

Wessex Learning Trust

# Calculation Policy

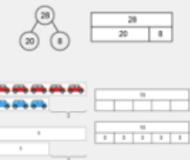


This policy has been written using the NCETM Calculation Guidance and the DfE Non-Statutory Guidance.

This policy is to ensure that pupils develop efficient strategies for solving calculations. Efficiency in calculation requires having a variety of mental strategies. Informal methods of recording calculations are an important stage to help children develop fluency with formal methods of recording. Teaching column methods for calculation provides the opportunity to develop both procedural and conceptual fluency. Teachers need to ensure that pupils understand the structure of the mathematics presented in the algorithms, with a particular focus on place value.

The consistent use of the CPA (concrete, pictorial, abstract) approach helps children develop mastery across all the operations in an efficient and reliable way. Children’s conceptual understanding of fluency is strengthened if they experience CPA representation of a concept during a lesson.

Pupils should be able to choose and use efficient calculation methods for addition, subtraction, multiplication and division. They must also have automatic recall of a core set of multiplicative and additive facts to enable them to focus on learning new concepts.

Representation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Tens frame 1NPV-1 1AS-1 1NF-1	2AS-1 2AS-3	3NPV-1 3NF-1 3NF-3	4NPV-1 4NF-3	5NPV-1 5NF-2 5MD-1	6NPV-1
	Number line 1NPV-1 1NPV-2 1NF-2	2NPV-2 2AS-2	3NPV-3 3F-3 3F-4	4NPV-3 4F-1 4F-2 4F-3	5NPV-3 5F-2 5F-3	6NPV-3 6F-1
	Gattegno chart 1NPV-1 1NF-2			4MD-1	5NPV-2 5MD-1	6NPV-1
	Partitioning diagrams including bar models 1AS-1 1AS-2 1NF-1	2NPV-1 2AS-1 2AS-3 2AS-4	3NPV-2 3NPV4 3AS-1 3AS-2 3AS-3 3F-2 3F-4	4NPV-2 4NPV-4 4MD-2 4F-3	5NPV-2 5NPV-4 5F-1	6NPV-4 6AS/MD-4 6F-3
	Groups of units in addition to ones such as Dienes, PV counters	2NPV-1 2AS-3 2AS-4 2MD-1 2MD-2	3AS-2 3MD-1	4MD-2 4F-2	5 NPV-1 5MD-3 5MD-4	6NPV-2

*A core set of representations have been selected to expose important mathematical structures and ideas, and make them accessible to the pupils.*

*Consistent use of representations across year groups help to connect prior learning to new learning.*

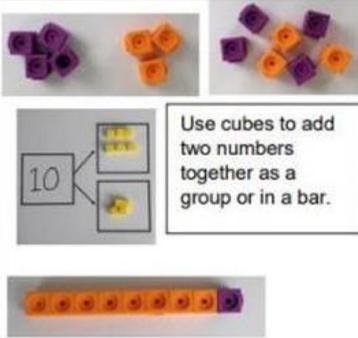
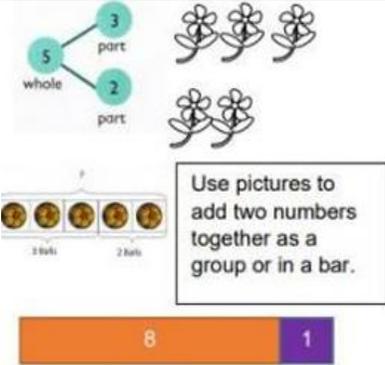
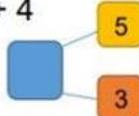
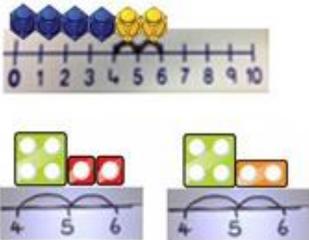
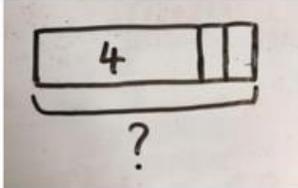
*These representations are found in the Ready-to-Progress materials*

# Addition

## EYFS and Year 1 Addition

### Key Vocabulary for Reception, Year 1 and 2

*whole, digit, part, number bonds, inverse, facts, problems, equals, 2 and 3 digit number  
addend, sum, add, plus, altogether, total, addition,*

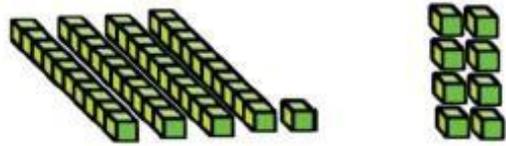
Objective/ Strategy	Concrete	Pictorial	Abstract
Combining two parts to make a whole: part-whole model	 <p>Use cubes to add two numbers together as a group or in a bar.</p>	 <p>Use pictures to add two numbers together as a group or in a bar.</p>	$4 + 3 = 7$  $10 = 6 + 4$  <p>Use the part-part whole diagram as shown above to move into the abstract.</p>
Starting at the bigger number and counting on	 <p>Start with the larger number and count on one by one. Bead strings can also be used.</p>	 <p>A bar model to encourage children to count on rather than count all.</p> <p>Children may also draw a number line and count on in ones or in one jump.</p>	$4 + 2 = 6$  Children place the larger number in their head and count on the smaller number to find the answer.  They may also think of the number line as an abstract idea – what is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2?

<p>Regrouping to make 10</p>	<p>6 + 5</p>	<p>Children draw the ten frame and counters / cubes. They may also partition the smaller number using the part-part-whole model to make 10</p>	<p><math>6 + 5 = 11</math></p> <p>Children start to understand the idea of equality</p> <p><math>6 + \quad = 11</math></p> <p><math>6 + 5 = 5 + \blacksquare</math></p> <p><math>6 + 5 = \blacksquare + 4</math></p>
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Year 2 Addition			
Objective/ Strategy	Concrete	Pictorial	Abstract
<p>Adding three single digits</p>	<p>Children should look for number bonds to 10, or doubles, to add more efficiently.</p>	<p>Children may draw a part-whole model or bar models to help.</p>	<p><b><math>7 + 6 + 3 = 16</math></b></p> <p><math>7 + 6 + 3 = 16</math></p>

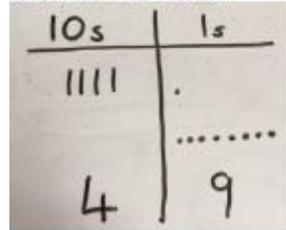
Adding a two-digit number and ones

TO + O using base 10. Continue to develop understanding of partitioning and place value.  
41 + 8

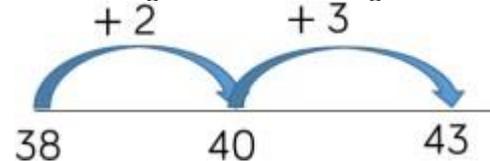


Practical apparatus used to find the number bond to 10

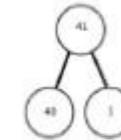
Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.



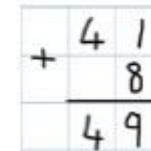
Children encouraged to count on from the larger number crossing 10



41 + 8



1 + 8 = 9  
40 + 9 = 49

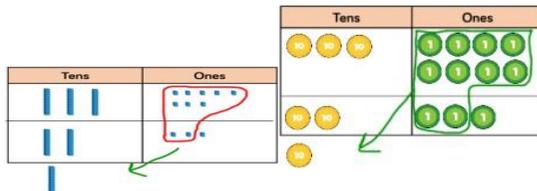


Children can also use their number bonds to 10 to help:

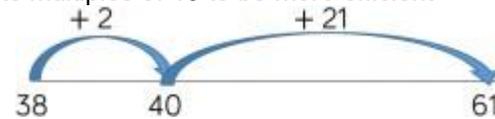
**38 + 5 = 43**

Adding two 2 digit numbers

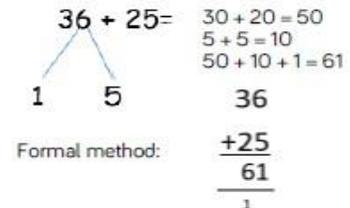
Children begin by adding 2-digit numbers with no exchange, using practical manipulatives to consolidate understanding alongside formal written methods (column addition). They then explore exchange.



Children can represent Base 10 or place value counters in a place value chart (see left) or continue to use number lines, jumping to multiples of 10 to be more efficient



Looking for ways to make 10.



Alternatively:  
36 + 20  
56 + 5

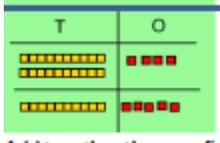
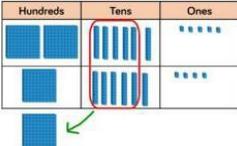
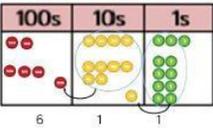
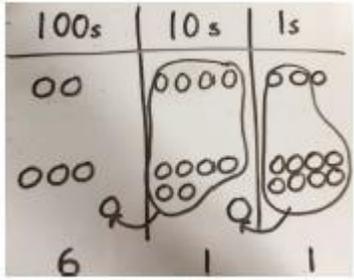
## KS2 Addition

### Key Vocabulary for Reception, Year 1 and 2

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addend, sum, add, plus, altogether, total, addition,*

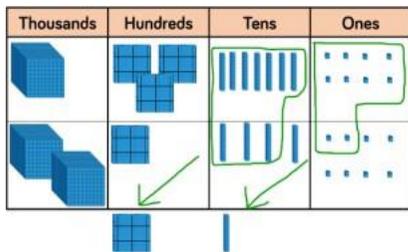
### Key Vocabulary for Years 3, 4, 5 and 6

*Column addition, exchange, estimate, operations, methods, 4 digit number*

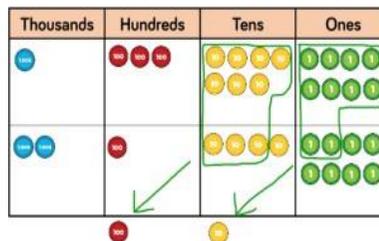
Objective/ Strategy	Concrete	Pictorial	Abstract
Adding numbers up to 3 digits – no exchange	Use Base 10 to solve practically, adding the ones first then the tens  Place value counters and grids will also be used (see below) with no regrouping (exchange)	Children may draw counters using a place value grid	They will use a written column method, adding the ones first, then the tens, then the hundreds $\begin{array}{r} 223 \\ + 114 \\ \hline 337 \end{array}$
Adding numbers with up to 3 digits - exchange	We will use base 10 $265 + 164 =$  Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. 	Children can represent the counters in a place value chart, showing where they need to exchange: 	Column method used: start with the ones first, then the tens, then the hundreds $\begin{array}{r} 243 \\ + 368 \\ \hline 611 \\ 11 \end{array}$

Adding numbers with up to 4 digits

Children will continue to use practical methods to add larger numbers – place value grids or Base 10. They will exchange 10 ones for a ten, 10 tens for a hundred and 10 hundreds for a thousand



Children can represent addition in a place value grid, using coloured circles to show the exchanges

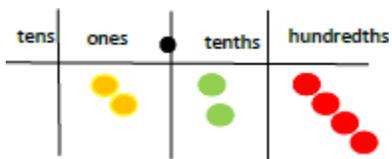


Children continue to use a formal written method of column addition

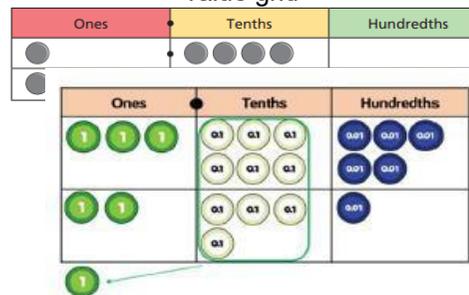
	1	3	7	8
+	2	1	4	8
	3	5	2	6
	1	1		

Adding numbers with more than 4 digits

Children use place value grids or Base 10 to consolidate understanding, using larger numbers  
Decimal place value counters introduced to help with exchange



Children may draw representations on a place value grid



Children use column methods accurately (relate decimals to money and measures)

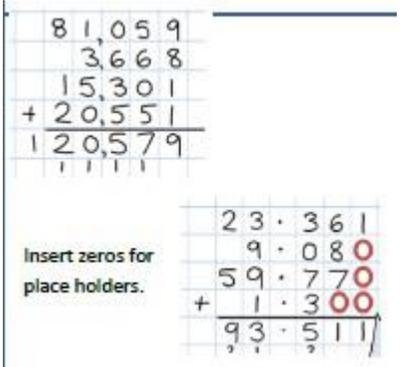
£	2	3	.	5	9
+	£	7	.	5	5
£	3		.		4

Estimate and use inverse operations to check answers to a calculation

**Calculate:**  $17 + 26 = 43$

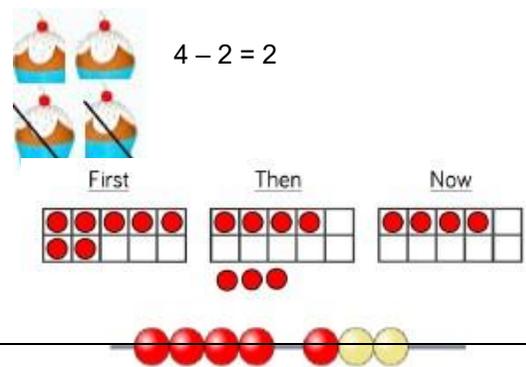
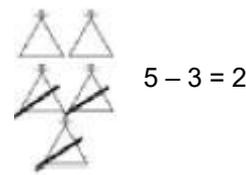
**Estimate:** Round 17 to 20 and 26 to 30.  
 $20 + 30 = 50$ .

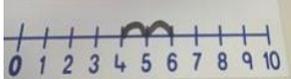
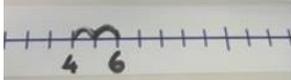
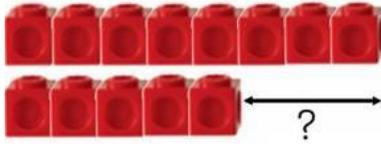
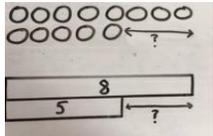
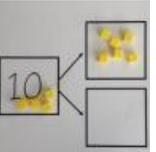
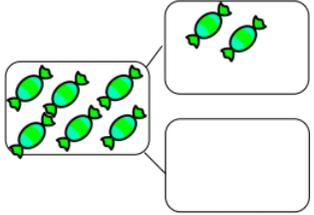
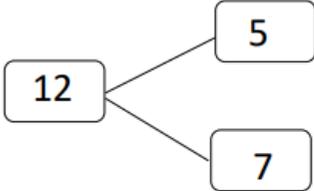
**Check:** Use the inverse operation (subtraction) to verify.  $43 - 26 = 17$  or  $43 - 17 = 26$ . Since  $17 + 26 = 43$ , and  $43 - 26 = 17$ , the original calculation is correct.

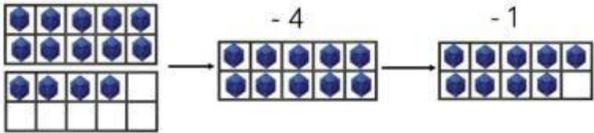
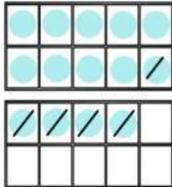
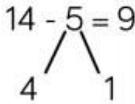
<p>Adding decimals, including money</p> <p>Adding several numbers of increasing complexity</p> <p>Adding money and measures with different numbers of decimal places</p>	<p>As Year 5, using place value counters to add decimals</p>	<p>As Year 5</p>	
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## EYFS and Year 1 Subtraction

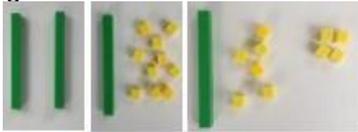
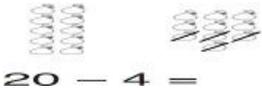
**Key Vocabulary for Reception, Year 1 and 2**  
*whole, digit, part, number bonds, inverse, facts, problems, equals, 2 and 3 digit number, minuend, subtrahend, subtraction, difference, take away, minus*

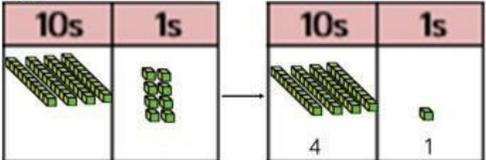
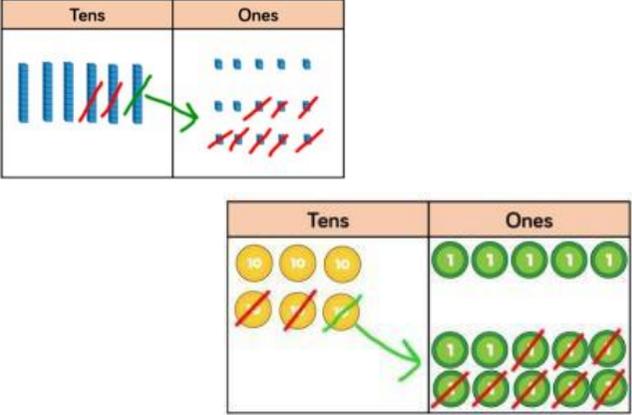
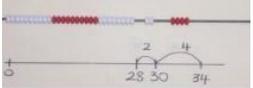
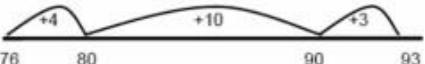
Objective/ Strategy	Concrete	Pictorial	Abstract
<p><b>Taking away ones</b> (starting within 10 and moving onto 20)</p>	<p>Use practical apparatus (counters, cubes, toys) to show how objects can be taken away</p> 	<p>Crossing out drawn objects to show what has been taken away</p> 	<p><math>7 - 4 = 3</math></p> <p><math>9 - 5 = 4</math></p>

<p><b>Counting back</b></p>	<p>Move objects away from the group, counting backwards</p>  <p>Moving beads along the string, counting backwards</p> 	<p>Count back in ones using a number line or a number track</p> <p><math>6 - 2 = 4</math></p> 	<p>Put 6 in your head and count back 2. What number are you at? Children can represent this on an empty</p>   <p>number line if needed</p>
<p><b>Finding the difference</b></p>	<p>Compare physical objects and quantities (display them carefully so they represent a bar model)</p> <p>Calculate the difference between 8 and 5.</p> 	<p>Count on using a number line to find the difference; they can also draw cubes or other concrete objects to show what they need to calculate</p> 	<p>Find the difference between 8 and 5. 8</p> <p>– 5, the difference is </p> <p>Children to explore why 9</p> <p>– 6 =</p> <p>8 – 5 =</p> <p>7 – 4 have the same difference</p>
<p><b>Part-part-whole model</b></p> <p>Represent and use number bonds and related subtraction facts within 20</p>	<p>Use part-part-whole models to show the link to addition (the inverse) with practical equipment</p>  <p>If 10 is the whole and 6 is one of the parts, what is the other part?</p>	<p>Draw the part-part-whole models pictorially</p> 	<p>Move to using numbers within part-part-whole models</p> 

<p><b>Make 10</b> using the ten frame</p>	<p>Use a ten frame and counters or cubes to create numbers and subtract using number bonds to 10 (partition the subtracted number)</p> <p>14 - 5</p> 	<p>Use number lines to count back to 10 and then beyond (bridging 10); they can also represent the ten frame pictorially and discuss what they did to make 10</p> 	<p>How many do we take off first to get to 10? How many left to take off?</p> $14 - 5 = 9$  <p>14 - 4 = 10 10 - 1 = 9</p>
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## Year 2 Subtraction

Objective/ Strategy	Concrete	Pictorial	Abstract
<p><b>Regroup a ten into 10 ones</b></p> <p><i>Regrouping = exchange</i></p>	<p>Use Base 10 to show practically that we can exchange a 10 for 10 ones</p> 	<p>Show the exchange of a 10 for 10 ones in pictures</p>  <p>20 - 4 =</p>	<p>Written calculation</p> $20 - 4 = 16$
<p><b>Partitioning to subtract (without exchange)</b></p> <p><i>Regrouping =</i></p>	<p>Use Base 10 to show how to partition the number when subtracting without exchange</p>	<p>Children draw representations of Base 10 and show the subtraction by crossing off</p>  <p>43 - 21 = 22</p>	<p>Begin to use column methods for 2-digit subtraction (without exchange)</p> $\begin{array}{r} 43 \\ -21 \\ \hline \end{array}$

<p><i>exchanging tens for ones</i></p>	<p>48-7</p> 		
<p><b>Column method with exchange</b> (2-digit numbers)</p>	<p>Use Base 10 and place value counters to demonstrate exchange practically</p> 	<p>Children can draw representations of Base 10 and place value to demonstrate understanding, showing the exchange</p>	<p>Children become more confident with the column method of subtraction (with exchange )</p> $\begin{array}{r} \overset{5}{6} \overset{1}{5} \\ - 28 \\ \hline 37 \end{array}$
<p><b>Make 10</b></p>	<p>Children count on to the next 10 and the rest using practical equipment</p>  <p>34-28</p>	<p>Use a number line to count onto next 10 and the rest</p>  <p>'counting on' to find 'difference'</p>	<p>Written calculation</p> $93 - 76 = 17$

## KS2 Subtraction

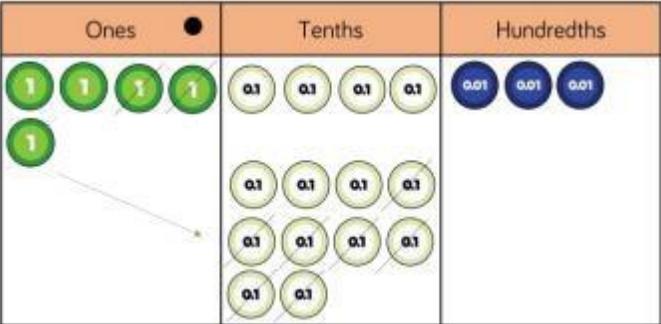
### Key Vocabulary for Reception, Year 1 and 2

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### Key Vocabulary for Years 3, 4, 5 and 6

*column subtraction, exchange, estimate, operations, methods, 4 digit number*

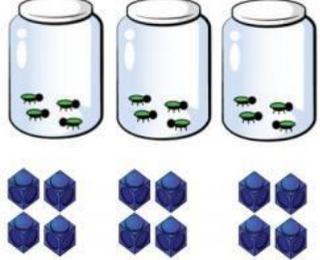
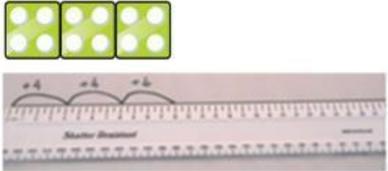
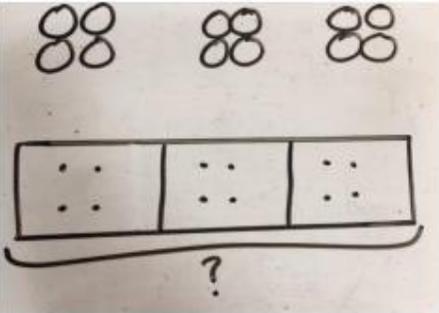
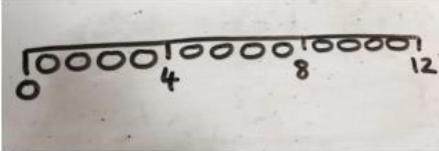
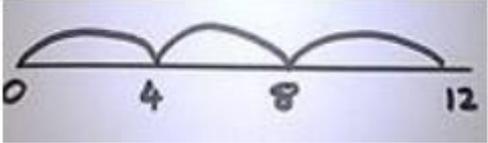
Objective/ Strategy	Concrete	Pictorial	Abstract
<p>Column method with exchange (up to 3-digit numbers)</p> <p><i>Further practice of 3-digit subtraction with no exchange</i></p>	<p>Use Base 10 and show the exchange practically; this can also be shown with place value counters (see below)</p>	<p>Represent the Base 10 or place value counters pictorially, showing the exchange</p>	<p>Formal written subtraction</p> $\begin{array}{r} \phantom{0}^3 \phantom{0}^1 \\ 435 \\ - 273 \\ \hline 262 \end{array}$
<p>Column method with exchange (up to 4-digit numbers)</p> <p><i>Introduce decimal subtraction in the context of money</i></p>		<p>Represent place value counters pictorially, showing the exchange</p>	<p>Formal column method – children need to understand what has happened when they cross out digits (exchange)</p> $\begin{array}{r} \phantom{0}^3 \phantom{0}^1 \\ 4357 \\ - 2735 \\ \hline 1622 \end{array}$

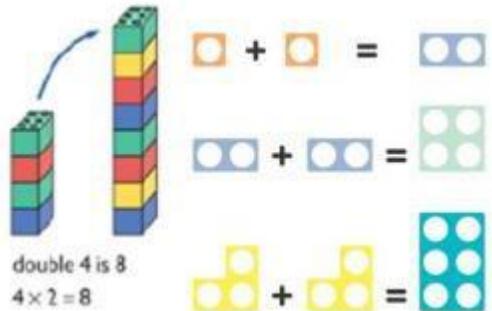
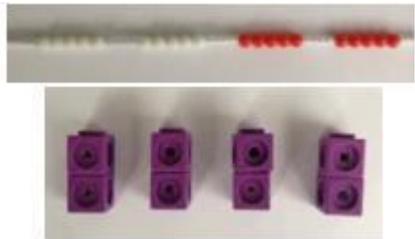
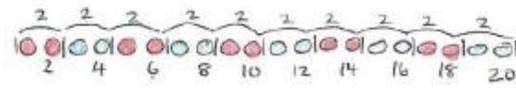
<p>Column method with exchange (more than 4-digit numbers)</p>	<p>See above – practical equipment still useful to consolidate understanding of exchange</p>	<p>See above</p>	<p>Formal column method (extend understanding of 0s for place holders)</p> $  \begin{array}{r}  \cancel{8} \cancel{1} 0 \cancel{8} 6 \\  - \quad 2128 \\  \hline  28928  \end{array}  $
<p>Column method to subtract numbers with up to 3 decimal places (same number of decimal places)</p>	<p>Place value counters to represent decimals</p> 	<p>Children draw or represent counters on a place value grid that includes decimals</p>	<p>Formal column method, aligning decimal point accurately</p> $  \begin{array}{r}  41 \\  5.43 \\  - 2.7 \\  \hline  2.73  \end{array}  $
<p>Column method to subtract larger numbers; decimals (different number of decimal places)</p>	<p>See above – practical equipment still used where needed to give clarity</p>	<p>See above</p>	$  \begin{array}{r}  \cancel{8} \cancel{1} 0,699 \\  - \quad 89,949 \\  \hline  60,750  \end{array}  $ $  \begin{array}{r}  \cancel{5} \cancel{1} 5 \cdot \cancel{4} 19 \text{ kg} \\  - \quad 36 \cdot 080 \text{ kg} \\  \hline  69 \cdot 339 \text{ kg}  \end{array}  $

## EYFS and Year 1 Multiplication

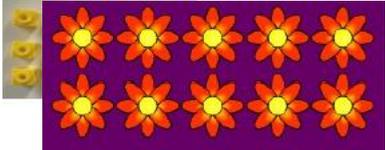
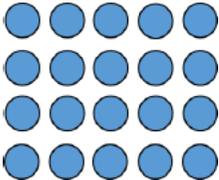
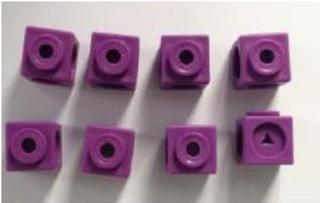
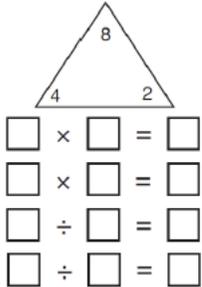
### Key Vocabulary for Reception, Year 1 and 2

*double, half, twice as many, equal, unequal, odd, even, multiplication, arrays, factor, product, commutative, repeated addition*

Objective/ Strategy	Concrete	Pictorial	Abstract
<b>Recognising and making equal groups; repeated addition</b>	<p>Use cubes, Numicon and other objects in the classroom</p> <p style="text-align: center;"><math>3 \times 4</math></p> <p style="text-align: center;">There are 3 equal groups, with 4 in each group.</p>  <p>Number lines can also be used to show repeated groups</p> 	<p>Represent practical resources in a picture and use a bar model</p>  <p>Pictorial representation alongside a number line</p> 	<p style="text-align: center;"><math>3 \times 4 = 12</math></p> <p style="text-align: center;"><math>4 + 4 + 4 = 12</math></p> <p>Abstract number line showing 3 jumps of 4</p> <p style="text-align: center;"><math>3 \times 4 = 12</math></p> 
<b>Doubling</b>	<p>Use cubes, Numicon and other objects in the classroom</p>	<p>Draw pictures to show how to double numbers</p>	<p style="text-align: center;"><math>4 \times 2 = 8</math></p>

	 <p>double 4 is 8  <math>4 \times 2 = 8</math></p>	<p>Double 4 is 8</p> 	
<p><b>Counting in multiples</b></p>	<p>Use cubes, Numicon and other objects in the</p>  <p>classroom</p>	<p>Draw representations to show counting in multiples</p> 	<p><math>2 \times 4 = 8</math></p>

## Year 2 Multiplication

Objective/ Strategy	Concrete	Pictorial	Abstract
<p><b>Arrays</b> – showing commutative multiplication</p>	<p>Objects can be laid out in arrays to find 2 lots of 5 (and 5 lots of 2) for example. Physical objects can also be used to create arrays (cubes)</p> 	<p>Children draw their own arrays to show understanding</p> 	<p style="text-align: center;"> <math>5 \times 4 = 20</math>  <math>4 \times 5 = 20</math>  <math>20 = 4 \times 5</math>  <math>5 + 5 + 5 + 5</math> </p> <p>Children can use the arrays to write multiplication sentences reinforcing repeated addition</p>
<p><b>Using the inverse relationship</b></p>	<p>Children will use practical objects to explore the relationship between multiplication and division</p> 		<p> <math>2 \times 4 = 8</math>  <math>4 \times 2 = 8</math>  <math>8 \div 2 = 4</math>  <math>8 \div 4 = 2</math>  <math>8 = 2 \times 4</math>  <math>8 = 4 \times 2</math>  <math>2 = 8 \div 4</math>  <math>4 = 8 \div 2</math> </p> <p>Show all 8 related fact family sentences.</p>

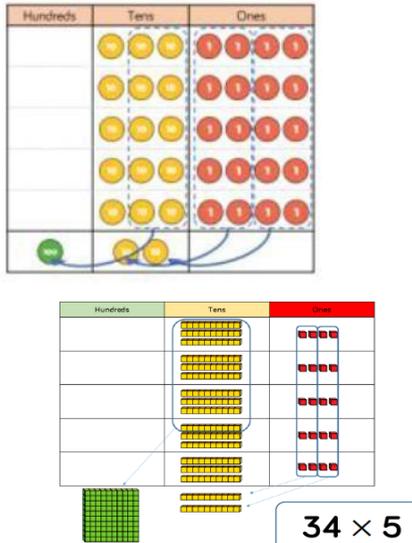
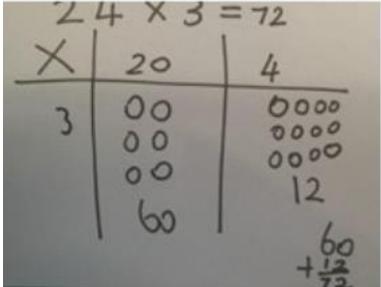
## KS2 Multiplication

### Key Vocabulary for Reception, Year 1 and 2

*double, half, twice as many, equal, unequal, odd, even, multiplication, arrays, factor, product, commutative, repeated addition,*

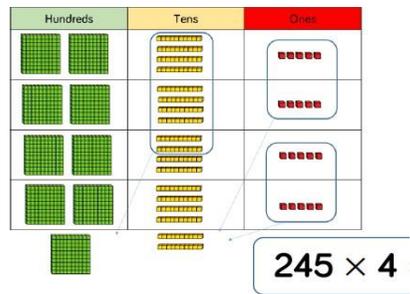
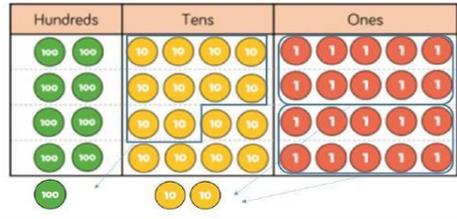
### Key Vocabulary for Years 3, 4, 5 and 6

*Integer scaling problems, corresponding problems, derived facts, factor pairs, formal written layout, distributive law, multiples, factors, prime numbers, square numbers, cube numbers, multi-digit numbers*

Objective/ Strategy	Concrete	Pictorial	Abstract																																																																											
<p>Column multiplication (2-digit x 1-digit numbers)</p>	<p>Children use place value counters and Base 10 to multiply practically</p> 	<p>Grid method may be drawn to help with understanding</p> 	<p>Children use understanding of practical methods to develop confidence with written methods of short multiplication (column multiplication) – expanded method used sometimes first</p> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr><th></th><th>H</th><th>T</th><th>O</th><th></th></tr> </thead> <tbody> <tr><td></td><td></td><td>3</td><td>4</td><td></td></tr> <tr><td>x</td><td></td><td></td><td>5</td><td></td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td></td><td></td><td>2</td><td>0</td><td>(5 × 4)</td></tr> <tr><td>+</td><td>1</td><td>5</td><td>0</td><td>(5 × 30)</td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td></td><td>1</td><td>7</td><td>0</td><td></td></tr> </tbody> </table> <table border="1" style="margin: 10px auto; border-collapse: collapse; text-align: center;"> <thead> <tr><th></th><th>H</th><th>T</th><th>O</th><th></th></tr> </thead> <tbody> <tr><td></td><td></td><td>3</td><td>4</td><td></td></tr> <tr><td>x</td><td></td><td></td><td>5</td><td></td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td></td><td>1</td><td>7</td><td>0</td><td></td></tr> <tr><td colspan="5"><hr/></td></tr> <tr><td></td><td>1</td><td>2</td><td></td><td></td></tr> </tbody> </table>		H	T	O				3	4		x			5		<hr/>							2	0	(5 × 4)	+	1	5	0	(5 × 30)	<hr/>						1	7	0			H	T	O				3	4		x			5		<hr/>						1	7	0		<hr/>						1	2		
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Column multiplication (2 and 3-digit numbers multiplied by 1-digit)

Children use place value counters and Base 10 to multiply practically, moving onto larger numbers and making sure they are always multiplying the ones first

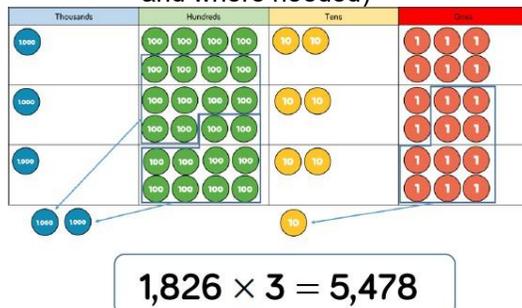


Children may continue to draw representations of Base 10 and place value counters but are encouraged to move towards the short, formal written method (see right)

	H	T	O
	2	4	5
x			4
	9	8	0
	1	2	

Column multiplication (up to 4-digit numbers multiplied by 1-digit numbers)

See above (practical methods used as revision and where needed)



See above

Written method

	Th	H	T	O
	1	8	2	6
x				3
	5	4	7	8
	2		1	

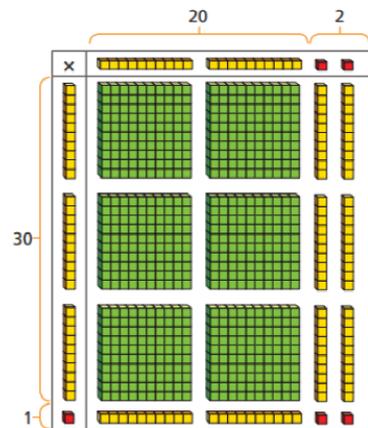
Column multiplication (2-digit numbers)

Children use place value counters and Base 10 to multiply practically, moving to the abstract method

See above

Written method (grid method may be used as an initial method before moving onto the formal, written method)

multiplied by  
2-digit  
numbers)

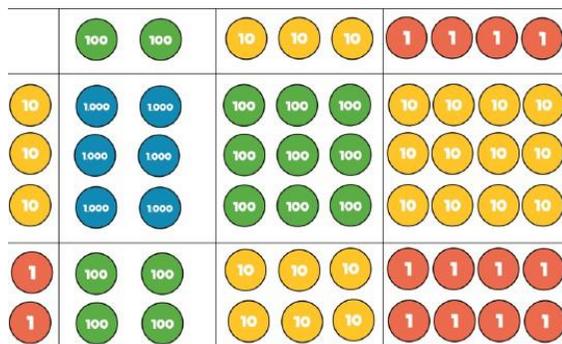


×	20	2
30	600	60
1	20	2

	H	T	O
		2	2
×		3	1
		2	2
	6	6	0
	6	8	2

Column  
multiplication  
(3-digit  
numbers  
multiplied by  
2-digit  
numbers)

Children use place value counters and Base 10 to consolidate understanding



See above

Children look at links to the grid method but move quickly onto the formal, written method of column multiplication

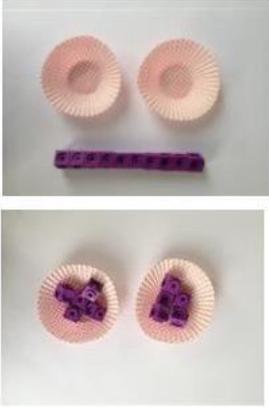
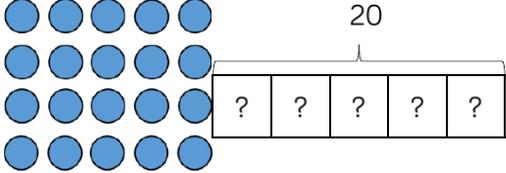
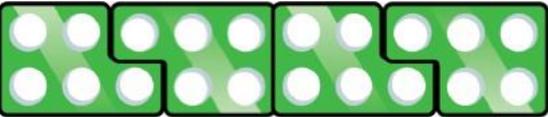
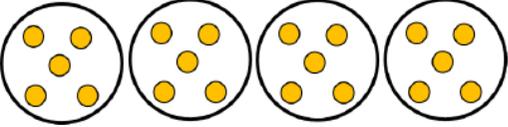
×	200	30	4
30	6,000	900	120
2	400	60	8

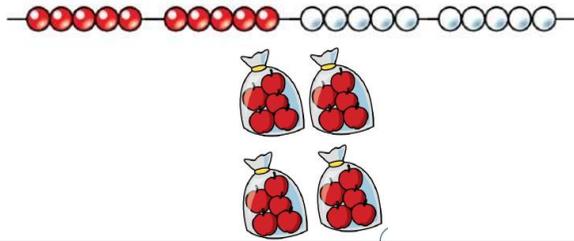
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<p>Column multiplication (multi-digit up to 4-digits multiplied by a 2-digit number)</p>	<p>Children should now be confident with the formal, written method of column multiplication. Practical equipment can be used to consolidate understanding. If children are still struggling with times tables, multiplication grids can be used as support so they can concentrate on the method</p>		<table border="1"> <thead> <tr> <th>TTh</th> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td></td> <td>2</td> <td>7</td> <td>3</td> <td>9</td> </tr> <tr> <td>x</td> <td></td> <td></td> <td>2</td> <td>8</td> </tr> <tr> <td colspan="5"><hr/></td> </tr> <tr> <td>22</td> <td>15</td> <td>93</td> <td>17</td> <td>2</td> </tr> <tr> <td>15</td> <td>4</td> <td>71</td> <td>8</td> <td>0</td> </tr> <tr> <td colspan="5"><hr/></td> </tr> <tr> <td>7</td> <td>6</td> <td>6</td> <td>9</td> <td>2</td> </tr> </tbody> </table> <table border="1"> <tbody> <tr> <td></td> <td>3</td> <td>1</td> <td>9</td> </tr> <tr> <td>x</td> <td>8</td> <td></td> <td></td> </tr> <tr> <td colspan="4"><hr/></td> </tr> <tr> <td>25</td> <td>5</td> <td>2</td> <td></td> </tr> <tr> <td></td> <td>1</td> <td>7</td> <td></td> </tr> </tbody> </table>	TTh	Th	H	T	O		2	7	3	9	x			2	8	<hr/>					22	15	93	17	2	15	4	71	8	0	<hr/>					7	6	6	9	2		3	1	9	x	8			<hr/>				25	5	2			1	7	
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# EYFS and Year 1 Division

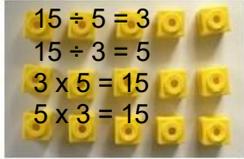
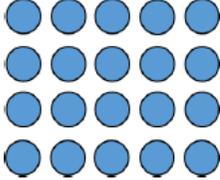
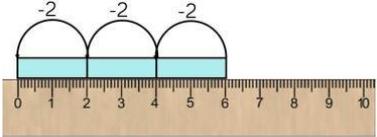
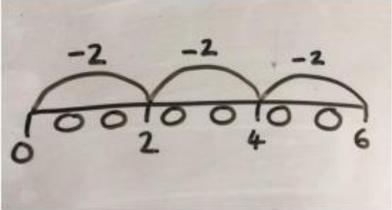
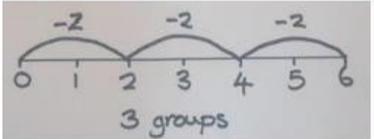
## Key Vocabulary for Reception, Year 1 and 2

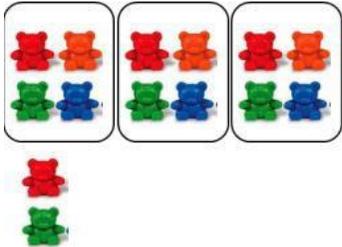
*double, half, equal, unequal, odd, even, factor, product, commutative, repeated addition, division, dividend, divisor, quotient*

Objective/ Strategy	Concrete	Pictorial	Abstract
<p><b>Sharing objects into groups</b></p>	<p>Use cubes and other objects in the classroom</p> 	<p>Children use pictures or shapes to share amounts into equal groups.</p>  <p>They may also use arrays or bar models as different pictorial representations</p> 	<p>At this stage, children do not need to record division formally but can use language like '20 shared between 5 is 4'</p>
<p><b>Division as grouping</b></p> <p><i>eg. I have 20 apples and put them in groups of 5. How many groups do I have?</i></p>	<p>Use cubes and other practical manipulatives to group objects</p> 	<p>Draw pictures to show groupings</p>  <p>Children may also use number lines to count in groups, or multiples</p> 	<p><math>20 \div 5 = 4</math> (children are introduced to the division symbol in Year 2)</p>



## Year 2 Division

Year 2 Division			
Objective/ Strategy	Concrete	Pictorial	Abstract
<p><b>Division within arrays</b> (links to multiplication)</p>	<p>Children link division to multiplication by making arrays practically and creating number sentences</p> 	<p>Children draw arrays and use lines to split them into groups, making multiplication and division sentences</p> 	<p>Children create division and multiplication families</p> $4 \times 5 = 20$ $5 \times 4 = 20$ $20 \div 4 = 5$ $20 \div 5 = 4$
<p><b>Repeated subtraction</b></p>	<p>Children use practical objects to subtract groups from a number ('chunks' of 2 for example)</p>  <p style="text-align: center;">3 groups of 2</p>	<p>Children represent repeated subtraction pictorially</p> 	<p>Children use an abstract number line to represent the equal groups that have been subtracted</p>  <p style="text-align: center;">3 groups</p>

<p><b>Division with a remainder</b> (times tables facts; repeated subtraction)</p>	<p>Divide practical objects into groups and see how many are left over ('remainders'). Cubes, lollipop sticks etc can be used</p>  <p><math>14 \div 4 = 3 \text{ r } 2</math></p>	<p>Children draw pictures to show remainders when dividing</p>  <p><math>14 \div 3 = 4 \text{ r } 2</math></p>	<p>Children understand that not all numbers divide perfectly (links to times tables)</p> <p><math>12 \div 3 = 4</math> (no remainder) <math>13 \div 3 = 4 \text{ r } 1</math></p>
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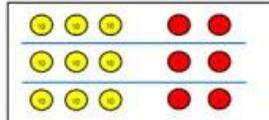
## KS2 Division

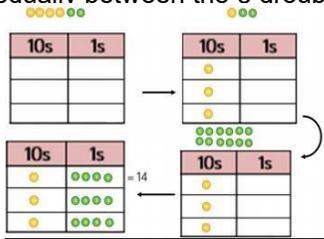
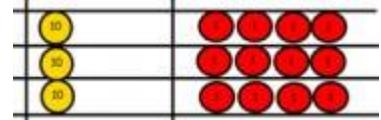
### Key Vocabulary for Reception, Year 1 and 2

*double, half, equal, unequal, odd, even, factor, product, commutative, repeated addition, division, dividend, divisor, quotient*

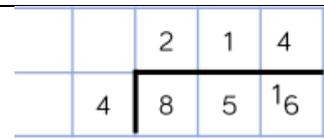
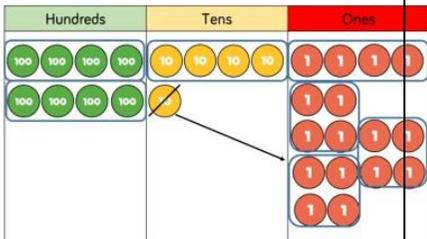
### Key Vocabulary Years 3, 4, 5 and 6

*exchange, remainders, short division, dividend, divisor, quotient, long division*

Objective/ Strategy	Concrete	Pictorial	Abstract						
<p>Division of 2-digit numbers by a 1-digit number (no exchange; short division introduced as an efficient method)</p>	<p>Children use Base 10 to start dividing larger numbers, partitioning into tens and ones. Place value counters will also be used to share numbers into equal groups</p> <p><math>96 \div 3</math></p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Tens</td> <td style="text-align: center;">Units</td> </tr> <tr> <td></td> <td style="text-align: center;">3</td> <td style="text-align: center;">2</td> </tr> </table> 		Tens	Units		3	2	<p>Children can represent the place value counters pictorially (see left)</p> <p>Children continue to recognise division as both sharing and grouping throughout KS2</p>	<p>Bus stop method (no exchange)</p> $\begin{array}{r} 32 \\ 3 \overline{)96} \end{array}$
	Tens	Units							
	3	2							

Division with a remainder	Children continue to explore division with remainders, reviewing smaller numbers using practical equipment (see Year 2)		
Division of 2-digit numbers by a 1-digit number (sharing with exchange)	<p>Children use Base 10 and then place value counters to exchange. Here, we are dividing 42 into 3 equal groups (or rows). We start with the tens; we can put 1 ten in each group and have 1 ten left over. We exchange this ten for 10 ones and then divide the ones equally between the 3 groups</p> 	<p>Children draw the place value counters to demonstrate understanding (supporting the practical method). Children can clearly see the equal groups</p> 	<p>Children extend understanding of the bus stop method using exchange (showing understanding of remainders)</p> $\begin{array}{r} 14 \\ 3 \overline{) 42} \end{array}$
Short division (up to 3-digits by a 1-digit number)	<p>Children continue to use Base 10 and place value counters to share 3-digit numbers into equal groups. Start with the equipment outside the place value grid before sharing the hundreds, tens and ones equally between the rows. Exchange can also be used</p> <p><math>844 \div 4 = 211</math> sharing</p> 	<p>Children draw the place value counters to demonstrate understanding (see left)</p>	<p>Children continue to use the bus stop method (with and without exchange)</p> $\begin{array}{r} 211 \\ 4 \overline{) 844} \end{array}$

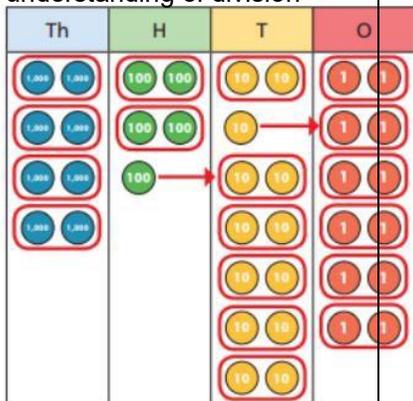
$856 \div 4$   
 $=$   
 $214$   
*grouping*



Short division  
 (up to 4-digits by  
 a 1-digit number,  
 including  
 remainders)

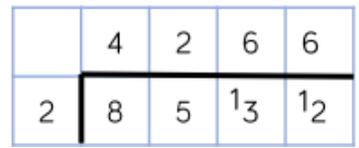
Place value counters can continue to be used  
 to support understanding of division

$8532 \div 2 =$   
 $4266$



Children can draw their own counters and  
 group them pictorially

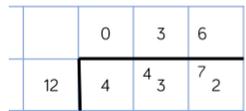
Children use the short method of division with  
 increasing confidence when dividing numbers with  
 multiple exchanges



Short division  
 (up to 4-digits by  
 a 2-digit  
 number)

When children begin to divide larger  
 numbers, written methods become more  
 efficient; concrete and pictorial methods are  
 less effective (see right)

Children can write out multiples to support



$432 \div 12 = 36$

$7,335 \div 15 = 489$



calculations with larger remainders

Long division  
(multi-digits  
by a 2-digit  
number)

		0	3	6
1	2	4	3	2
	-	3	6	0
			7	2
	-		7	2
				0

- $12 \times 1 = 12$
- $12 \times 2 = 24$
- $12 \times 3 = 36$
- $12 \times 4 = 48$
- $12 \times 5 = 60$
- $12 \times 6 = 72$
- $12 \times 7 = 84$
- $12 \times 8 = 96$
- $12 \times 9 = 108$
- $12 \times 10 = 120$

$$432 \div 12 = 36$$

$$7,335 \div 15 = 489$$

		0	4	8	9	
15	7	3	3	5		
-	6	0	0	0		
		1	3	3	5	
-		1	2	0	0	
				1	3	5
-				1	3	5
						0

- $1 \times 15 = 15$
- $2 \times 15 = 30$
- $3 \times 15 = 45$
- $4 \times 15 = 60$
- $5 \times 15 = 75$
- $10 \times 15 = 150$

When a remainder is left at the end of a calculation, children can leave it as a remainder or convert it to a fraction, depending on the question. They may also need to round

$$372 \div 15 = 24 \text{ r}12$$

			2	4	r	1	2
1	5	3	7	2			
-		3	0	0			
			7	2			
-			6	0			
				1	2		

- $1 \times 15 = 15$
- $2 \times 15 = 30$
- $3 \times 15 = 45$
- $4 \times 15 = 60$
- $5 \times 15 = 75$
- $10 \times 15 = 150$

			2	4	$\frac{4}{5}$
1	5	3	7	2	
-		3	0	0	
			7	2	
-			6	0	
				1	2

$$372 \div 15 = 24 \frac{4}{5}$$

## Multiplication Tables expectations in Year Groups

<b>Year 1</b>	Count in multiples of 2, 5 and 10. Recall and use doubles of all numbers to 10 and corresponding halves.
<b>Year 2</b>	Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.
<b>Year 3</b>	Recall and use the multiplication and division facts for the 3, 4 and 8 multiplication tables.
<b>Year 4</b>	Recall and use multiplication and division facts for multiplication tables up to 12 x 12.
<b>Year 5</b>	Revision of all multiplication and division facts up to 12 x 12.
<b>Year 6</b>	Revision of all multiplication and division facts up to 12 x 12.