

Bearnes Voluntary Primary School: Number & Calculation policy: Years 3 & 4



Intent

At Bearnes our intent is based on school research and our study as part of Teaching for Mastery Project, to enable KS2 pupils to develop the core ideas that underpin all calculation. In Years 3&4, pupils develop the basis of written methods by building their skills alongside a deep understanding of place value. They should use known addition/subtraction and multiplication/division facts to calculate efficiently and accurately, rather than relying on counting. Pupils use place value equipment to support their understanding.

Staff will begin units of work with an elicitation task/pre assessment in order to ascertain prior understanding and future steps. These pre-assessments will include questions involving fluency, reasoning and problem solving, in a variety of contexts. These tasks will provide staff with a clear picture of a pupil's knowledge and skills and then allow staff to meet need and extend pupil's learning from their individual starting points. They will be used again at the end of a unit of work, enabling staff to see a clear picture of progress and mastery of given areas.

Threaded through all learning across the school we use CAPED to enable children to demonstrate their mastery of mathematics:

C: check it

A: another way

P: prove it

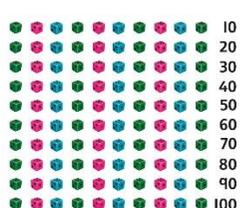
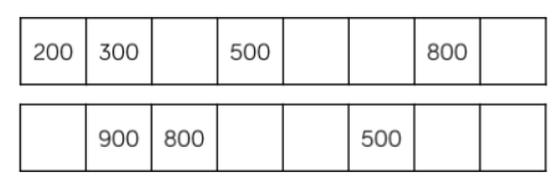
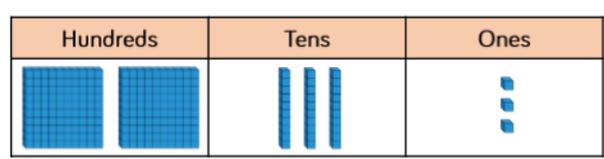
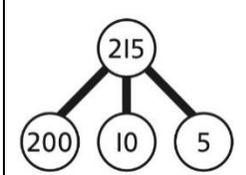
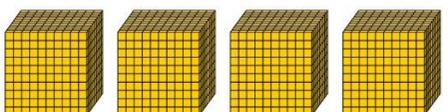
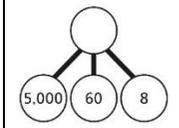
E: explain

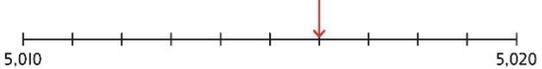
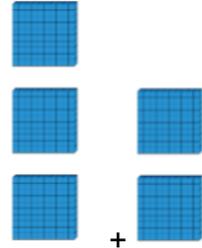
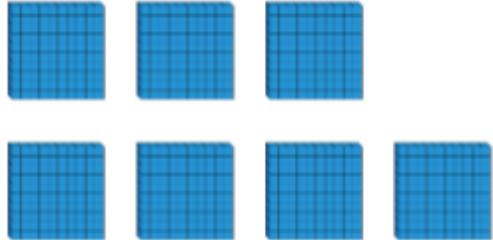
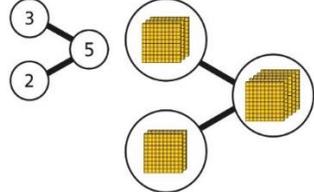
D: draw

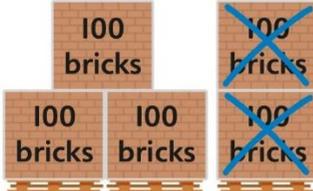
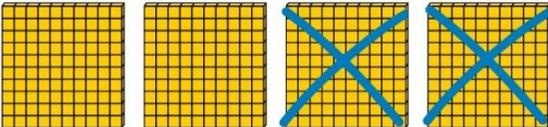
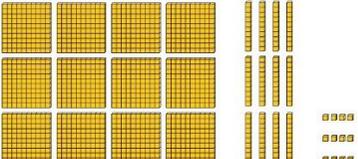
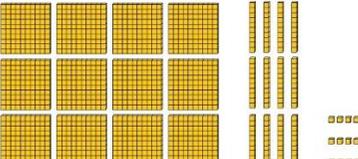
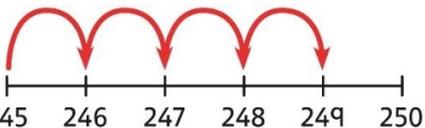
Key Vocabulary:

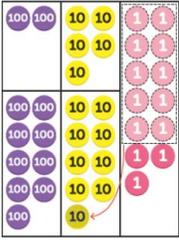
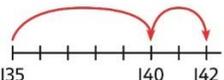
rounding, partition, place value, tens, hundreds, thousands, column method, whole, part, equal groups, sharing, grouping, bar model

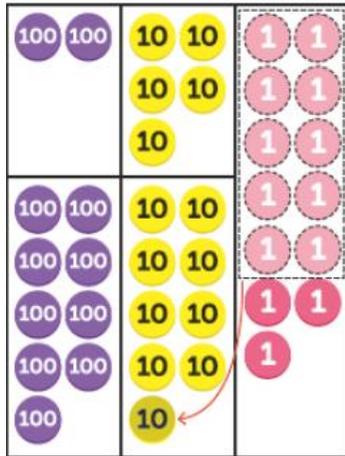
Years 3 & 4

Years 3 & 4			
	Concrete	Pictorial	Abstract
Place value	All children will be taught:		
Understanding 100s	<p>Understand the cardinality of 100, and the link with 10 tens.</p> <p>Use cubes to place into groups of 10 tens.</p> 	<p>count in steps of 100.</p> <p>There are 100 sweets in each jar.</p> 	<p>Represent steps of 100 on a number line and a number track and count up to 1,000 and back to 0.</p> 
Understanding place value to 1,000	<p>Unitise 100s, 10s and 1s to build 3-digit numbers.</p> 	<p>Use equipment to represent numbers to 1,000.</p> 	<p>Represent the parts of numbers to 1,000 using a part-whole model.</p>  <p>$215 = 200 + 10 + 5$</p> <p>Recognise numbers to 1,000 represented on a number line, including those between intervals.</p>
Understanding numbers to 10,000	<p>Use place value equipment to understand the place value of 4-digit numbers.</p> 	<p>Represent numbers using place value counters once children understand the relationship between 1,000s and 100s.</p> 	<p>Understand partitioning of 4-digit numbers, including numbers with digits of 0.</p>  <p>$5,000 + 60 + 8 = 5,068$</p>

	<p>4 thousands equal 4,000.</p>	<p>$4,000 + 300 + 50 + 5 = 4,355$</p>	<p>Understand and read 4-digit numbers on a number line.</p> 																								
<p>Round to the nearest 10/100/1000</p>	<p>Say whether each number on the number line is closer to 500 or 600.</p>  <p>Round 535, 556 and 568 to the nearest 100 Use the stem sentence: ____ rounded to the nearest 100 is ____.</p>	<p>Complete the table:</p> <table border="1" data-bbox="891 331 1451 555"> <thead> <tr> <th>Start number</th> <th>Rounded to the nearest 10</th> </tr> </thead> <tbody> <tr> <td>  </td> <td></td> </tr> <tr> <td>851</td> <td></td> </tr> <tr> <td>XCVIII</td> <td></td> </tr> </tbody> </table>	Start number	Rounded to the nearest 10			851		XCVIII		<p>Round these numbers to the nearest 1,000</p> <ul style="list-style-type: none"> Eight thousand and fifty-six 5 thousands, 5 hundreds, 5 tens and 5 ones LXXXII <p>Complete the table.</p> <table border="1" data-bbox="1601 475 2101 689"> <thead> <tr> <th>Start number</th> <th>Rounded to the nearest 10</th> <th>Rounded to the nearest 100</th> <th>Rounded to the nearest 1,000</th> </tr> </thead> <tbody> <tr> <td>  </td> <td></td> <td></td> <td></td> </tr> <tr> <td>4,999</td> <td></td> <td></td> <td></td> </tr> <tr> <td>LXXXII</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Start number	Rounded to the nearest 10	Rounded to the nearest 100	Rounded to the nearest 1,000					4,999				LXXXII			
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<p>Adding 100s</p>	<p>Use known facts and unitising to add multiples of 100.</p>  <p>$3 + 2 = 5$ 3 hundreds + 2 hundreds = 5 hundreds $300 + 200 = 500$</p>	<p>Use known facts and unitising to add multiples of 100.</p>  <p>$3 + 4 = 7$ 3 hundreds + 4 hundreds = 7 hundreds $300 + 400 = 700$</p>	<p>Use known facts and unitising to add multiples of 100.</p> <p>Represent the addition on a number line.</p> <p>Use a part-whole model to support unitising.</p>  <p>$3 + 2 = 5$ $300 + 200 = 500$</p>																								
<p>Subtracting 100s</p>	<p>Use known facts and unitising to subtract multiples of 100.</p>	<p>Use known facts and unitising to subtract multiples of 100.</p>	<p>Understand the link with counting back in 100s.</p>																								

	 <p>5 - 2 = 3 500 - 200 = 300</p>	 <p>4 - 2 = 2 400 - 200 = 200</p>	 <p>400 - 200 = 200</p> <p>Use known facts and unitising as efficient and accurate methods. I know that 7 - 4 = 3. Therefore, I know that 700 - 400 = 300.</p>												
Multiplying by multiples of 10 and 100	<p>Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.</p>  <p>3 groups of 4 ones is 12 ones. 3 groups of 4 tens is 12 tens. 3 groups of 4 hundreds is 12 hundreds.</p>	<p>Use unitising and place value equipment to understand how to multiply by multiples of 1, 10 and 100.</p>  <p>3 x 4 = 12 3 x 40 = 120 3 x 400 = 1,200</p>	<p>Use known facts and understanding of place value and commutativity to multiply mentally.</p> <p>4 x 7 = 28 4 x 70 = 280 40 x 7 = 280 4 x 700 = 2,800 400 x 7 = 2,800</p>												
Addition	<p>All children will be taught the column method. Place value equipment will be used to represent additions and support mathematics where necessary. Other methods may also offer support to secure knowledge and skills. All children will be taught to add 1/10/100 without exchange and then add 1/10/100 with exchange</p>														
	Concrete	Pictorial	Abstract												
3 / 4-digit number + 1s, no exchange or bridging	<p>Use number bonds to add the 1s.</p>  <p>214 + 4 = ?</p>	<p>Use number bonds to add the 1s.</p> <table border="1" data-bbox="887 1126 1189 1374"> <thead> <tr> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td>2</td> <td>4</td> <td>9</td> </tr> </tbody> </table> <p>245 + 4</p> <p>Use number bonds to add the 1s. 5 + 4 = 9</p>	H	T	O							2	4	9	<p>Understand the link with counting on.</p> <p>245 + 4</p>  <p>Use number bonds to add the 1s and understand that this is more efficient and</p>
H	T	O													
															
															
2	4	9													

	<p>Now there are 4 + 4 ones in total. $4 + 4 = 8$</p> <p>$214 + 4 = 218$</p>	<p>$5 + 4 = 9$</p> <p>$245 + 4 = 249$</p>	<p>less prone to error.</p> <p>$245 + 4 = ?$</p> <p><i>I will add the 1s.</i> $5 + 4 = 9$ So, $245 + 4 = 249$</p>
<p>3 / 4-digit number + 1s with exchange</p>	<p>Understand that when the 1s sum to 10 or more, this requires an exchange of 10 ones for 1 ten.</p> <p>Children should explore this using unitised objects or physical apparatus.</p>	<p>Exchange 10 ones for 1 ten where needed. Use a place value grid to support the understanding.</p> 	<p>Understand how to bridge by partitioning to the 1s to make the next 10.</p>  <p>$135 + 7 = ?$ $135 + 5 + 2 = 142$ Ensure that children understand how to add 1s bridging a 100.</p> <p>$198 + 5 = ?$ $198 + 2 + 3 = 203$</p>
<p>3-digit number + 10s, no exchange</p>	<p>Calculate mentally by forming the number bond for the 10s.</p> <p>Add 9 to 3041.</p> <p>$3041 + 9 = \square$ <i>make 10</i></p> <p>$3041 + 9 = 3040 + 10$</p> <p>$3041 + 9 = 3050$</p>	<p>Calculate mentally by forming the number bond for the 10s.</p> <p>$98 + 4142 = \square$ <i>make 100</i></p> <p>$98 + 4142 = 100 + 4140$ $= 4240$</p>	<p>Calculate mentally by forming the number bond for the 10s.</p> <p>$753 + 40$</p> <p><i>I know that $5 + 4 = 9$</i></p> <p>So, $50 + 40 = 90$ $753 + 40 = 793$</p>
<p>3-digit number + 2-digit / 3 digit number, exchange required</p>	<p>Use place value equipment / grids to model addition and understand where exchange is required.</p>	<p>Use a column method with exchange. Children must understand how the method relates to place value at each stage of the calculation.</p>	



There are 13 ones, so that is 1 ten and 3 ones. There are 14 tens so I will exchange.

$$\begin{array}{r} \text{H T O} \\ 275 \\ + 16 \\ \hline \end{array}$$

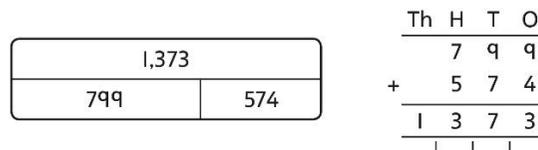
$$\begin{array}{r} \text{H T O} \\ 275 \\ + 16 \\ \hline 91 \end{array}$$

$$\begin{array}{r} \text{H T O} \\ 275 \\ + 16 \\ \hline 291 \end{array}$$

$$275 + 16 = 291$$

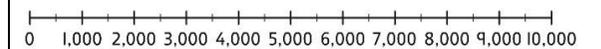
Representing additions and checking strategies

Bar models may be used to represent additions in problem contexts, and to justify mental methods where appropriate.



I chose to work out $574 + 800$, then subtract 1.

Use rounding and estimating on a number line to check the reasonableness of an addition.



$$912 + 6,149 = ?$$

I used rounding to work out that the answer should be approximately $1,000 + 6,000 = 7,000$.

Subtraction

All children will be taught column subtraction. Place value equipment will be used to represent subtractions and support mathematics where necessary. Other methods may also offer support to secure knowledge and skills. All children will be taught to subtract without exchange and then subtract with exchange

Concrete

Pictorial

Abstract

3-digit number - 1s, no

Use number bonds to subtract the 1s.

Use number bonds to subtract the 1s.

Understand the link with counting back using a number line.

exchange



$$214 - 3 = ?$$



$$4 - 3 = 1$$

$$214 - 3 = 211$$

H	T	O
3	1	9

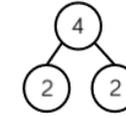
$$319 - 4 = ?$$

H	T	O
3	1	9

$$9 - 4 = 5$$

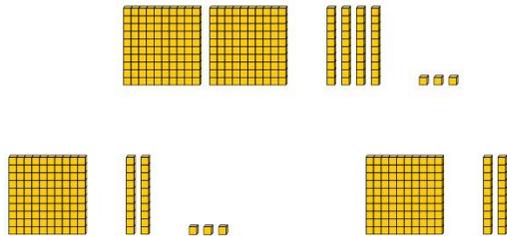
$$319 - 4 = 315$$

$$132 - 4$$



3-digit number
– up to 3 / 4-
digit number

Use place value equipment to explore the effect of splitting a whole into two parts, and understand the link with taking away.



Represent the calculation on a place value grid.



Use column subtraction to calculate accurately and efficiently.

$$\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 7 \end{array}$$

$$\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 47 \end{array}$$

$$\begin{array}{r} \text{H T O} \\ 999 \\ - 352 \\ \hline 647 \end{array}$$

3-digit number
– up to 3-digit
number,
exchange
required

Use equipment to exchange 1 hundred for 10 tens, and 1 ten for 10 ones.

Model the required exchange on a place value grid.

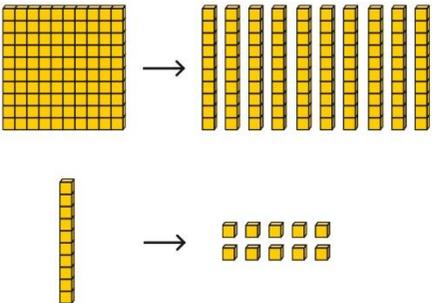
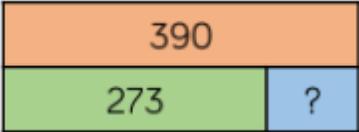
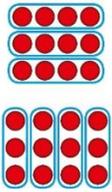
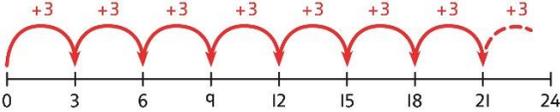
$$175 - 38 = ?$$

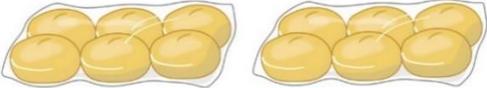
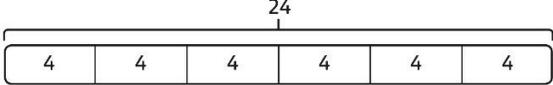
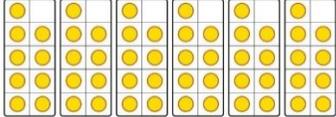
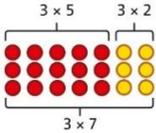
I need to subtract 8 ones, so I will exchange a ten for 10 ones.

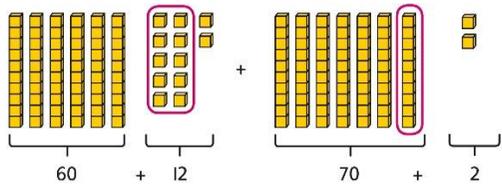
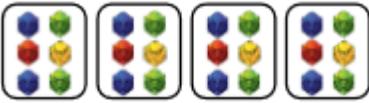
Use column subtraction to work accurately and efficiently.

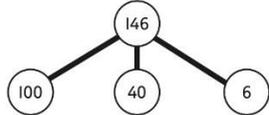
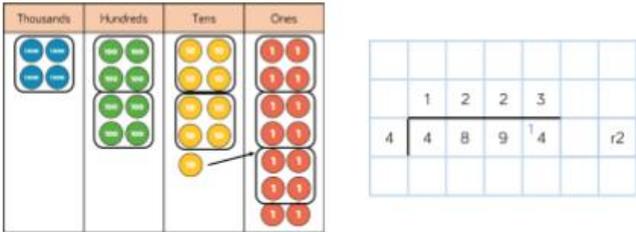
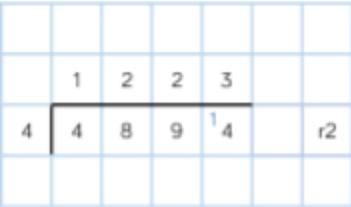
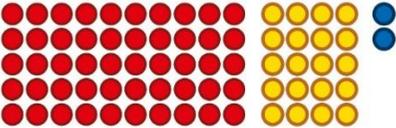
$$\begin{array}{r} \text{H T O} \\ 175 \\ - 38 \\ \hline 137 \end{array}$$

$$175 - 38 = 137$$

			
Representing subtraction problems		<p>Use bar models to represent subtractions.</p> <p>'Find the difference' is represented as two bars for comparison.</p>  <p>Bar models can also be used to show that a part must be taken away from the whole.</p>	<p>Children use alternative representations to check calculations and choose efficient methods.</p> <p>Children use inverse operations to check additions and subtractions.</p> $\begin{array}{r} \text{H T O} \\ 270 \\ + 255 \\ \hline 525 \end{array}$ <p>I will check using addition.</p>
Multiplication	All children will be taught times tables to 12x12 and begin with formal written methods for short multiplication		
	Concrete	Pictorial	Abstract
Understanding equal grouping and repeated addition Using commutativity to support understanding of the times-	<p>Children continue to build understanding of equal groups and the relationship with repeated addition.</p>  <p>Children recognise that arrays can be used to model commutative</p>	<p>Children recognise that arrays demonstrate commutativity.</p>  <p><i>This is 3 groups of 4.</i> <i>This is 4 groups of 3.</i></p>	<p>Children understand the link between repeated addition and multiplication.</p>  <p><i>8 groups of 3 is 24.</i></p> $3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 24$ $8 \times 3 = 24$ <p>A bar model may represent multiplications</p>

<p>tables</p>	<p>multiplications.</p>  <p><i>I can see 2 groups of 6. I can see 6 groups of 2.</i></p> <p>$2 \times 6 = 12$ $6 \times 2 = 12$</p>	<p>$3 \times 4 = 12$ $4 \times 3 = 12$</p>	<p>as equal groups.</p>  <p>$6 \times 4 = 24$</p>
<p>Learning and understanding times-tables up to 12×12</p>	<p>Learn times tables to 12×12</p> <p>Understand the special cases of multiplying by 1 and 0.</p>  <p>$5 \times 1 = 5$</p>  <p>$5 \times 0 = 0$</p>	<p>Represent the relationship between the $\times 9$ table and the $\times 10$ table.</p>  <p>Represent the $\times 11$ table and $\times 12$ tables in relation to the $\times 10$ table.</p>  <p>$2 \times 11 = 20 + 2$ $3 \times 11 = 30 + 3$ $4 \times 11 = 40 + 4$</p>  <p>$4 \times 12 = 40 + 8$</p>	<p>Understand how times-tables relate to counting patterns.</p> <p>Understand links between the $\times 3$ table, $\times 6$ table and $\times 9$ table <i>5×6 is double 5×3</i></p> <p>$\times 5$ table and $\times 6$ table <i>I know that $7 \times 5 = 35$ so I know that $7 \times 6 = 35 + 7$.</i></p> <p>$\times 5$ table and $\times 7$ table $3 \times 7 = 3 \times 5 + 3 \times 2$</p>  <p>$\times 9$ table and $\times 10$ table $6 \times 10 = 60$ $6 \times 9 = 60 - 6$</p>
<p>Multiplying a 2-digit number by a 1-digit number, expanded column method</p>	<p>Use place value equipment to model how 10 ones are exchanged for a 10 in some multiplications.</p> <p>$3 \times 24 = ?$</p> <p>$3 \times 20 = 60$</p>	<p>Understand that multiplications may require an exchange of 1s for 10s, and also 10s for 100s.</p> <p>$4 \times 23 = ?$</p> <p>$4 \times 20 = 80$ $4 \times 3 = 12$</p>	<p>Short multiplication method</p>

	$3 \times 4 = 12$  $3 \times 24 = 60 + 12$ $3 \times 24 = 70 + 2$ $3 \times 24 = 72$	$4 \times 23 = 92$	<table border="1" data-bbox="1541 119 1706 343"> <tr><td></td><td>T</td><td>O</td></tr> <tr><td></td><td>3</td><td>4</td></tr> <tr><td>x</td><td></td><td>5</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>1</td><td>7</td><td>0</td></tr> </table> <p data-bbox="1556 351 1635 375">1 2</p>		T	O		3	4	x		5	<hr/>			1	7	0																										
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Column multiplication for 2- and 3-digit numbers multiplied by a single digit	<p>Use place value equipment to make multiplications. 26×3</p> <table border="1" data-bbox="358 651 600 821"> <thead> <tr><th>Tens</th><th>Ones</th></tr> </thead> <tbody> <tr><td>20</td><td>6</td></tr> <tr><td>20</td><td>6</td></tr> <tr><td>20</td><td>6</td></tr> </tbody> </table> <p>There are 3×6 ones... 18 ones There are 3×2 tens ... 6 tens $18 + 60 = 78$</p>	Tens	Ones	20	6	20	6	20	6	<p>Use place value equipment alongside a column method for multiplication of up to 3-digit numbers by a single digit.</p> <table border="1" data-bbox="929 683 1310 885"> <thead> <tr><th>Tens</th><th>Ones</th></tr> </thead> <tbody> <tr><td>10 10 10</td><td>1 1 1 1</td></tr> <tr><td>10 10 10</td><td>1 1 1 1</td></tr> </tbody> </table> <table border="1" data-bbox="1344 683 1505 896"> <tr><td></td><td>T</td><td>O</td></tr> <tr><td></td><td>3</td><td>4</td></tr> <tr><td>x</td><td></td><td>2</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>6</td><td>8</td><td></td></tr> </table>	Tens	Ones	10 10 10	1 1 1 1	10 10 10	1 1 1 1		T	O		3	4	x		2	<hr/>			6	8		<p>Use the formal column method for up to 3-digit numbers multiplied by a single digit.</p> <table data-bbox="1541 638 1646 726"> <tr><td>3</td><td>1</td><td>2</td></tr> <tr><td>x</td><td></td><td>3</td></tr> <tr><td colspan="3"><hr/></td></tr> <tr><td>9</td><td>3</td><td>6</td></tr> </table>	3	1	2	x		3	<hr/>			9	3	6
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Division	All children will be taught short division method (bus stop)																																											
	Concrete	Concrete	Concrete																																									
Understanding the relationship between multiplication and division, including times-tables	<p>Use objects to explore families of multiplication and division facts.</p>  $12 \div 3 = 4$ $3 = 12 \div 4$ $12 = 4 \times 3$ $3 \times 12 = 4$ $3 \div 4 = 12$ $3 \times 4 = 12$	<p>Represent divisions using an array.</p>  $24 \div 4 = 6$	<p>Understand families of related multiplication and division facts.</p> <p><i>I know that $5 \times 7 = 35$</i></p> <p><i>so I know all these facts:</i></p> $5 \times 7 = 35$ $7 \times 5 = 35$ $35 = 5 \times 7$ $35 = 7 \times 5$																																									

			$35 \div 5 = 7$ $35 \div 7 = 5$ $7 = 35 \div 5$ $5 = 35 \div 7$
Dividing 2-digit and 3-digit numbers by a single digit by partitioning into 100s, 10s and 1s	Partition into 10s and 1s to divide where appropriate. $39 \div 3 = ?$  $39 = 30 + 9$ $30 \div 3 = 10$ $9 \div 3 = 3$ $39 \div 3 = 13$ Use Base 10 equipment to divide where appropriate.	Partition into 100s, 10s and 1s using a part-whole model to divide where appropriate. $142 \div 2 = ?$  $100 \div 2 = \square$ $40 \div 2 = \square$ $6 \div 2 = \square$ $100 \div 2 = 50$ $40 \div 2 = 20$ $6 \div 2 = 3$ $50 + 20 + 3 = 73$ $142 \div 2 = 73$	
Dividing 2-digit and 3-digit numbers by a single digit, using short division			
Understanding remainders	Use place value equipment to find remainders. <i>85 shared into 4 equal groups There are 24, and 1 that cannot be shared.</i>	Represent the remainder as the part that cannot be shared equally.  $72 \div 5 = 14 \text{ remainder } 2$	Understand how partitioning can reveal remainders of divisions. $80 \div 4 = 20$ $12 \div 4 = 3$ $95 \div 4 = 23 \text{ remainder } 3$

