Mauldeth Road Primary School

Calculation Policy

Policy Aims

This policy is supported by the White Rose Maths Scheme of Learning (SoL) and Ready To Progress Criteria. The White Rose SoL and Calculation Policy have been adopted throughout the school and alongside this document, encourage the use of a Mastery approach to teaching mathematics. Progression within each area of the calculation policy is in line with the Mathematics Programme of Study from the National Curriculum 2013. Our mathematics curriculum has mastery of each topic at its core premise and it is intended that mathematical fluency and reasoning underpin each objective. Children should be exposed to problem solving and encouraged to make connections in order to apply their knowledge in other subject areas.

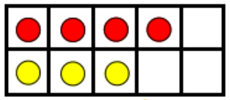
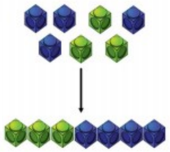
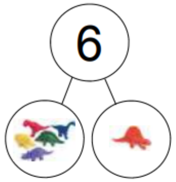
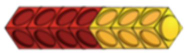
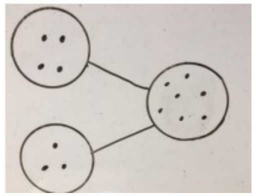
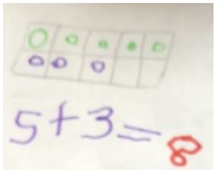
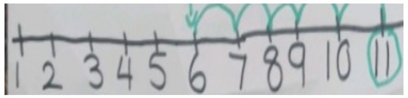
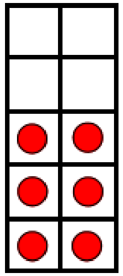
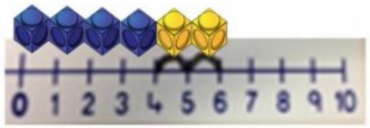
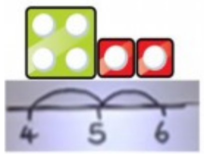
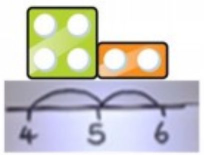
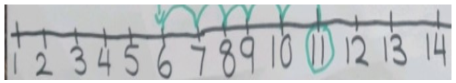
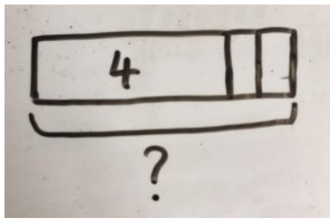
Throughout this document, the emphasis is put on the use of concrete, pictorial and abstract representations alongside formal written methods. Additionally, it ensures there are sufficient opportunities to explore mathematical language. It is vital that children understand why they are learning new mathematical skills and are encouraged to put each calculation into context from the very beginning of their learning journeys.

The examples given cover a range of suggestive means by which children can make sense of calculations. It is not indented to be exhaustive, it just gives a variety of different ways that calculations can be solved.

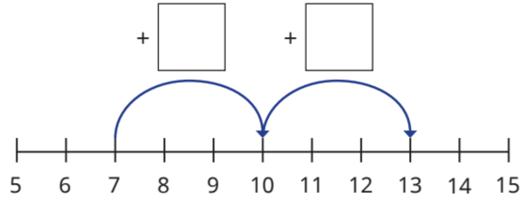
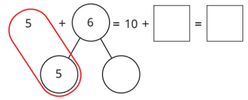
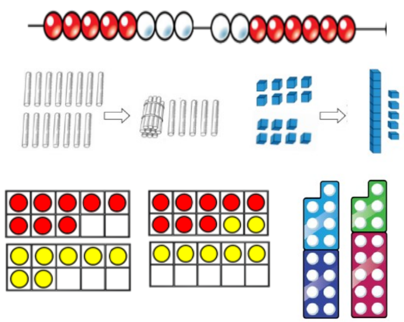
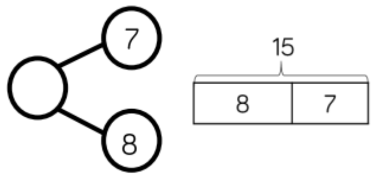
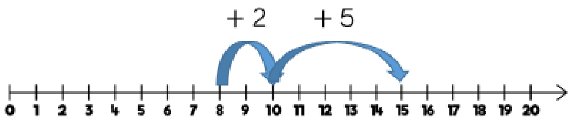
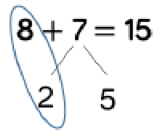
Addition Vocabulary Progression:

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
add	add	add	add	add	add	add
whole	whole	whole	whole	whole	whole	whole
part	part	part	part	part	part	part
altogether	altogether	altogether	altogether	altogether	altogether	altogether
more	more	more	more	more	more	more
ones	total	total	total	total	total	total
bigger	plus	plus	plus	plus	plus	plus
	regroup	regroup	regroup	regroup	regroup	regroup
	tens	tens	tens	tens	tens	tens
	ones	ones	ones	ones	ones	ones
	total	sum	sum	sum	sum	sum
		addend	addend	addend	addend	addend
		commutative	commutative	commutative	commutative	commutative
		inverse	inverse	inverse	inverse	inverse
		exchange	exchange	exchange	exchange	exchange
			increase	increase	increase	increase
			hundreds	hundreds	hundreds	hundreds
				thousands	thousands	thousands
					ten thousands	ten thousands
					hundred thousands	hundred thousands

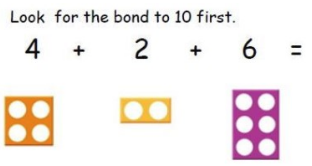
Addition

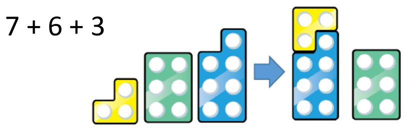
	Skill	Concrete	Pictorial	Abstract	Guidance
EYFS/Y1	Combine two parts to make a whole.	Any resources can be used, teddies, shells, cars etc.      	Children to represent the objects using dots or crosses. They could put each part on a part/part whole model too.   	 3 + 3 = 6	The children will use real objects to see that the quantity of a group can be changed by adding more. The first, then, now structure can be used to create mathematical stories in meaningful contexts. At first, the children may need to re-count all of the items to see how many they have altogether. When they are ready, support them to count on. E.g 4,5,6,7 Encourage the children to represent the number stories using 10 frames, number tracks and their fingers.
	Adding up to 10: Starting at the bigger number and counting on (Y1)	Start with the larger number and then count on to the smaller number 1 by 1 to find the answer.   	  A bar model which encourages the children to count on rather than count all.	Place the larger number in your head and count on the smaller number to find your answer. 5 + 3 = 8 	

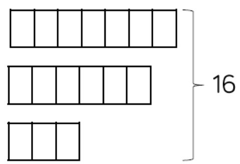
Addition

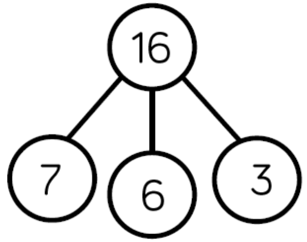
	Skill	Concrete	Pictorial	Abstract	Guidance
Year 1/2	Regrouping to make 10 (Y2)	 6 + 5 = regroup to fill a tens frame, making 10 + 1 = 9 + 3 = regroup to make 10 + 2 on a bead string 	 7 + 6 =		
	Add 1 and 2-digit numbers to 20	 When adding ones that cross 10, it is important to highlight that ten ones is equal to 10. Children should explore composing numbers to ten from 2 parts. And should recognise the +, - and = symbols. Different manipulatives can be used to represent the exchange. Using manipulatives alongside number lines and Base-10 blocks can help children when looking to count on or partition their 'jumps'. Children have a good understanding of base ten (tens and ones) as well as bar modelling ready for transition into Year 2.	 	 8 + 7 = 15 7 + 8 = 15 15 = 8 + 7 15 = 7 + 8	Children have a good understanding of base ten (tens and ones) as well as bar modelling ready for transition into Year 2. When using the '=' sign, children should be encouraged to say "Is equal to".

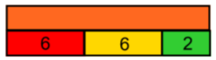
Addition

<table>
<tr><th></th><th>Skill</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th><th>Guidance</th></tr>
<tr><td rowspan="2">Year 2</td><td>Add three 1-digit numbers</td><td>


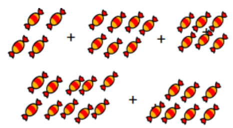
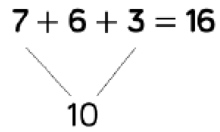


Manipulatives that highlight number bonds to 10 are effective when adding three 1-digit numbers.</td><td>


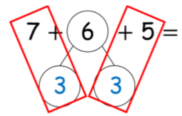




Add together three groups of objects. Draw a picture to recombine the groups to make 10.

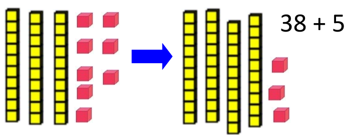
</td><td>


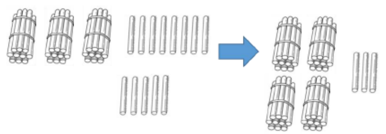
The method below can be supported with tens frames.

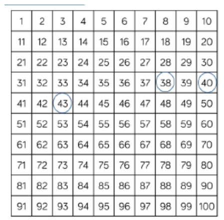


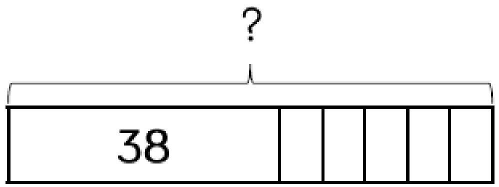
10 + 8 = 18</td><td>When adding three 1-digit number, children should be encouraged to look for number bonds to 10 or doubles to add the numbers more efficiently.

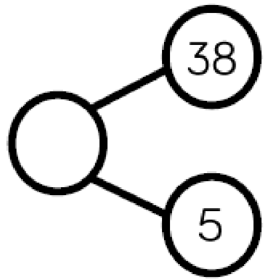
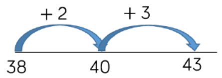
This supports children in their understanding of commutativity.</td></tr>
<tr><td>Add 1 and 2-digit numbers to 100.</td><td>When children are adding a single digit number, they should be encouraged to use their number bonds to 10 to help them complete the calculation more efficiently. Hundred squares and manipulatives can support this.





</td><td>


</td><td>


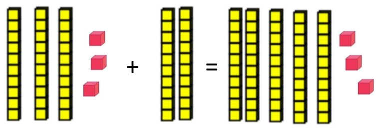
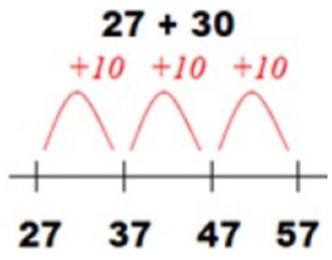
$\boxed{38 + 5 = 43}$

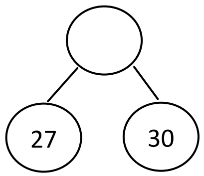
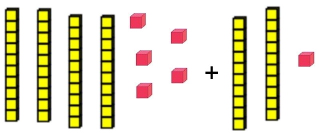
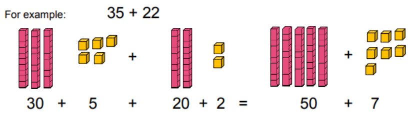
38 + 5 = 43
5 + 38 = 43
43 = 38 + 5
43 = 5 + 38</td><td>When adding single digit to a two-digit number, children should be encouraged to count on from the larger number.

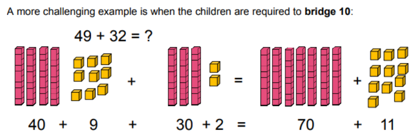
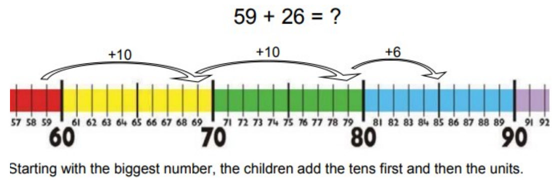
They should apply their knowledge of number bonds to add more efficiently. E.g 8 + 5 = 13 so 38 + 5 = 43.

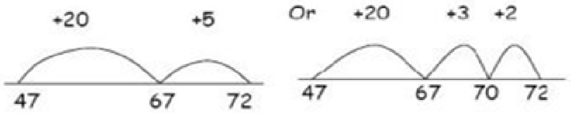
Hundred squares and manipulatives can support children to find the number bond to 10.</td></tr>
</table>

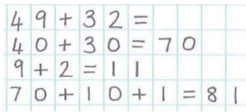
Addition

<table>
<tr><th></th><th>Skill</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th><th>Guidance</th></tr>
<tr><td rowspan="2">Year 2</td><td>Add a 2 digit number and tens</td><td>
Children use base 10 to add a multiple of ten to a 2-digit number. They can explore how the ones digit does not change.</td><td>

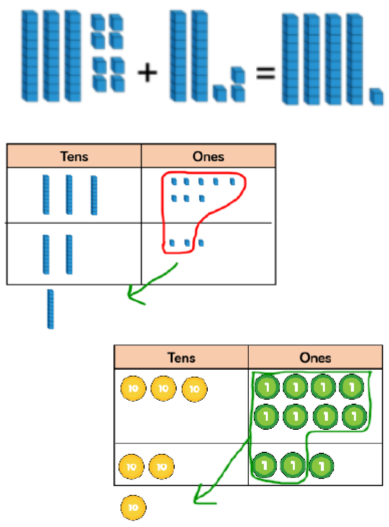
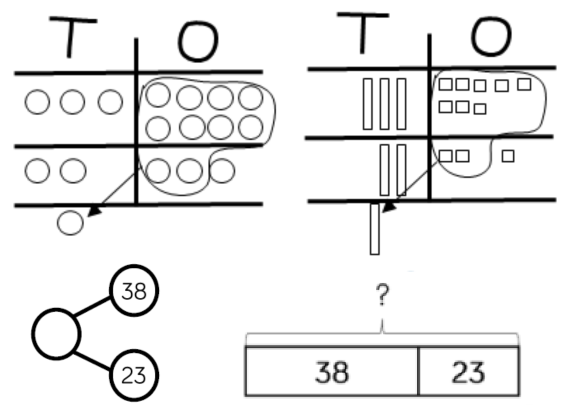
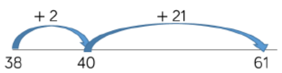
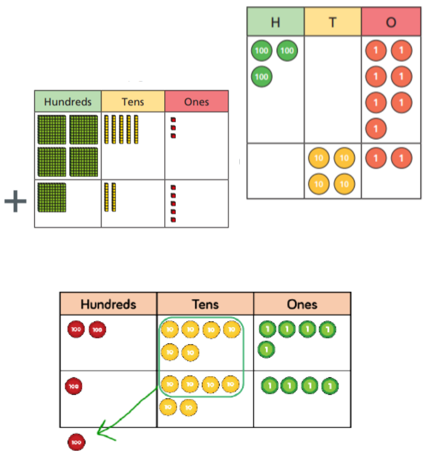
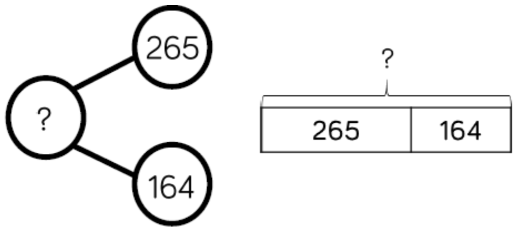
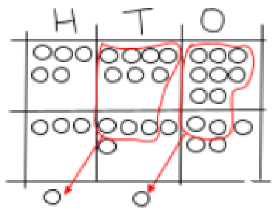
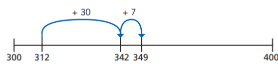
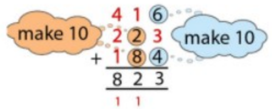
Children can use a number line to count on in 10's.

</td><td>27 + 10 = 37
27 + 20 = 47
27 + □ = 57</td><td></td></tr>
<tr><td>Add two 2-digit numbers up to 100</td><td>Model using base 10 , place value counters and numicon.

Initially, the children might use base 10 resources to partition the numbers into their tens and units and then add them separately.



</td><td>The children can draw out base ten or place value counters to help them visualise this.
They can also use a number line to add the two digit numbers.


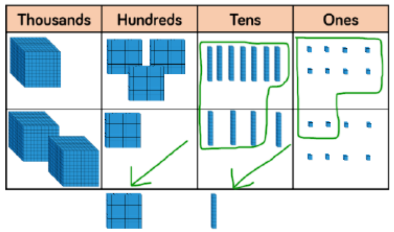
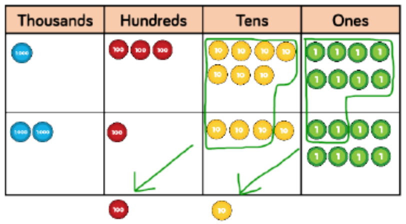
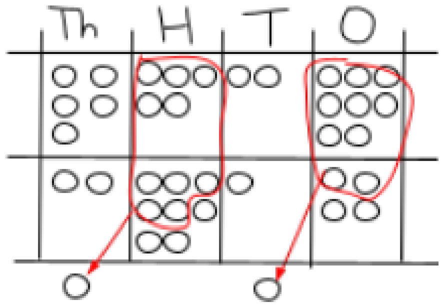
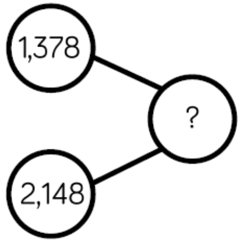
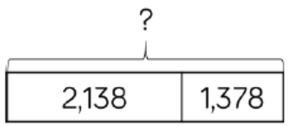
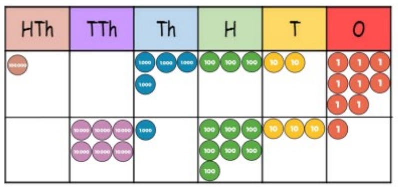
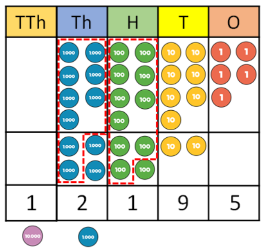
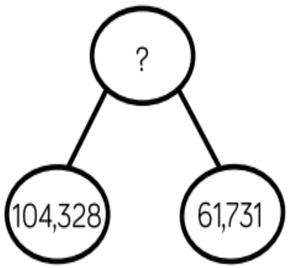
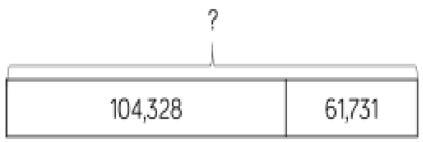


Use number line and bridge ten using part whole if necessary.</td><td>When recording, children can show each step in their calculation.
e.g.

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

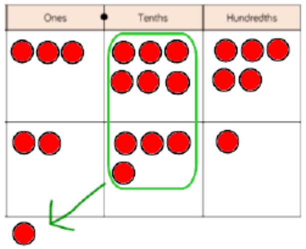
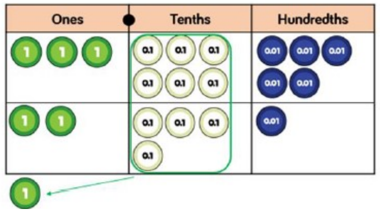
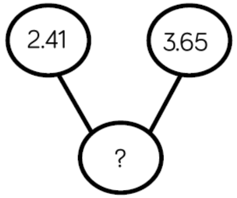
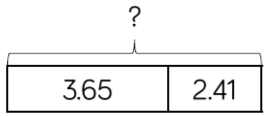
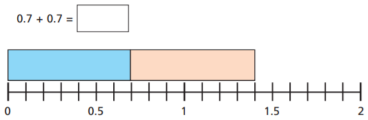
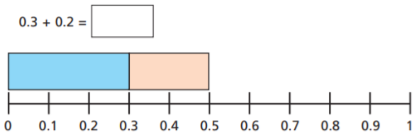
Addition

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 2/3	Add 2 digit numbers to 100 - Formal written method		After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$ 	At this stage, encourage children to use the formal column method when calculating alongside base 10 or place value counters. Children can also use a blank number line to count on to find the total. Encourage them to jump to multiple of 10. to become more efficient.
	Add numbers with up to 3 digits		 After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 	 $$\begin{array}{r} 265 \\ +\ 164 \\ \hline 429 \\ \hline 1 \end{array}$$ 	Base 10 and place value counters are the most effective manipulatives when adding numbers with up to 3 digits. Ensure children write out the calculation alongside any concrete resources so they can see the links to the written column method. # Plain counters on a place value gris can also be used to support learning.

Addition

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 4	Add numbers with up to 4-digits	 	  	1 3 7 8 + 2 1 4 8 3 5 2 6 1 1	At this stage, the use of counters or Base-10 are the most efficient manipulatives when adding numbers up-to 4 digits. Children should use the formal method of addition alongside any use of concrete resources so they can see any links to the written column method. For some examples, encouraging children to look for bonds to ten, will help with regrouping. The use of bars will help children unpick word questions, these should be used alongside the formal written method. Formal, written column addition should include the highlighting of Place Value 'titles' (Th, H, T, O etc.)
Year 5/6	Add numbers with more than 4 digits	 	 	1 0 4 3 2 8 + 6 1 7 3 1 1 6 6 0 5 9 1	At this stage, the use of counters or Base-10 are the most efficient manipulatives when adding numbers up-to 4 digits. At this stage, children should be encouraged to work in the abstract, using column methods. The use of bars will help children unpick word questions, these should be used alongside the formal written method.

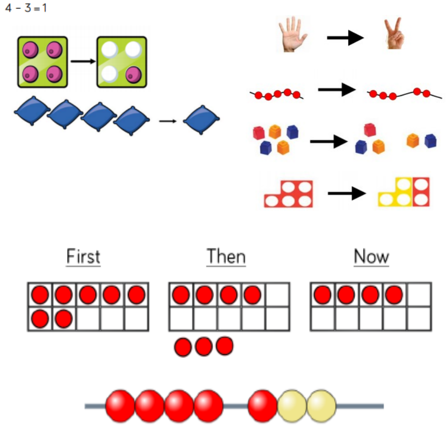
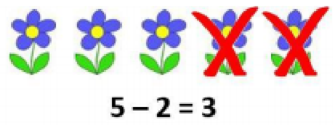
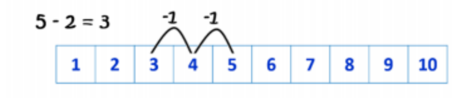
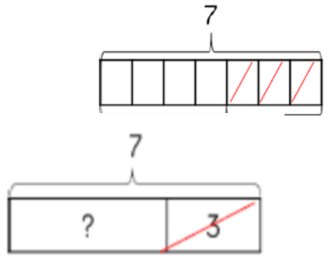
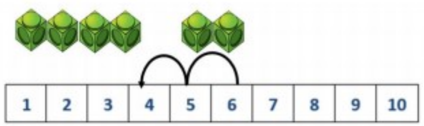
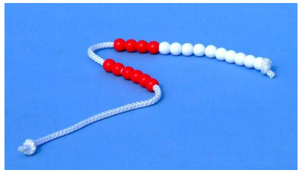
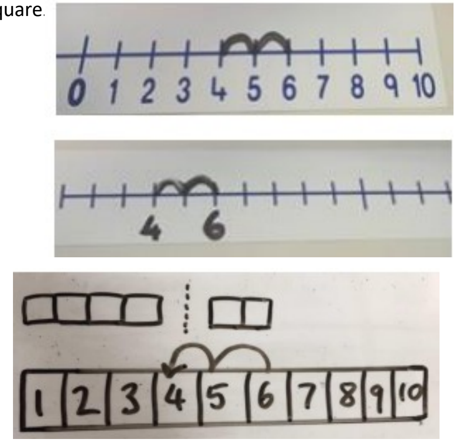
Addition

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 5/6	Add with up to 3 decimal places.	 	   	$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline {\scriptstyle 1}\ \ \ \ \end{array}$ 0.45 + 0.67 = 0.55 + 0.12 0.45 + 0.55 + 0.12 = 1.12	Place value counters and plain counters on a place value grid are the most effective manipulatives when adding decimals with 1,2 and 3 decimal places. Ensure children have experience of adding decimals with a variety of decimal places. This includes putting this into context when adding money and other measures.

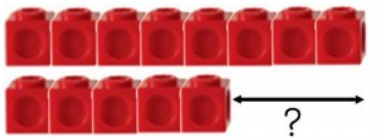
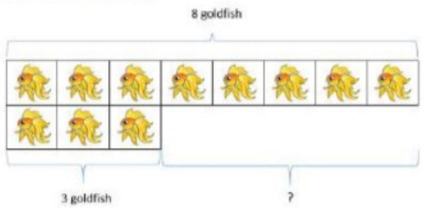
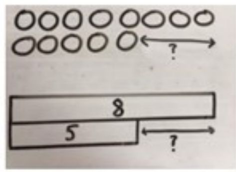
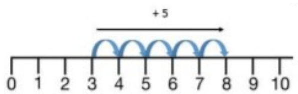
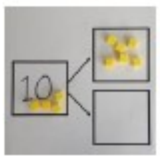
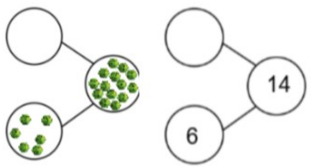
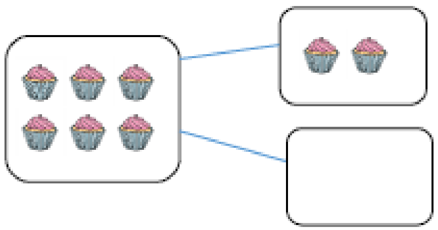
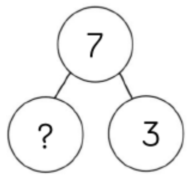
Subtraction Vocabulary Progression:

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
whole	whole	whole	whole	whole	whole	whole
part	part	part	part	part	part	part
less	less	less	less	less	less	less
take away	take away	take away	take away	take away	take away	take away
fewer	difference	difference	difference	difference	difference	difference
smaller	minus	minus	minus	minus	minus	minus
	less than	less than	decreased by	decreased by	decreased by	decreased by
		exchange	exchange	exchange	exchange	exchange
		regroup	regroup	regroup	regroup	regroup
		partition	partition	partition	partition	partition
			minuend	minuend	minuend	minuend
			subtrahend	subtrahend	subtrahend	subtrahend
			rebalance	rebalance	rebalance	rebalance
			estimate	estimate	estimate	estimate
			efficient	efficient	efficient	efficient
					approximate	approximate
					approximate	approximate

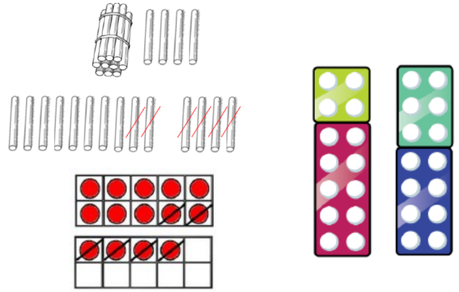
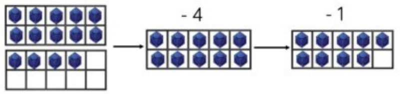
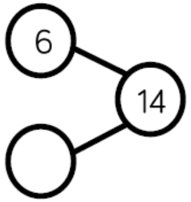
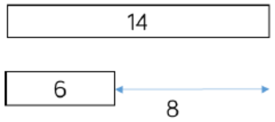
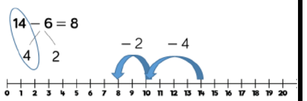
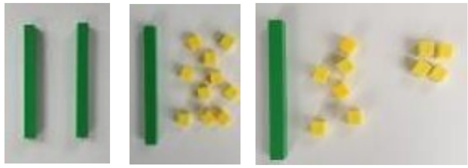
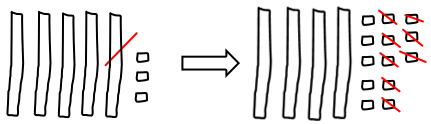
Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Reception/ Year 1	Take away up to 10	**Physically taking and away objects from a whole** Tens frames, numicon, bean bags etc can be used. 	Crossing out what has been taken away  Starting to use a number line to take away ones  	7 - 3 = 4 4 = 7 - 3	
	Counting back	Counting back (using beads, blocks, number tracks etc). 6 - 2 = 4  20 - 6 = 	Count back on a number line, number track or hundred square. 	Put 9 in your head, count back 6, use your fingers to help. 	

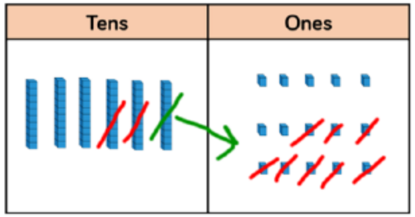
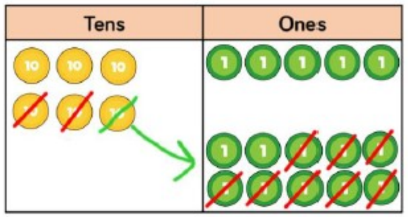
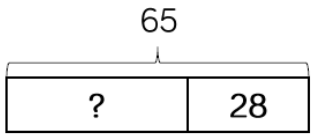
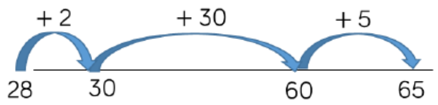
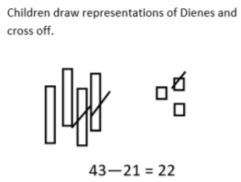
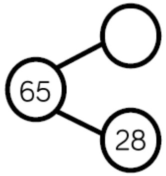
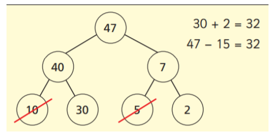
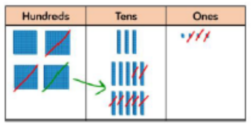
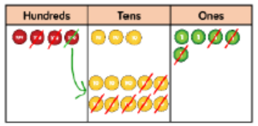
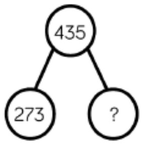
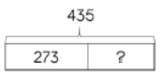
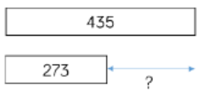
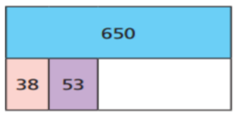
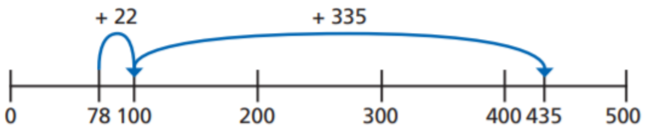
Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 1	Find the difference within 20	Finding the difference (use Numicon, base 10 and other objects) Calculate the difference between 8 and 5.  Compare amounts and objects to find the difference.  	Find the difference by drawing out the objects and counting the difference.  When finding the difference, use bar modelling to show the children that we are finding the missing number and that it is a subtraction. Also use part part whole modelling to visualise this.   Count on to find the difference.	5 - 3 = 2 5 and 3 have a difference of 2.	
	Specific direction into using the Part-Part whole model	The part part whole model makes links with addition, helping to explain the inverse between addition and subtraction. If 10 is the whole and 6 is one of the parts, what is the other part?   	Use a pictorial representation of objects to show the part part whole model 	Move to using numbers within the part whole model.  	

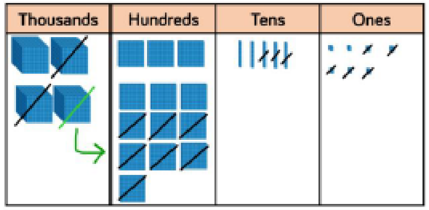
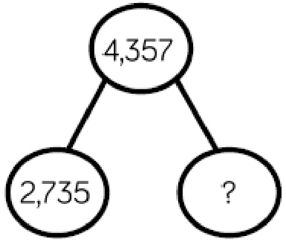
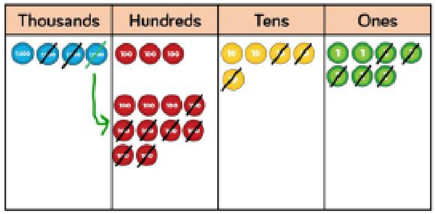
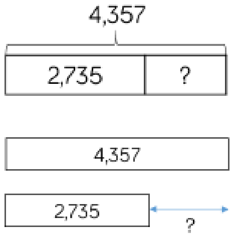
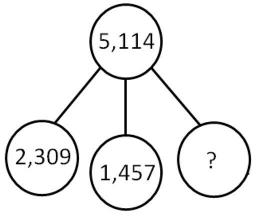
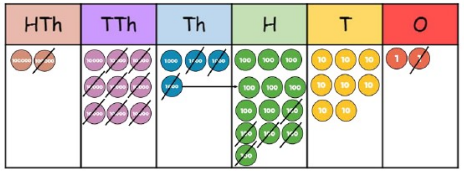
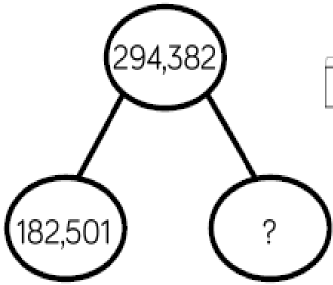
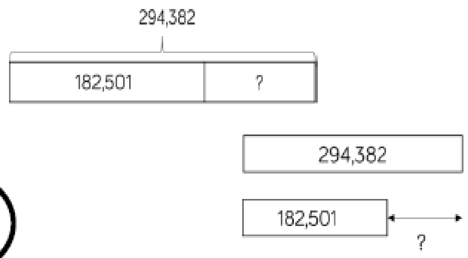
Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 1/2	Subtract 1 and 2-digit numbers to 20	 Make 14 on the tens frame. Split the 5 being taken away into a 4 and a 1 . Take the 4 away first to leave 10 then take the remaining 1 away. 14 - 5 	 		
Year 2	Subtract numbers to 100 using regrouping	 Use base 10 to show how to change a ten into ones. Use the term ‘exchange’.	53 - 8 = 	53 - 8 = 45 45 = 53 - 8	

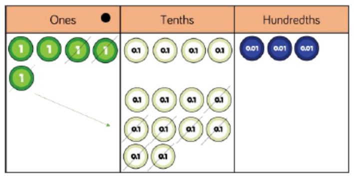
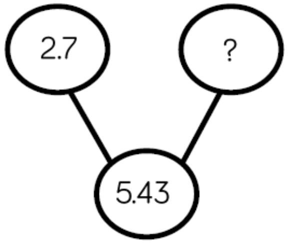
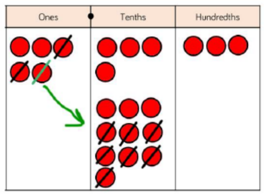
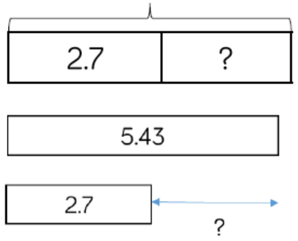
Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 2/3	Subtract 1 and 2-digit numbers to 100 - Formal written method without and exchange	 	   	$\begin{array}{r} {}^{5}\cancel{6}{}^{1}5 \\ -\ 28 \\ \hline 37 \\ \hline \end{array}$ 	At this stage, children should be encouraged to partition their subtrahend into tens and ones. Children should also be taught to exchange tens into ones when necessary. Children are encouraged to move towards a formal method of calculation alongside Base 10, counters or tens frames. Terminology is key here, it is important to avoid terms such as 'borrowing' or 'take from' when exchanging. When using the '=' sign, children should be encouraged to say "Is equal to".
	Subtract numbers with uo to 3 digits.	    	 Whitney uses a number line to show that 435 – 78 = 357  Explain what you think Whitney has done.	$\begin{array}{r} {}^{3}\cancel{4}{}^{1}35 \\ -\ 273 \\ \hline 262 \\ \hline \end{array}$	Base 10 and place value counters are the most effective manipulative when subtracting numbers with up to 3 digits. Ensure children write out their calculation alongside any concrete resources so they can se links to the written method. Plain counters on a place value grid can also ne used to support learning.

Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 4	To subtract numbers with up to 4 digits.	 	  	Th H T O 3 1 $\cancel{4}357$ $-\ 2735$ 1622	At this stage, children should be encouraged to identify how many exchanges they will need to do, before they start the calculation. Children should be exposed to exchanging through zeros with explanation as to how to do this and why. Ensure that children write out their calculation alongside any concrete resources they have used. Terminology is key here, it is important to avoid terms such as 'borrowing' or 'take from' when exchanging. Use Dienes to model the calculations, and to draw attention to the exchange in subtraction. Move away from using Dienes when children are more confident.
Year 5/6	To subtract numbers with more than 4 digits	 		2 9 $\cancel{4}^{3}$ $^{1}3$ 8 2 − 1 8 2 5 0 1 1 1 1 8 8 1	Place value counters or plain counters on a place value grid are the most effective concrete resources when subtracting numbers with more than 4 digits. At this stage, children should be encouraged to work in the abstract, using the column method to subtract larger numbers efficiently.

Subtraction

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 5/6	To subtract with up to 3 decimal places	 	 	$\begin{array}{r} \overset{4}{\cancel{5}}.{}^{1}43 \\ -\ 2.7 \\ \hline 2.73 \\ \hline \end{array}$	At this stage, the use of place value counters or plain counters are the more efficient method when adding decimals of 1,2 or 3 decimal places. Bead strings can be used to show relationship between whole numbers and decimal numbers and be used to count on our back. Children should use the formal method of addition alongside any use of concrete resources so they can see any links to the written column method. The use of bars will help children unpick word questions, these should be used alongside the formal written method. Ensure Children have had plenty of experience of adding decimals with a verity of decimal places. This includes putting this into context e.g. money and other measures.

Glossary

Addend - A number to be added to another.

Aggregation - combining two or more quantities or measures to find a total.

Augmentation - increasing a quantity or measure by another quantity.

Commutative – numbers can be added in any order.

Complement – in addition, a number and its complement make a total e.g. 300 is the complement to 700 to make 1,000

Difference – the numerical difference between two numbers is found by comparing the quantity in each group.

Exchange – Change a number or expression for another of an equal value.

Minuend – A quantity or number from which another is subtracted.

Partitioning – Splitting a number into its component parts.

Reduction – Subtraction as take away.

Subitise – Instantly recognise the number of objects in a small group without needing to count.

Subtrahend - A number to be subtracted from another.

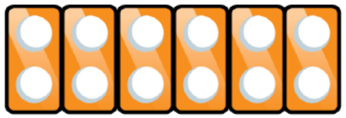
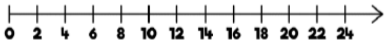
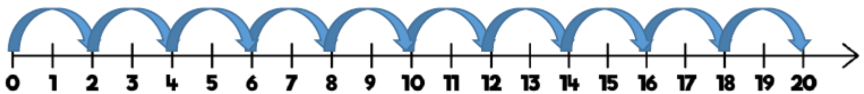
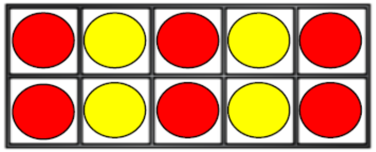
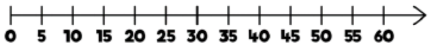
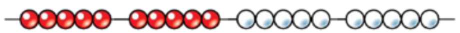
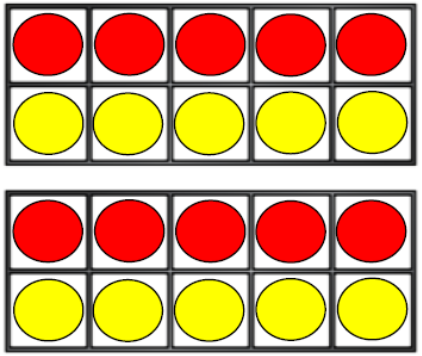
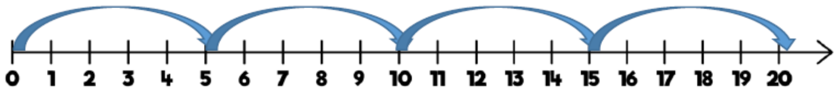
Sum - The result of an addition.

Total – The aggregate or the sum found by addition.

Multiplication Vocabulary Progression:

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
part	part	part	part	part	part	part
whole	whole	whole	whole	whole	whole	whole
double	double	double	double	double	double	double
equal	equal	equal	equal	equal	equal	equal
group	group	group	group	group	group	group
	multiply	multiply	multiply	multiply	**multiply**	multiply
	Repeated addition	Repeated addition	Repeated addition	Repeated addition	**Repeated addition**	Repeated addition
	multiple	array	array	array	array	array
		commutative	commutative	commutative	commutative	commutative
		product	product	product	product	product
		factor	factor	factor	factor	factor
		multiple	multiple	multiple	multiple	multiple
		row	row	row	row	row
		column	column	column	column	column
			efficient	efficient	efficient	efficient
					multiplicand	multiplicand

Multiplication - Times Tables

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 2	2 times table	      			Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the tow times table, using concrete manipulatives to support. Notice how all the numbers are even and there is a pattern in the ones. Use different methods fluently.
	5 times table	      			Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the five times table, using concrete manipulatives to support. Notice the pattern in the ones as well as highlighting the odd, even, odd, even pattern.

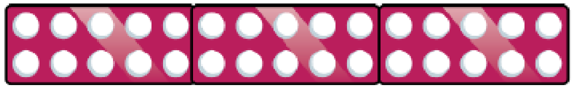
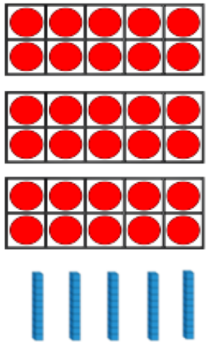
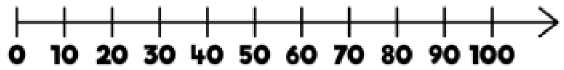
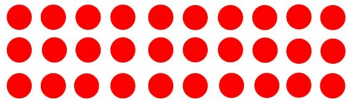
2 times table (hundred square):

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

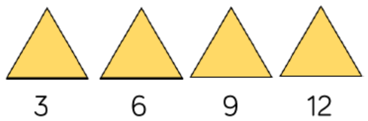
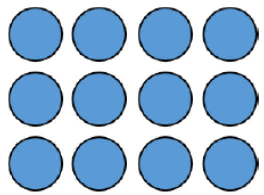
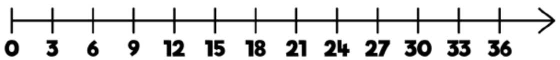
5 times table (hundred square):

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Multiplication - Times Tables

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 2	10 times table	 	   	10 + 10 + 10 + 10 4 x 10 = 40 10 x 4 = 40 commutative	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the ten times table, using concrete manipulatives to support. Notice the pattern in the digits - the ones are always 0, and the tens increase by 1 ten each time.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 3	3 times table	 	  	3 + 3 + 3 + 3 + 3 + 3 6 x 3 = 18 3 x 6 = 18 commutative	Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square. Look for patterns in the three times table, using concrete manipulatives to support. Notice the odd, even, odd, even pattern using number shapes to support. Highlight the pattern in the ones using a hundred square.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

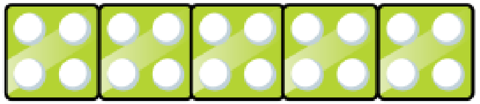
12			
3	3	3	3

Multiplication - Times Tables

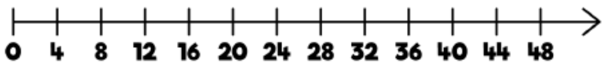
	Skill	Concrete	Pictorial	Abstract	Guidance

Year 3

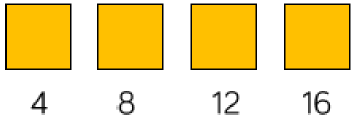
Skill: 4 times table

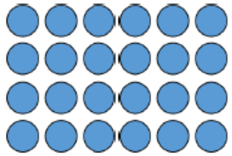


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50



4	8	12	16	20
24	28	32	36	40
44	48	52	56	60





4 + 4 + 4 + 4 + 4 + 4 + 4

7 x 4 = 28

4 x 7 = 28

16			
4	4	4	4

Guidance:

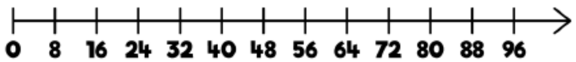
Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

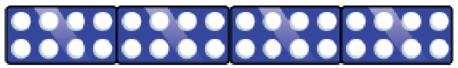
Look for patterns in the four times table, using concrete manipulatives to support. Make links to the 2 times table, seeing how each multiple is double the twos. Notice the pattern in the ones within each group of five multiples.

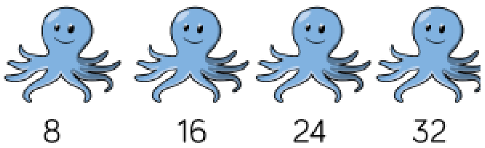
Highlight that all the multiples are even using number shapes to support.

Year 3

Skill: 8 times table







8	16	24	32	40
48	56	64	72	80

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

32			
8	8	8	8

8 + 8 + 8 + 8

4 x 8 =32

8 x 4 = 32

Guidance:

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the four times table, using concrete manipulatives to support. Make links to the 4 times table, seeing how each multiple is double the fours. Notice the pattern in the ones within each group of five multiples.

Highlight that all the multiples are even using number shapes to support.

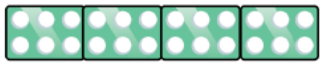
Multiplication - Times Tables

	Skill	Concrete	Pictorial	Abstract	Guidance

Year 4

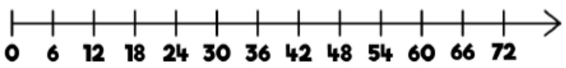
Skill: 6 times table

Concrete / Pictorial:



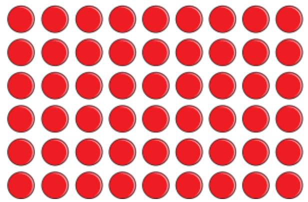
6	12	18	24	30
36	42	48	54	60
66	72	78	84	90

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Abstract:

24							
6		6		6		6	
3	3	3	3	3	3	3	3



6 x 9 =54

9 x 6 = 54

Guidance:

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the six times table, using concrete manipulatives to support. Make links to the 3 times table, seeing how each multiple is double the threes. Notice the pattern in the ones within each group of five multiples

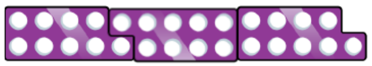
.

Highlight that all the multiples are even using number shapes to support.

Year 4

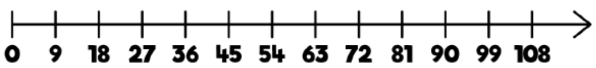
Skill: 9 times table

Concrete / Pictorial:



9	18	27	36	45
54	63	72	81	90

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Abstract:

True or False?

$$2 \times 3 \times 9 = 5 \times 9$$

$$9 \times 3 = 3 \times 3 \times 3$$

$$2 \times 3 \times 9 = 9 \times 6$$

Guidance:

Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the nine times table, using concrete manipulatives to support. Make links to the 4 times table, seeing how each multiple is double the fours. Notice the pattern in the tens and ones using the hundred square to support.

Highlight the odd, even pattern within the multiples.

Multiplication - Times Tables

<table>
<tr><th></th><th>Skill</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th><th>Guidance</th></tr>
<tr><td>Year 4</td><td>7 times table</td><td>
<table>
<tr><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr>
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<tr><td>31</td><td>32</td><td>33</td><td>34</td><td>35</td><td>36</td><td>37</td><td>38</td><td>39</td><td>40</td></tr>
<tr><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td><td>46</td><td>47</td><td>48</td><td>49</td><td>50</td></tr>
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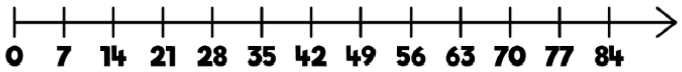

</td><td></td><td>Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Then seven times table can be trickier to learn due to the lack of obvious pattern in the numbers, however they already know several facts due to commutativity.

Children can still see the odd, even pattern in the multiples using number shapes to support.</td></tr>
<tr><td>Year 4</td><td>11 times table</td><td>
<table>
<tr><td>11</td><td>22</td><td>33</td><td>44</td><td>55</td><td>66</td></tr>
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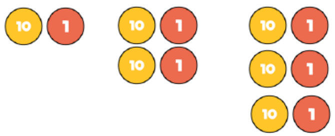

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<tr><td>51</td><td>52</td><td>53</td><td>54</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td></tr>
<tr><td>61</td><td>62</td><td>63</td><td>64</td><td>65</td><td>66</td><td>67</td><td>68</td><td>69</td><td>70</td></tr>
<tr><td>71</td><td>72</td><td>73</td><td>74</td><td>75</td><td>76</td><td>77</td><td>78</td><td>79</td><td>80</td></tr>
<tr><td>81</td><td>82</td><td>83</td><td>84</td><td>85</td><td>86</td><td>87</td><td>88</td><td>89</td><td>90</td></tr>
<tr><td>91</td><td>92</td><td>93</td><td>94</td><td>95</td><td>96</td><td>97</td><td>98</td><td>99</td><td>100</td></tr>
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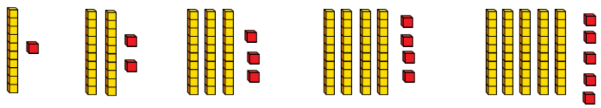
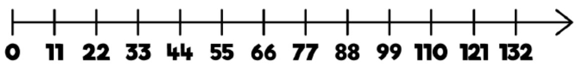



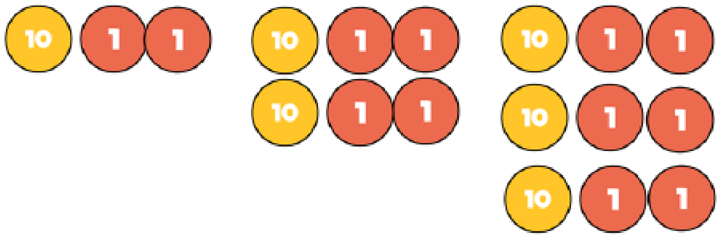
</td><td></td><td>Encourage daily counting in multiples both forwards and backwards. This can be supported using a number line or a hundred square.

Look for patterns in the eleven times table, using concrete manipulatives to support. Notice the pattern in the tens and ones using the hundred square to support. Also consider the pattern after crossing 100.</td></tr>
</table>

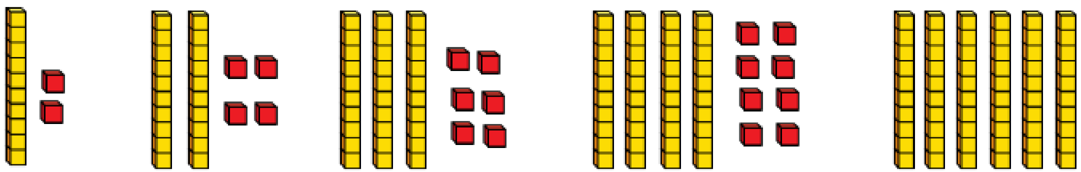
Multiplication - Times Tables

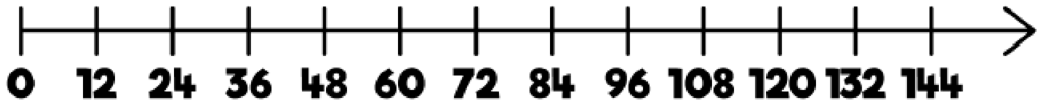
	Skill	Concrete	Pictorial	Abstract	Guidance
Year 4	12 times table				Encourage daily counting in multiples, supported by a number line or a hundred square. Look for patterns in the 12 times table, using manipulatives to support. Make links to the 6 times table, seeing how each multiple is double the sixes. Notice the pattern in the ones within each group of five multiples. The hundred square can support in highlighting this pattern.

12	24	36	48	60
72	84	96	108	120
132	144			

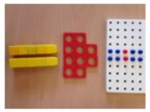
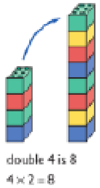
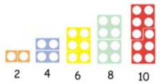
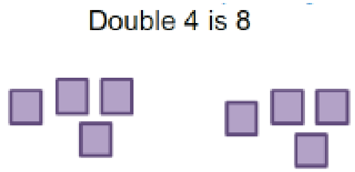
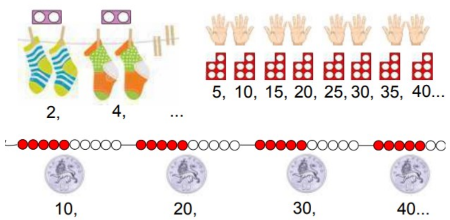
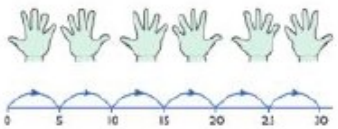


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

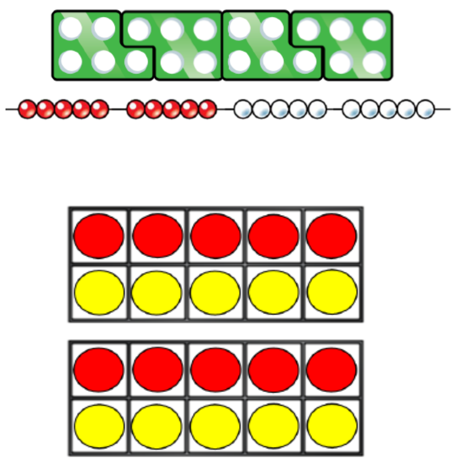
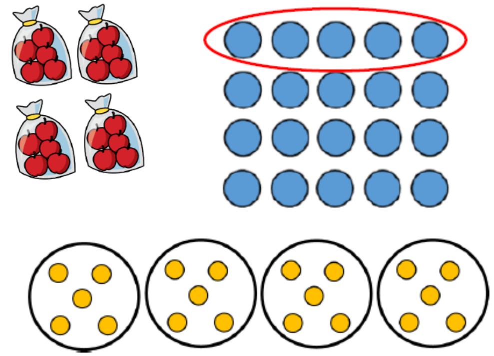
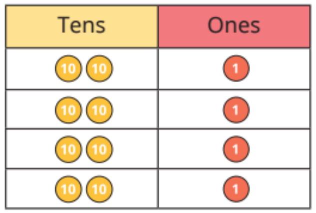
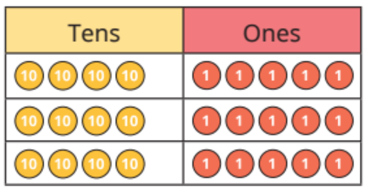
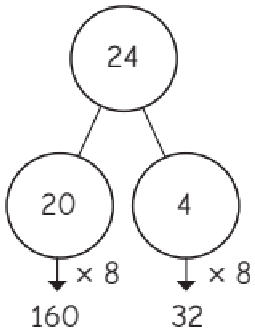




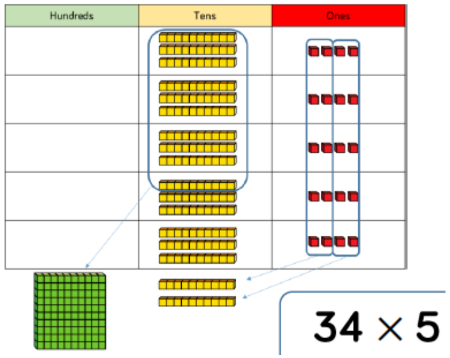
Multiplication

	Skill	Concrete	Pictorial	Abstract	Guidance
Reception / Year 1	Doubling	Use practical activities to show to double a number.      Counting and other maths resources for children to make 2 equal groups.	Draw pictures of how to double a number. 	Double 4 is 8 4 + 4 = 8	
	Counting in multiples	Count in multiples of different numbers starting with 2, 5 and 10. The use of concrete objects will enable them to grasp this concept more quickly. 	Use a number line, counting stick or pictures to continue support in counting in multiples of different numbers.  Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers 2, 4, 6, 8, 10 … 5, 10, 15, 20, 25 …	

Multiplication

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 1/2	Solving 1 step problems using multiplication			5 + 5 + 5 + 5 = 20 4 × 5 = 20 5 × 4 = 20 One bag holds 5 apples. How many apples do 4 bags hold?	Children represent multiplication as repeated addition in many different ways. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally. In Year 2, children are introduced to the multiplication symbol.
Year 3	Multiply a 2-digit number by a 1-digit number.	21 x 4 =  45 x 3 = 	Mo uses a part-whole model to work out 24 × 8  160 + 32 = 192 24 x 8 = 192		Children use their knowledge of partitioning and place value to multiply the tens and then the ones. They will need a firm understanding of related calculations. This method lays the foundation for the children to move onto the formal written method in Year 4.

Multiplication

<table>
<tr><th></th><th>Skill</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th><th>Guidance</th></tr>
<tr>
<td>Year 4</td>
<td>Multiply 2-digit numbers by 1-digit numbers.</td>
<td>
</td>
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<table>
<tr><td></td><td>H</td><td>T</td><td>O</td></tr>
<tr><td></td><td></td><td>3</td><td>4</td></tr>
<tr><td>×</td><td></td><td></td><td>5</td></tr>
<tr><td></td><td>1</td><td>7</td><td>0</td></tr>
<tr><td></td><td>1</td><td>2</td><td></td></tr>
</table>

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<tr><td></td><td>H</td><td>T</td><td>O</td></tr>
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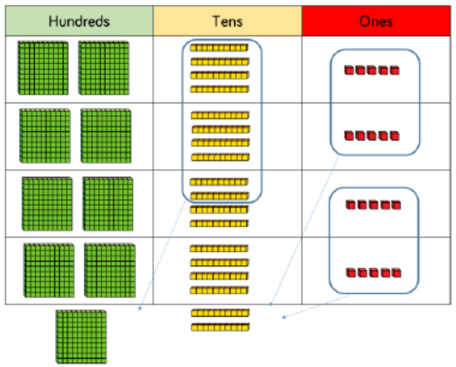
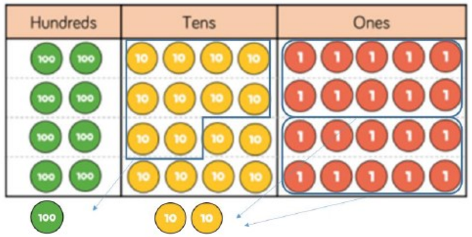
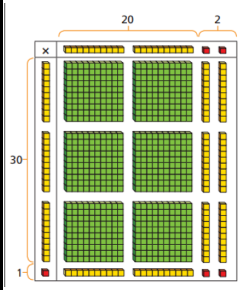
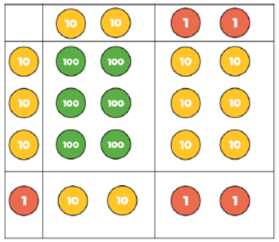
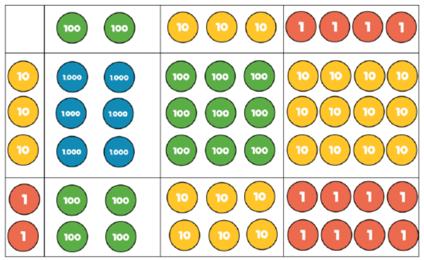
<tr><td></td><td>1</td><td>2</td><td></td></tr>
</table>
</td>
<td>Teachers may decide to first look at the expanded column method before moving on to the short multiplication method.

The place value counters should be used to support the understanding of the method rather than supporting the multiplication, as children should use the times table knowledge.</td>
</tr>
</table>

Multiplication

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 4	Multiply 1-digit by 3-digit numbers.			H T O 2 4 5 × 4 9 8 0 1 2	When moving to 3-digit by 1-digit multiplication, encourage children to move towards the short formal written method. Base 10 and place value counters continue to support the under-standing of the written method. Limit the number of exchanges needed in the questions and move children away from resources when multiplying larger numbers.
Year 5	Multiply 1-digit by 4-digit numbers.			Th H T O 1 8 2 6 × 3 5 4 7 8 2 1	When multiplying 4-digit num-bers, place value counters are the best manipulative to use to sup-port children in their understand-ing of the formal written method. If children are multiplying larger numbers and struggling with their times tables, encourage the use of multiplication grids so children focus on the written method.

Multiplication

	Skill	Concrete	Pictorial	Abstract	Guidance
Year 5	Multiply 2-digit by 2-digit Numbers Multiply 3-digit by 2-digit numbers.	  		see tables below	When multiplying a multi-digit number by 2-digits, use the area model to help children understand the size of the numbers they are using. This links to finding the area of a rectangle by finding the space covered by the base 10. The grid method matches the area model as an initial written method before moving on to the formal written multiplication method.
Year 5/ 6	Multiply 4-digit by 2-digit Numbers			see table below	When multiplying 4-digits, children should be confident in the written method. If they are still struggling with times tables, provide multiplication grids to support when they are focusing on the written method. Consider where exchanged digits are placed and make sure this is consistent.

Year 5 – Abstract:

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

×	20	2
30	600	60
1	20	2

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

Th	H	T	O
	2	3	4
×		3	2
	4	6	8
$_1$7	$_1$0	2	0
7	4	8	8

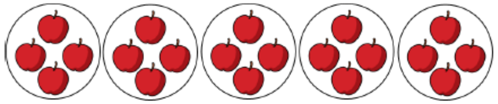
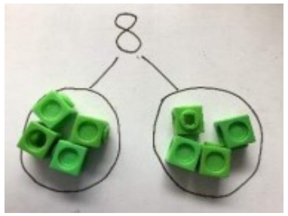
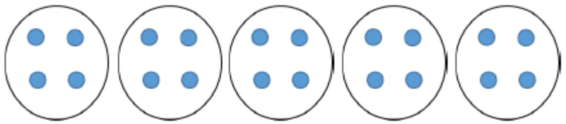
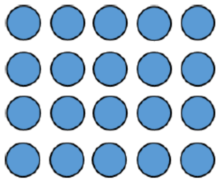
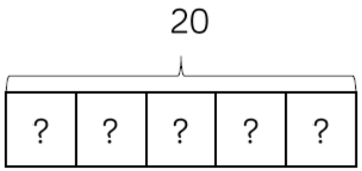
Year 5/6 – Abstract:

TTh	Th	H	T	O
	2	7	3	9
×			2	8
2 $_2$	1 $_5$	9 $_3$	1 $_7$	2
5 $_1$	4	7 $_1$	8	0
7	6	6	9	2
		1		

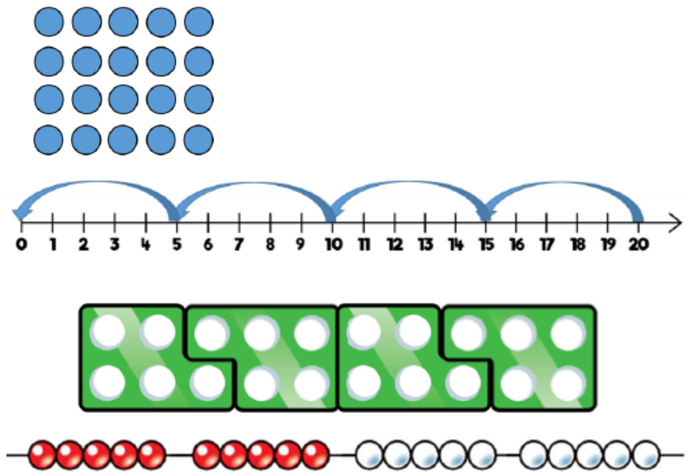
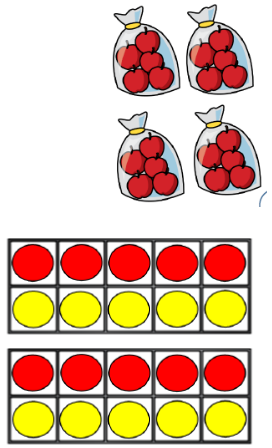
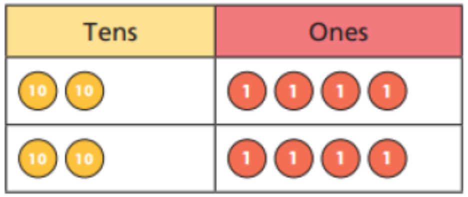
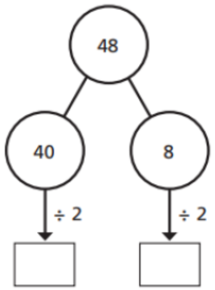
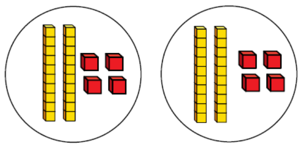
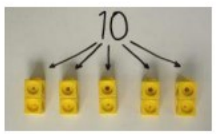
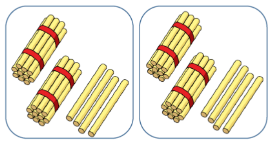
Division Vocabulary Progression:

EYFS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Equal groups	Equal groups	Equal groups	Equal groups	Equal groups	Equal groups	Equal groups
share	share	share	share	share	share	share
part	part	part	part	part	part	part
half	half	half	half	half	half	half
		grouping	grouping	grouping	grouping	grouping
		arrays	arrays	arrays	arrays	arrays
		divide	divide	divide	divide	divide
				divisor	Long division	Long division
					quotient	quotient
					divisor	divisor
					dividend	dividend

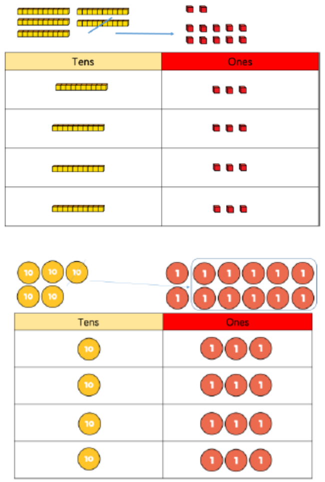
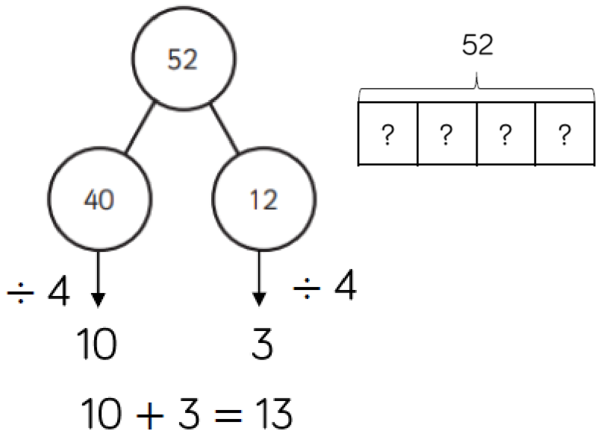
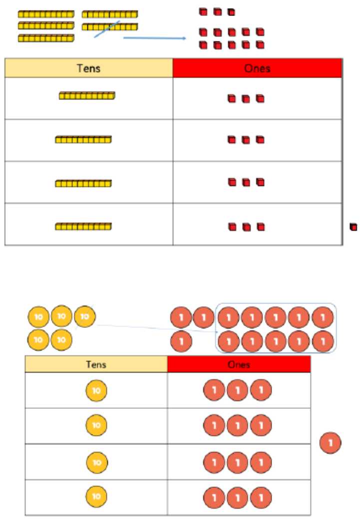
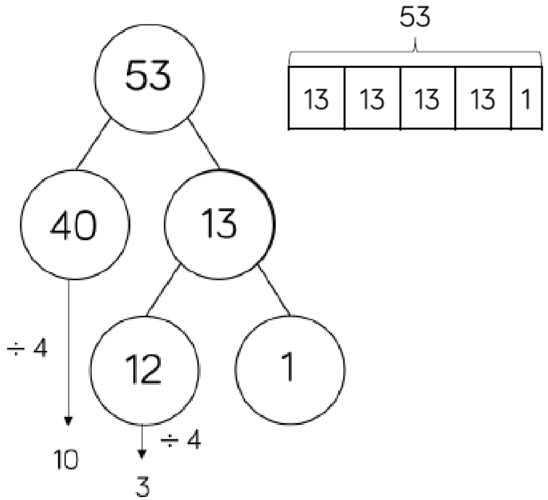
Division

	Skill	Concrete	Pictorial	Abstract	Guidance
Reception	Understanding division as sharing				Children solve problems by sharing objects into equal groups.
Y1/2	Solve 1-step problems using division (sharing)	  	 	There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag? $20 \div 5 = 4$	Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. In Year 2, children are introduced to the division symbol.

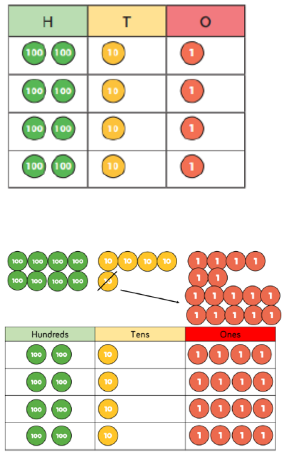
Division

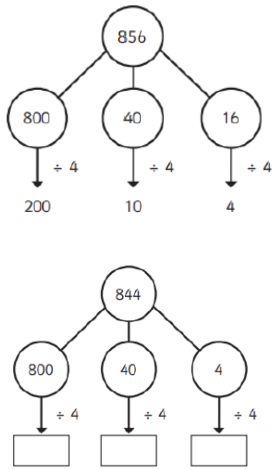
	Skill	Concrete	Pictorial	Abstract	Guidance
Y1/2	Solve 1-step problems using multiplication (grouping)			There are 20 apples altogether. They are put in bags of 5. How many bags are there? $20 \div 5 = 4$	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.
Y1/2	Divide 2-digits by 1-digit (sharing with no exchange)	  	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.  	$48 \div 2 = 24$	When dividing larger numbers, children can use manipulatives that allow them to partition into tens and ones. Straws, base 10 and place value counters can all be used to share numbers into equal groups. Part-whole models can provide children with a clear written method that matches the concrete representation.

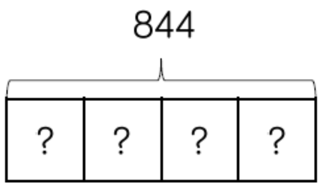
Division

	Skill	Concrete	Pictorial	Abstract	Guidance
Y3/4	Divide 2-digits by 1-digit (sharing with exchange)			$52 \div 4 = 13$	When dividing numbers involving an exchange, children can use base 10 and place value counters to exchange one ten for ten ones. Children should start with the equipment outside the place value grid before sharing the tens and ones equally between the rows. Flexible partitioning in a part-whole model supports this method.
Y3/4	Divide 2-digits by 1-digit (sharing with remainders)			$53 \div 4 = 13$ r1	When dividing numbers with remainders, children can use base 10 and place value counters to exchange one ten for ten ones. Starting with the equipment outside the place value grid will highlight remainders, as they will be left outside the grid once the equal groups have been made. Flexible partitioning in a part whole model supports this method.

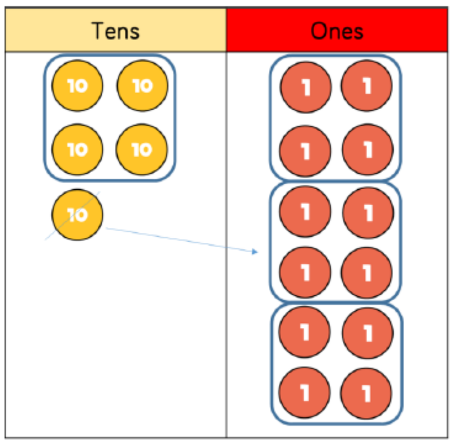
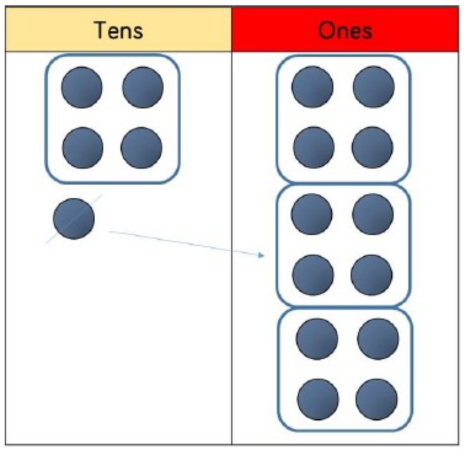
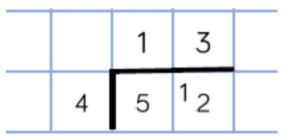
Division

<table>
<tr><th></th><th>Skill</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th><th>Guidance</th></tr>
<tr><td>Y4</td><td>Divide 2-digits by 1-digit (sharing)</td><td colspan="2">




</td><td>$844 \div 4 = 211$</td><td>Children can continue to use place value counters to share 3-digit numbers into equal groups.

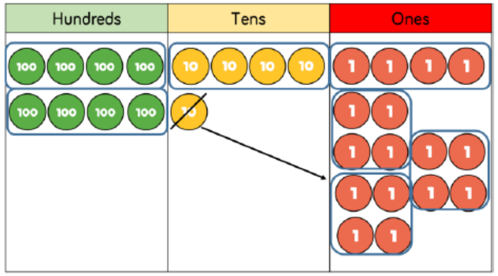
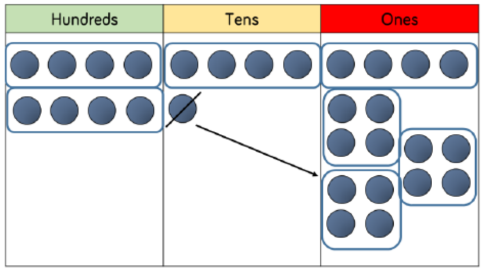
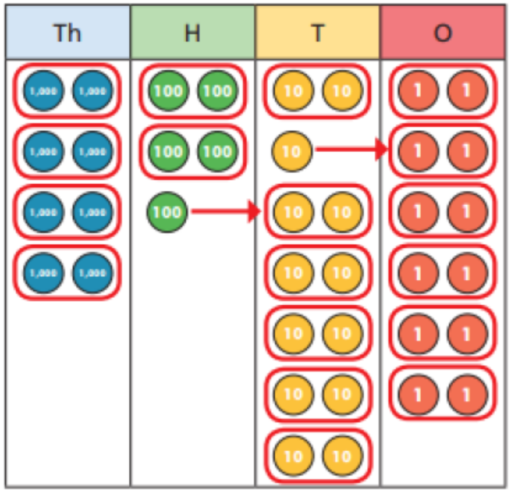
Children should start with the equipment outside the place value frid before sharing the hundreds, tens and ones equally between the rows.

This method can also help to highlight remainders. Flexible partitioning in a part –whole model supports this method.</td></tr>
<tr><td>Y4/5</td><td>Divide 2-digits by 1-digit (grouping)</td><td>
</td><td>
</td><td>$52 \div 4 = 13$

</td><td>When using the short division method. Children use grouping. Starting with the largest place value, they group by the divisor.

Language is important here. Children should consider ‘How many groups of 4 tens can we make?’ and How many groups of 4 ones can we make?’

Remainders can also be seen as they are left ungrouped.</td></tr>
</table>

Division

	Skill	Concrete	Pictorial	Abstract	Guidance
Y5	Divide 3-digits by 1-digit (grouping)			$\begin{array}{r|lll} & 2 & 1 & 4 \\ \hline 4 & 8 & 5 & ^{1}6 \end{array}$ $856 \div 4 = 214$	Children can continue to use grouping to support their understanding of short division when dividing a 3-digit number by a 1-digit number. Place value counters or plain counters can be used on a place value grid to support this understanding. Children can also draw their own counters and group them through a more pictorial method.
Y4/5	Divide 4-digits by 1-digit (grouping)			$\begin{array}{r|llll} & 4 & 2 & 6 & 6 \\ \hline 2 & 8 & 5 & ^{1}3 & ^{1}2 \end{array}$ $8{,}532 \div 2 = 4{,}266$	Place value counters or plain counters can be used on a place value grid to support children to divide 4-digits by 1-digit. Children can also draw their own counters and group them through a more pictorial method. Children should be encouraged to move away from the concrete and pictorial when dividing numbers with multiple exchanges.

Division

<table>
<tr><th></th><th>Skill</th><th>Abstract</th><th>Guidance</th></tr>
<tr>
<td>Y6</td>
<td>Divide multi digits by 2-digit (short division)</td>
<td>
<table>
<tr><td></td><td></td><td>0</td><td>3</td><td>6</td></tr>
<tr><td></td><td>12</td><td>4</td><td>$^{4}3$</td><td>$^{7}2$</td></tr>
</table>
<table>
<tr><td>15</td><td>30</td><td>45</td><td>60</td><td>75</td><td>90</td><td>105</td><td>120</td><td>135</td><td>150</td></tr>
</table>
$432 \div 12 = 36$
<table>
<tr><td></td><td>0</td><td>4</td><td>8</td><td>9</td></tr>
<tr><td>15</td><td>7</td><td>$^{7}3$</td><td>$^{13}3$</td><td>$^{13}5$</td></tr>
</table>
$7{,}335 \div 15 = 489$
</td>
<td>When children begin to divide up to 4-digits by 2-digits, written methods become the most accurate as concrete and pictorial representations become less effective.

Children can write out multiples to support their calculations with larger remainders.

Children will also solve problems with remainders where the quotient can be rounded as appropriate.</td>
</tr>
<tr>
<td>Y6</td>
<td>Divide multi digits by 2-digit (long division)</td>
<td>
<table>
<tr><td></td><td></td><td>0</td><td>3</td><td>6</td><td></td></tr>
<tr><td>1</td><td>2</td><td>4</td><td>3</td><td>2</td><td></td></tr>
<tr><td></td><td>–</td><td>3</td><td>6</td><td>0</td><td>(×30)</td></tr>
<tr><td></td><td></td><td></td><td>7</td><td>2</td><td></td></tr>
<tr><td></td><td>–</td><td></td><td>7</td><td>2</td><td>(×6)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td></td></tr>
</table>
$12 \times 1 = 12$
$12 \times 2 = 24$
$12 \times 3 = 36$
$12 \times 4 = 48$
$12 \times 5 = 60$
$12 \times 6 = 72$
$12 \times 7 = 84$
$12 \times 8 = 96$
$12 \times 7 = 108$
$12 \times 10 = 120$
$432 \div 12 = 36$
$7{,}335 \div 15 = 489$
<table>
<tr><td></td><td>0</td><td>4</td><td>8</td><td>9</td><td></td></tr>
<tr><td>15</td><td>7</td><td>3</td><td>3</td><td>5</td><td></td></tr>
<tr><td>–</td><td>6</td><td>0</td><td>0</td><td>0</td><td>(×400</td></tr>
<tr><td></td><td>1</td><td>3</td><td>3</td><td>5</td><td></td></tr>
<tr><td>–</td><td>1</td><td>2</td><td>0</td><td>0</td><td>(×80)</td></tr>
<tr><td></td><td></td><td>1</td><td>3</td><td>5</td><td></td></tr>
<tr><td>–</td><td></td><td>1</td><td>3</td><td>5</td><td>(×9)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>0</td><td></td></tr>
</table>
$1 \times 15 = 15$
$2 \times 15 = 30$
$3 \times 15 = 45$
$4 \times 15 = 60$
$5 \times 15 = 75$
$10 \times 15 = 150$
</td>
<td>Children can also divide by 2-digit numbers using long division.

Children can write out multiples to support their calculations with larger remainders.

Children will also solve problems with remainders where the quotient can be rounded as appropriate.</td>
</tr>
</table>

Division

	Skill	Abstract	Guidance
Y6	Divide multi digits by 2-digits (short division)	2 4 r 1 2 1 5 | 3 7 2 − 3 0 0 7 2 − 6 0 1 2 $1 \times 15 = 15$ $2 \times 15 = 30$ $3 \times 15 = 45$ $4 \times 15 = 60$ $5 \times 15 = 75$ $10 \times 15 = 150$ $372 \div 15 = 24$ r12 2 4 $\frac{4}{5}$ 1 5 | 3 7 2 − 3 0 0 7 2 − 6 0 1 2 $372 \div 15 = 24\frac{4}{5}$	When a remainder is left at the end of a calculation, children can either leave it as a remainder or convert it to a fraction. This will depend on the context of the question. Children can also answer questions where the quotient needs to be rounded according to the context.

Glossary

Array – An ordered collection of counters, cubes or other item in rows and columns.

Commutative – Numbers can be multiplied in any order.

Dividend – In division, the number that is divided.

Divisor – In division, the number by which another is divided.

Exchange – Change a number or expression for another of an equal value.

Factor – A number that multiplies with another to make a product.

Multiplicand – In multiplication, a number to be multiplied by another.

Partitioning – Splitting a number into its component parts.

Product – The result of multiplying one number by another.

Quotient – The result of a division

Remainder – The amount left over after a division when the divisor is not a factor of the dividend.

Scaling – Enlarging or reducing a number by a given amount, called the scale factor