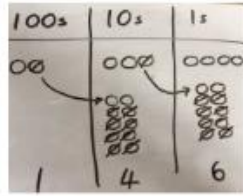
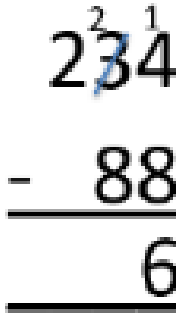
<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
<p>Combining two parts to make a whole</p> <p>Using a range of resources: cubes, teddy bears, counters</p> 	<p>Represent the resources using dots/crosses on a part whole model</p> 	<p>$4 + 3 = 7$</p> 
<p>Counting on using a number line or cubes</p> <p>Children need to start from one number, rather than counting all</p> 	<p>Bar model</p> <p>Children can count on from one number</p> 	<p>Represent the calculation on a blank number line</p> <p>$4 + 2 = 6$</p> 
<p>Regrouping to make 10</p> <p>Using 10s frames, counters or cubes</p> 	<p>Draw the 10s frame</p>  <p>Group 10 and then count on</p> 	<p>Children to use 10 with missing number</p> <p>$6 + \underline{\quad} = 11$</p>
<p>TO + O using base 10</p> <p>Children need to understand partitioning and place value of 2 digit number</p> 	<p>Represent base 10</p> 	<p>Partition the TO</p> <p>$41 + 8 =$</p>  <p>$1 + 8 = 9$</p> <p>$40 + 9 = 49$</p>

	<p>Bar model</p> 	
<p>TO + TO using base 10</p> <p>Children need to continue to develop understanding of partitioning and place value of 2 digit number.</p> <p>Children to regroup by exchanging 10 one blocks for a ten stick.</p> 	<p>Represent base 10</p>  <p>Bar model</p> 	<p>Partitioning two digit number</p> $36 + 25 =$ $6 + 5 = 11$ $30 + 20 = 50$ $50 + 11 = 61$ <p>Formal method</p> $\begin{array}{r} +25 \\ \hline 61 \\ \hline 1 \end{array}$
<p>Use place value counters to add HTO + TO, HTO + HTO etc.</p> <p>When there are 10 ones in the 1s column, we exchange for 1 ten.</p> <p>Where there are 10 tens, we exchange 1 hundred etc.</p> 	<p>Represent base 10</p>  <p>Bar model</p> 	<p>Formal methods</p> $\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1 \quad 1 \end{array}$

Subtraction

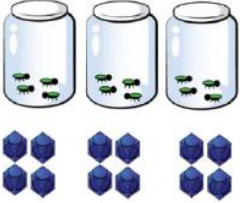
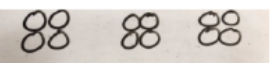
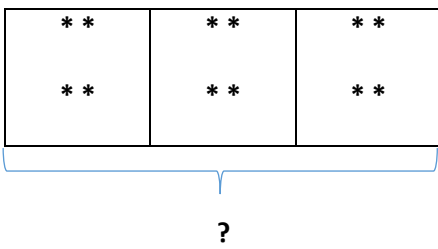
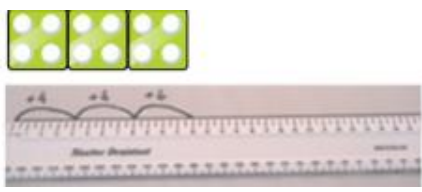
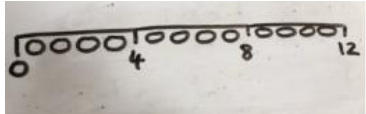
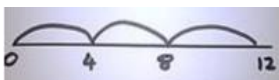

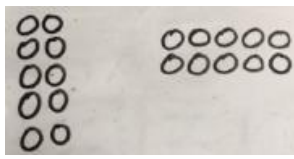
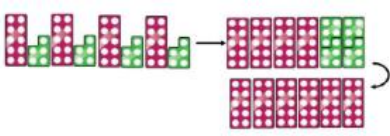
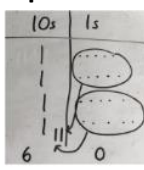
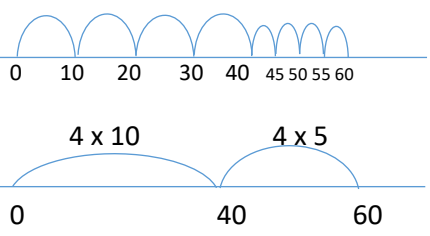

Key vocabulary: take away, less than, the difference, subtract, minus, fewer, decrease


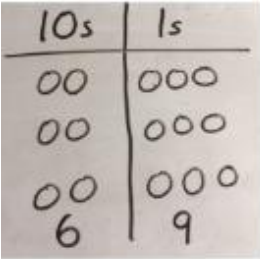
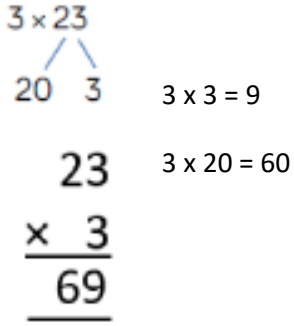
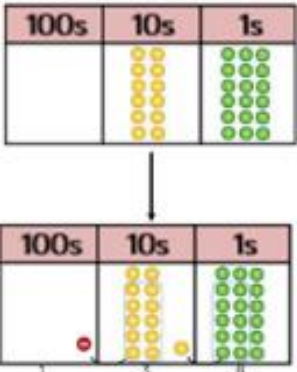
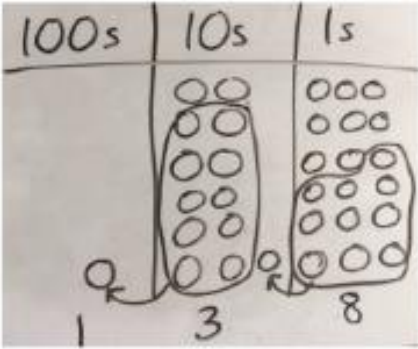
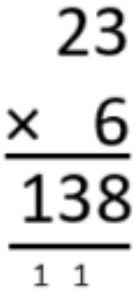
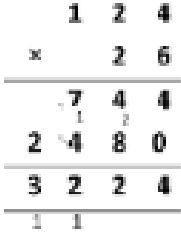
Concrete	Pictorial	Abstract
<p>Physically taking away and removing objects from the whole</p> <p>Use a range of resources: tens frames, cubes, teddy bears</p> 	<p>Represent the resources</p>  <p>Simple bar model</p> 	<p>$4 - 3 =$</p> <p>_____ = $4 - 3$</p>
<p>Counting back</p> <p>Children to use number lines to count back</p> 	<p>Represent the resources alongside a number line</p> 	<p>Represent the calculation on a blank number line</p> 
<p>Finding the difference</p> <p>Using cubes or other objects to calculate the difference between two different sets</p> 	<p>Bar Model</p> 	<p>Difference</p> <p>The difference between 8 and 5 is...</p> <p>Why does 9 and 6 have the same difference as 8 and 5?</p>
<p>Making 10</p> <p>Using tens frames and counters</p> 	<p>Represent the tens frame</p> 	<p>Partitioning to find 10</p> $14 - 5 = 9$  <p>$14 - 4 = 10$ $10 - 1 = 9$</p>
<p>Column method</p> <p>Children to use base 10</p> 	<p>Represent the base 10</p> 	<p>Formal method</p> 

	<p>Bar model for take away (or difference if appropriate)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 60px; height: 30px; text-align: center;">?</td> <td style="width: 60px; height: 30px; text-align: center;">7</td> </tr> </table> <p style="text-align: center;">47</p>	?	7	
?	7			
<p>Column method with regrouping</p> <p>Children to use base 10</p> 	<p>Represent the base 10</p>  <p>Bar model for take away (or difference if appropriate)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 60px; height: 30px; text-align: center;">?</td> <td style="width: 60px; height: 30px; text-align: center;">26</td> </tr> </table> <p style="text-align: center;">41</p>	?	26	<p>Formal method</p> 
?	26			
<p>Use place value counters to subtract HTO + TO, HTO + HTO etc.</p> 	<p>Represent base 10</p>  <p>Bar model</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="width: 60px; height: 30px; text-align: center;">234</td> <td style="width: 60px; height: 30px; text-align: center;">88</td> </tr> </table> <p style="text-align: center;">?</p>	234	88	<p>Formal methods</p> 
234	88			

Multiplication

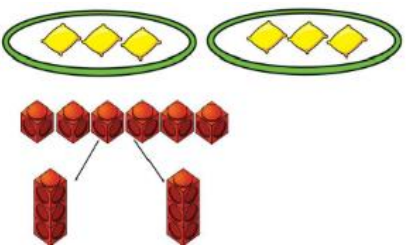
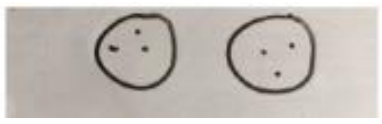
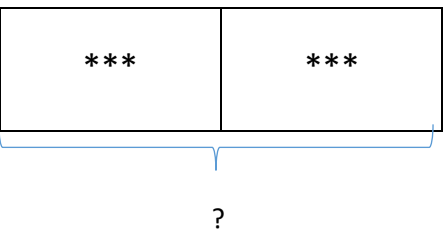

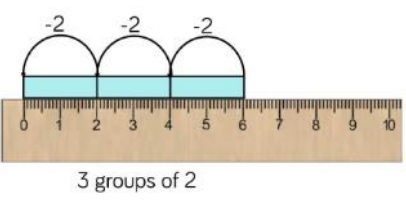
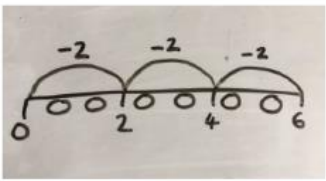
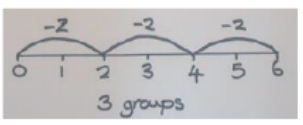

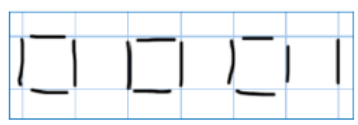
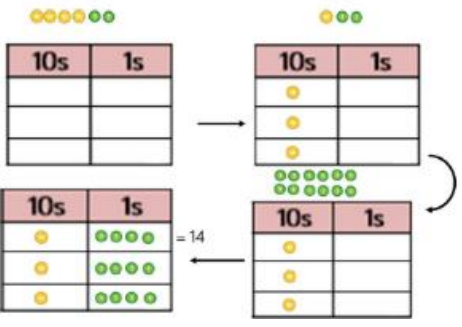
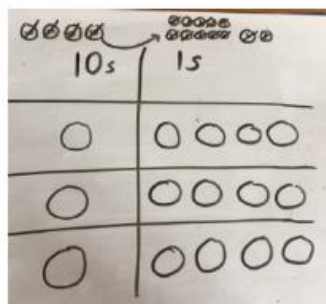
Key vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups

<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
<p>Repeated addition</p> <p>There are 3 equal groups with 4 in each group</p> <p>$3 \times 4 = 4 + 4 + 4$</p> 	<p>Represent each addition</p>  <p>Bar model</p> 	<p>Calculate</p> <p>$3 \times 4 = 4 + 4 + 4 = 12$</p>
<p>Number lines to show repeated groups</p> 	<p>Represent the number line</p> 	<p>Represent the calculation on a blank number line</p> 
<p>Use arrays to show commutativity</p> <p>$2 \times 5 = 5 \times 2$</p>  <p>2 lots of 5 5 lots of 2</p>	<p>Represent the arrays</p> 	<p>Using arrays</p> <p>Children can apply their knowledge to write different calculations</p> <p>$10 = 2 \times 5$</p> <p>$5 \times 2 = 10$</p> <p>$2 + 2 + 2 + 2 + 2 = 10$</p> <p>$10 = 5 + 5$</p>
<p>Partition to multiply</p> <p>Use a range of resources: base 10 or Numicon</p> <p>4×15</p> 	<p>Represent the resources</p>  <p>Number line</p> 	<p>Partition</p>  <p>$4 \times 10 = 40$</p> <p>$4 \times 5 = 20$</p>

<p>Column method</p> <p>Place value counters or base 10 can be used</p> 	<p>Represent showing place value</p> 	<p>Formal method (with steps)</p> 
<p>Formal column method (with regrouping)</p> 	<p>Represent to show regrouping</p> 	<p>Formal written method</p> 
<p>When children start to multiply HTO x HTO and ThHTO x TO etc. they should be confident with abstract methods.</p> <p>The children will need to be able to:</p> <p>$6 \times 124 = 744$</p> <p>$20 \times 124 = 2480$</p>	 <p>Answer: 3224</p>	

Division

Key vocabulary: share, group, divide, divided by, half

Concrete	Pictorial	Abstract
<p>Sharing</p> <p>6 shared by 2</p> 	<p>Represent sharing</p>  <p>Bar model</p> 	<p>Calculate</p>  <p>Recall</p> <p>I know $2 \times 3 = 6$ so $6 \div 2 = 3$</p>
<p>Repeated subtraction</p> 	<p>Represent taking away</p> 	<p>Represent the calculation on a blank number line</p> 
<p>$16 \div 3$ (with remainders)</p> <p>Share a range of resources: cubes etc.</p>  <p>$16 \div 3 =$</p>	<p>Represent the groups</p> 	<p>Recall</p> <p>I know 3 groups of 4 is 12 so there would be 1 left over.</p>
<p>Sharing using place value</p> 	<p>Represent the place value</p> 	<p>Partition</p> <p>$42 = 30 + 12$</p> <p>$30 \div 3 = 10$</p> <p>$12 \div 3 = 4$</p> <p>So $42 \div 3 = 14$</p>

Short division with counters

Make 615

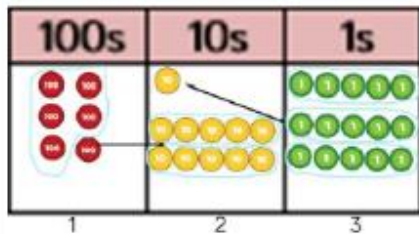
How many groups of 5 hundreds can you make with 5 hundred counters? 1

Exchange 1 hundred for 10 tens

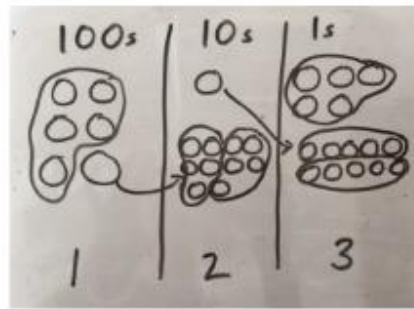
How many groups of 5 tens can you make with 11 ten counters? 2

Exchange 1 ten for 10 ones

How many groups of 5 ones can you make with 15 ones? 3



Represent each step

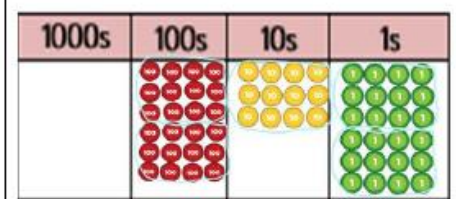
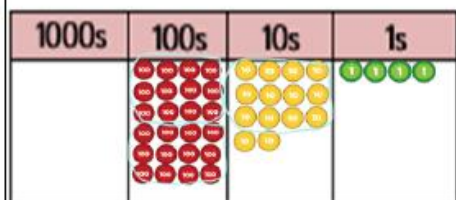
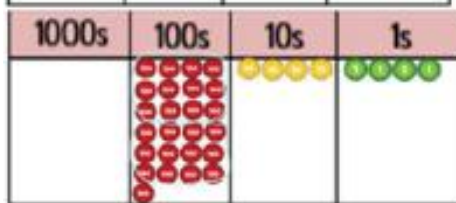


Short division

$$5 \overline{) 615} \begin{matrix} 123 \\ \underline{5} \\ 11 \\ \underline{10} \\ 15 \\ \underline{15} \\ 0 \end{matrix}$$

Long division with place value columns

$$2544 \div 12$$



We can't group 2 thousands into groups of 12 so we can exchange them

We can group 24 hundreds into groups of 12 (two groups), which leaves 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 group 24 ones into 2 groups of 12 with no remainder.

Long division

$$12 \overline{) 2544} \begin{matrix} 0212 \\ \underline{24} \\ 14 \\ \underline{12} \\ 24 \\ \underline{24} \\ 0 \end{matrix}$$