

Christ Church C of E Primary School, Moreton.



Calculations Policy

Together we can do all things through Christ who strengthens us.

Date Written: July 2023

Date for Review: July 2024

School Vision

Contributions from parents, pupils, staff and school Governors have determined the priorities for our school vision. A consistent school vision shared by all based on the following:

“Love must be completely sincere. Hate what is evil, hold on to what is good. Love one another warmly as Christians, and be eager to show respect for one another. Work hard and do not be lazy. Serve the Lord with a heart full of devotion. Let your hope keep you joyful, be patient in your troubles, and pray at all times.” Romans 12:9-1.

Rationale

At Christ Church CE Primary school we believe that Maths provides significant opportunities for the children to develop spirituality, morally, socially and culturally. The study of Maths involves giving opportunities in all areas of maths to develop their spirituality of self. This can be done through spotting things that help us make progress, looking at ways to apply problem solving and drive to solve problems. These approaches help develop the children’s resilience and grow their ability to persevere, giving them a huge sense of achievement. Maths can also help develop them socially, when they are given open ended questions, work in a group or partner situation and work with peers and buddies to help them succeed. This creates a culture that is safe and supportive and enables them to develop their growth mind-set. In addition, our mathematics policy allows the children to develop their awe and wonder of the world and understanding of creation, through a deeper understanding of nature and looking at patterns of symmetry, visual representations of mathematics within the world and real life examples of fundraising and other initiatives linked to our school community.

Calculations policy

This policy is intended to demonstrate how we teach different forms of calculation and the progression within calculation at Christ Church. 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 Concrete, Pictorial and Abstract approach to teach these methods. Maths No Problem is used in Years 1-5 to enable children to learn in this way and Year 6 consolidates this using White Rose and other selected materials. For each year group’s methods below, there are references to how Maths No Problem presents the method. These are some examples; there are more throughout the Maths No Problem resources. By the end of year 6, children are expected to use written formal methods for all four operations (addition, subtraction, multiplication and division) in readiness for secondary school.


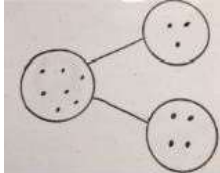
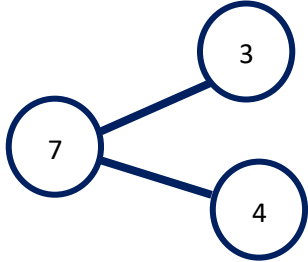
Objectives by year group

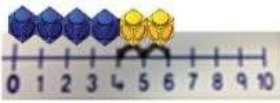
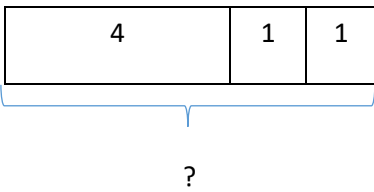
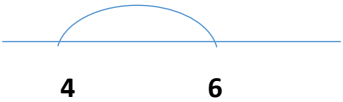
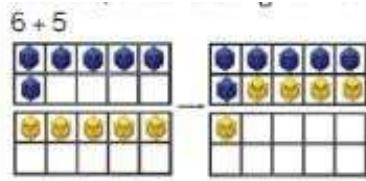
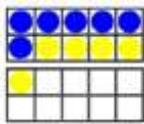

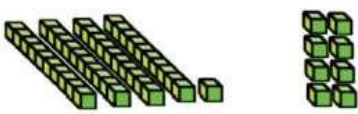
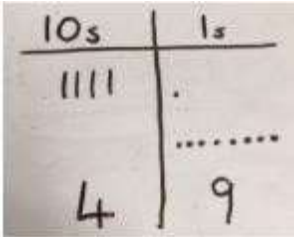
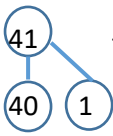
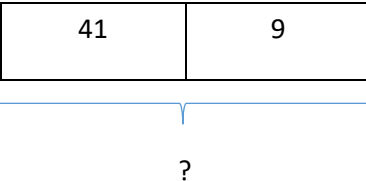
	<u>EYFS/Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>	<u>Year 6</u>
<u>Addition</u>	<p>Combining two parts to make a whole (Part whole model) within 20 MNP Book 1A, Chapter 3 Addition within 10, lesson 1.</p> <p>Starting at the bigger number and counting on within 20 MNP Book 1A, 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>Column method introducing regrouping.renaming. MNP Book 2A, Chapter 2 Addition and Subtraction, lesson 5</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)</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>Column method with regrouping MNP Book 2A, Chapter 2 Addition and Subtraction, lesson 11.</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)</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>			

<p><u>Multiplication</u></p>	<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</p>
<p><u>Division</u></p>	<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</p>

Addition

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

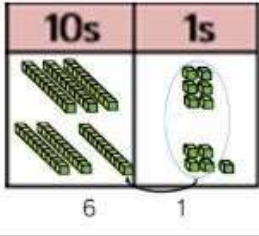
<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
<p>Combining two parts to make a whole</p> <p>Using a range of resources: cubes, teddy bears, counters</p> 	<p>Represent the resources using dots/crosses on a part whole model</p> 	<p>$4 + 3 = 7$</p> 

<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 numbers</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> 	

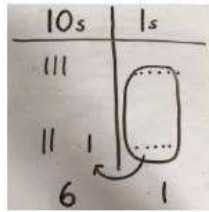
TO + TO using base 10

Children need to continue to develop understanding of partitioning and place value of 2 digit numbers.

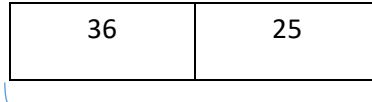
Children to regroup by exchanging 10 one blocks for a ten stick.



Represent base 10



Bar model



?

Partitioning two-digit numbers

$36 + 25 =$

$6 + 5 = 11$

$30 + 20 = 50$

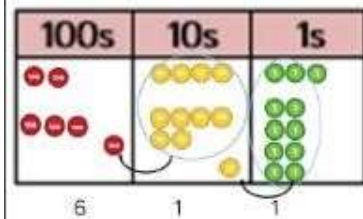
$50 + 11 = 61$

Formal method

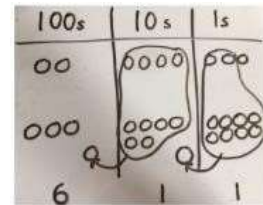
$$\begin{array}{r} 36 \\ + 25 \\ \hline 61 \\ 1 \end{array}$$

Use place value counters to add HTO + TO, HTO + HTO etc.

When there are 10 ones in the 1s column, we exchange or rename for 1 ten. Where there are 10 tens, we exchange or rename to 1 hundred etc.



Represent base 10



Bar model



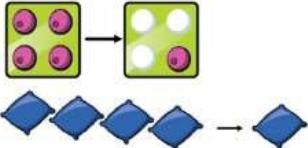
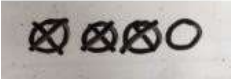





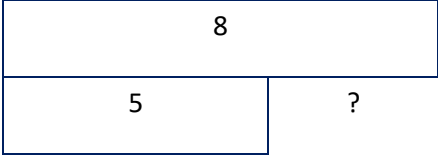
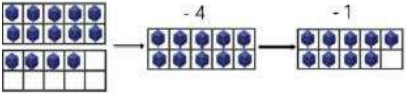
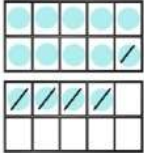
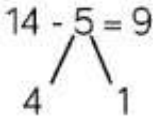
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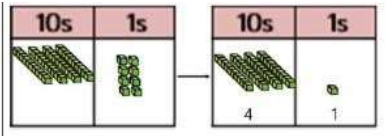
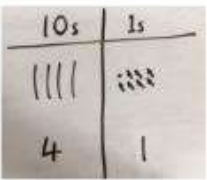
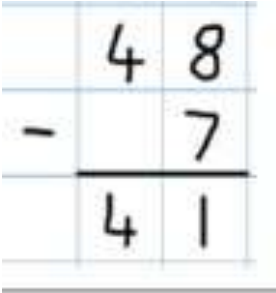
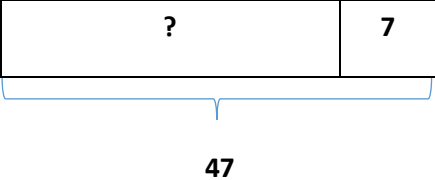

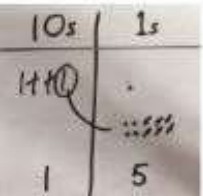
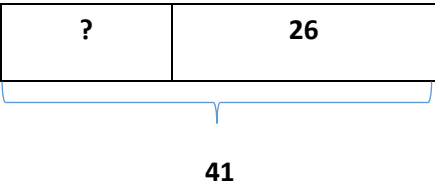
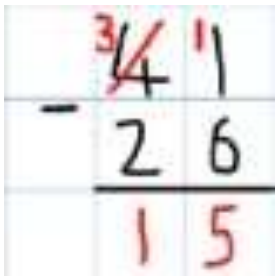
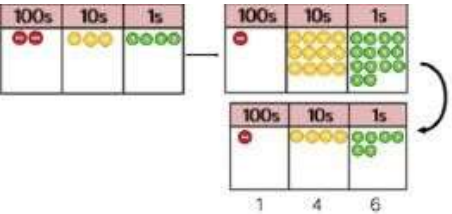
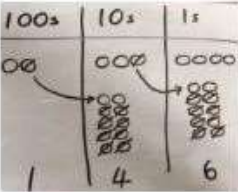
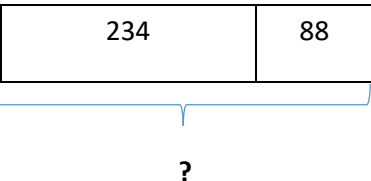
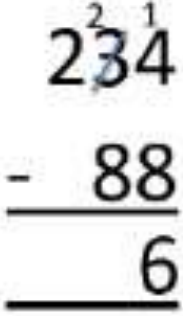
Formal methods

$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ 1 \ 1 \end{array}$$

Subtraction



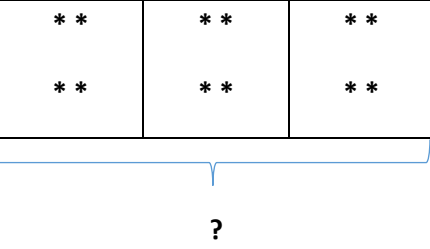
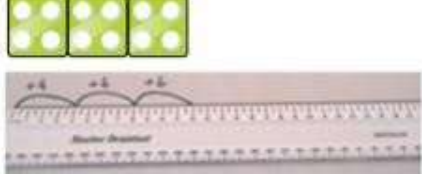


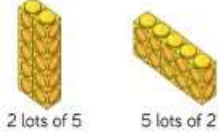
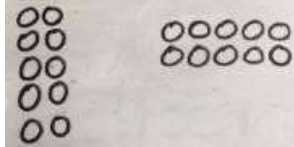
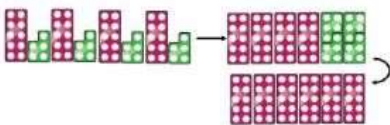
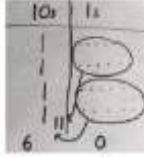
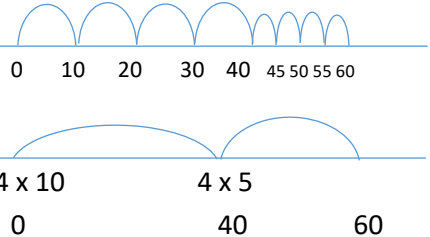
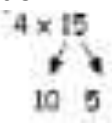
Key vocabulary: take away, less than, the difference, subtract, minus, fewer, decrease

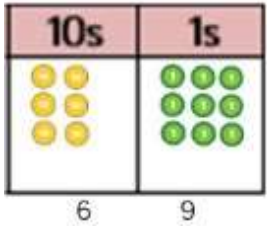
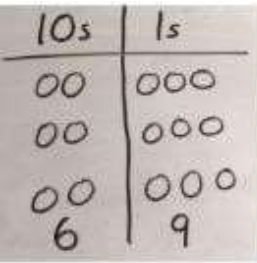
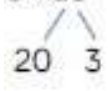
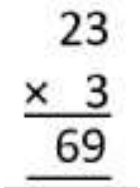
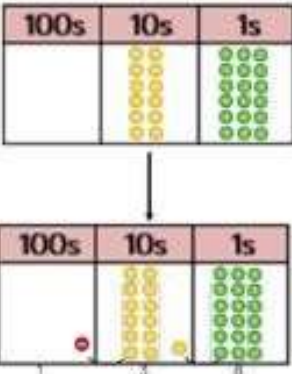
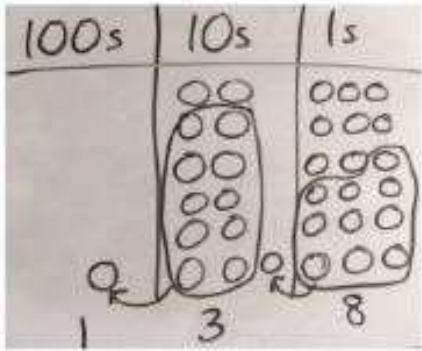
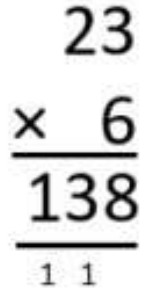

<u>Concrete</u>	<u>Pictorial</u>	<u>Abstract</u>
<p>Physically taking away and removing objects from the whole</p> <p>Use a range of resources: tens frames, cubes, teddy bears</p> 	<p>Represent the resources</p>  <p>Simple bar model</p> 	<p>$4 - 3 = \underline{\quad}$ $= 4 - 3$</p>
<p>Counting back</p> <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> <p>$14 - 5 = 9$</p>  <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> 	
<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> 	<p>Formal method</p> 
<p>Use place value counters to subtract HTO + TO, HTO + HTO etc.</p> 	<p>Represent base 10</p>  <p>Bar model</p> 	<p>Formal methods</p> 

Multiplication

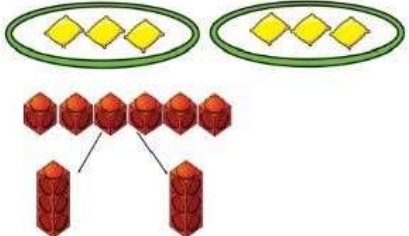
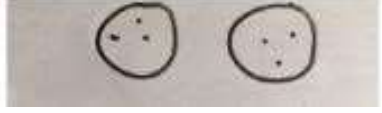
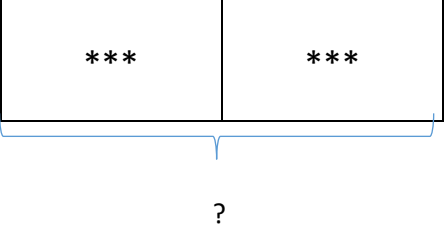
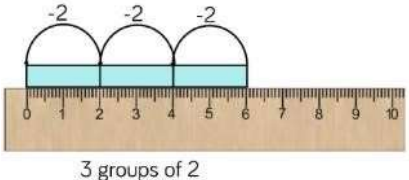
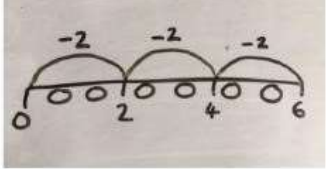
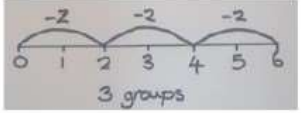

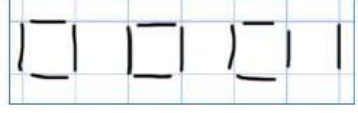
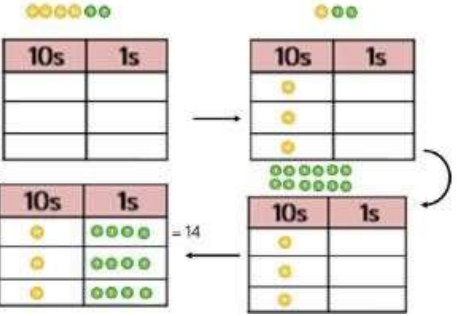
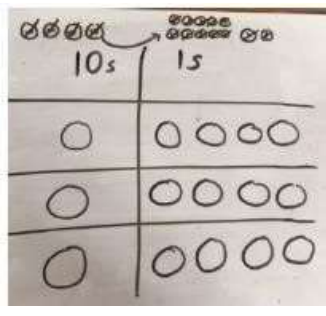
Key vocabulary: double, times, multiplied by, the product of, groups of, lots of, equal groups

<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>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> 3×23  $3 \times 3 = 9$ $3 \times 20 = 60$ 
<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> <table border="1" data-bbox="1077 347 1508 414"> <tr> <td>3</td> <td>3</td> </tr> </table> <p>Recall</p> <p>I know $2 \times 3 = 6$ so $6 \div 2 = 3$</p>	3	3
3	3			
<p>Repeated subtraction</p>  <p>3 groups of 2</p>	<p>Represent taking away</p> 	<p>Represent the calculation on a blank number line</p>  <p>3 groups</p>		
<p>$TO \div O$ (with remainders)</p> <p>Share a range of resources: cubes etc.</p>  <p>$12 \div 3 =$</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>= 14</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

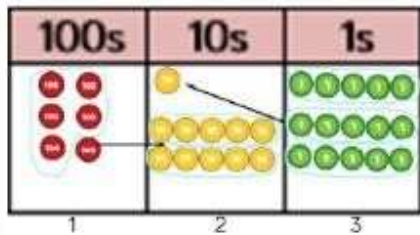
How many groups of 5 hundreds can you make with 6 hundred counters? 1

Exchange 1 hundred for 10 tens

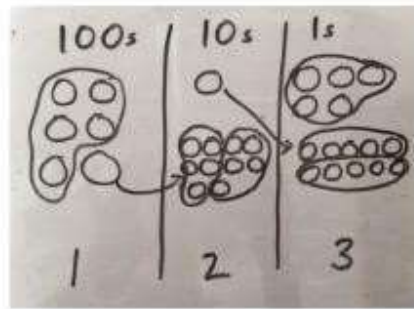
How many groups of 5 tens can you make with 11 ten counters? 2

Exchange 1 ten for 10 ones

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



Represent each step

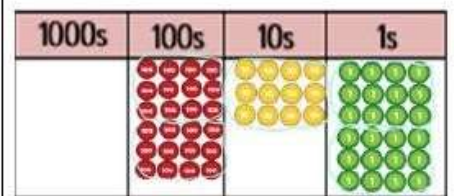
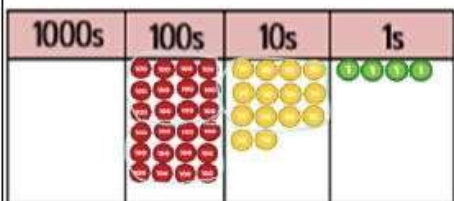
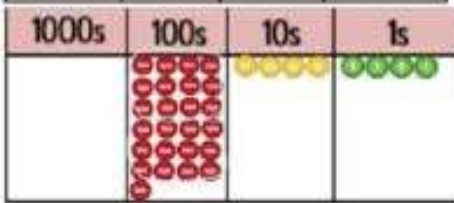
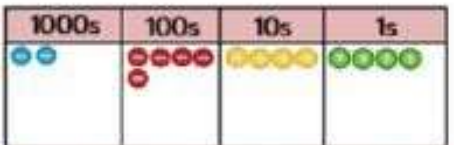


Short division

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

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

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