



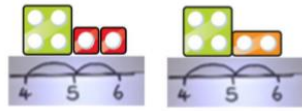
St Felix RC Primary School

Calculation Policy 2020



Addition

Year 1:				
	Concept / Key Skill	Concrete	Pictorial	Abstract
Add single digit numbers to 10	Combining two parts to make a whole.	<p>(Use other resources too e.g. eggs, shells, teddy bears, cars).</p>	<p>Use pictorial representations to show whole-part model.</p>	<p>$4 + 3 = 7$ Recognising that 4 and 3 are both parts and 7 is the whole.</p>
	Counting on, starting from the larger number.			<p>Using empty number lines $4 + 2 =$</p>



Introducing the beginning of bar models

4

5 6

Develop fluency with number facts to 10.

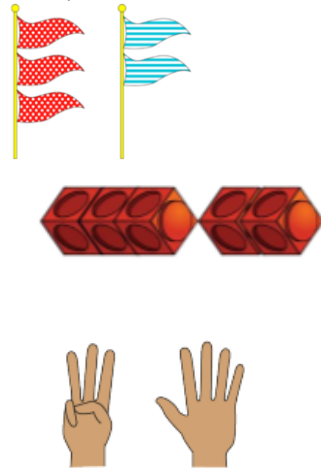
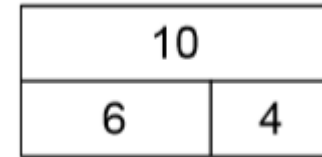
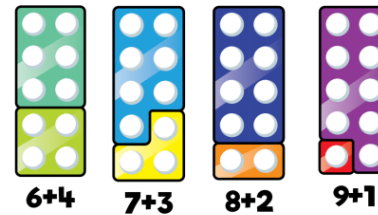
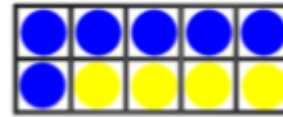


Figure 15: 8 represented as 3 fingers and 5 fingers

Exploring different ways to make 10 e.g.



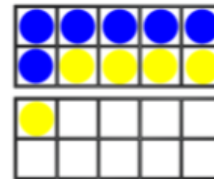
$6 + 4 = 10$
 $4 + 6 = 10$

Add 1 and 2-digit numbers to 20

Re-grouping to bridge 10



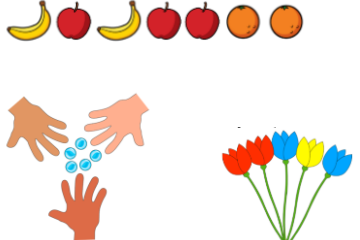
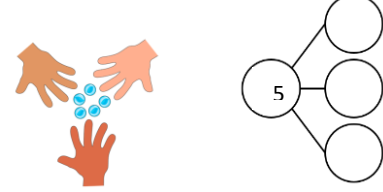

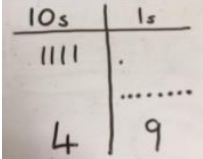
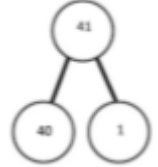
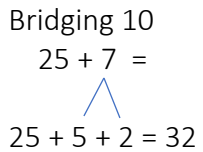
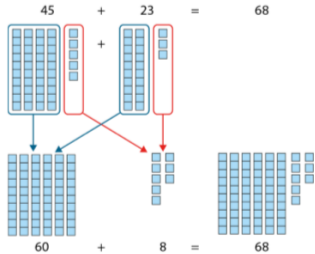
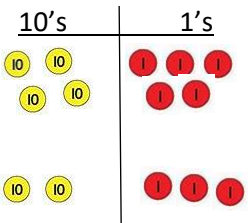
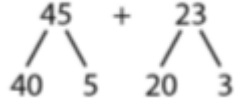
Children draw their own tens frames to show $6 + 5$

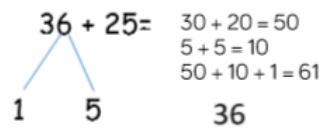


Children use their knowledge of numbers bonds partition 5 into 4 + 1

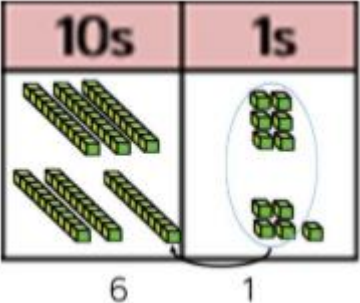
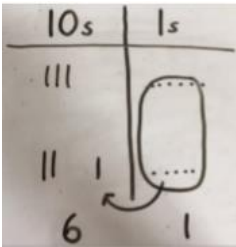
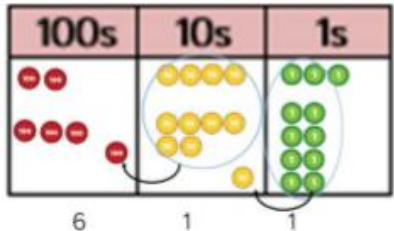
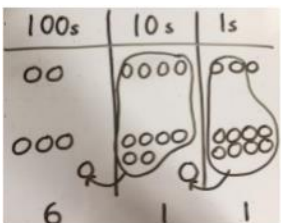
$$\begin{array}{c}
 6 + 5 = \\
 \swarrow \quad \searrow \\
 6 + 4 + 1 =
 \end{array}$$

Year 2


	Key Skill / Concept	Concrete	Pictorial	Abstract
	Adding 3 single digit numbers			$\underline{\quad} + \underline{\quad} + \underline{\quad} = 10$
	TO + O Using base 10	$41 + 8 =$ 	$41 + 8 =$ 	 $40 + 1$ $1 + 8 = 9$ $40 + 9 = 49$ Bridging 10 $25 + 7 =$  $25 + 5 + 2 = 32$
	TO + TO Using base 10 or place value counters	$45 + 23 =$ 	$45 + 23 =$ 	 $40 + 20 = 60$ $5 + 3 = 8$ $60 + 8 = 68$

				$36 + 25 =$  <p>There is no formal requirement for column addition to be taught at Year 2</p>
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Year 3


	Key Skill / Concept	Concrete	Pictorial	Abstract
	To add 2 digit numbers formal column method.	$36 + 25 =$ 	$36 + 25 =$ 	Formal column method $\begin{array}{r} 36 \\ +25 \\ \hline 61 \\ \hline 1 \end{array}$
	To add 3 digit numbers using formal column method (including with regrouping)	$243 + 368 =$ 	$243 + 368 =$ 	$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1 \quad 1 \end{array}$

Year 4

	Key Skill / Concept	Concrete	Pictorial	Abstract												
	To mentally add 1000's, 100's, 10's and 1's to any 4 digit number.	 <p>Add 2 hundreds to this number Add 4 ones etc.</p>	<table border="1" data-bbox="1153 343 1545 414"> <thead> <tr> <th>Thousands</th> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>3</td> <td>8</td> <td>2</td> </tr> </tbody> </table> <p>Add 3 hundreds Add 2 thousands etc.</p>	Thousands	Hundreds	Tens	Ones	5	3	8	2	$5,165 + 500 =$ $5,165 + \underline{\quad} = 9,168$				
Thousands	Hundreds	Tens	Ones													
5	3	8	2													
	To add 4 digit numbers without regrouping	$3,242 + 2,213$ <table border="1" data-bbox="638 614 1108 758"> <thead> <tr> <th>1,000s</th> <th>100s</th> <th>10s</th> <th>1s</th> </tr> </thead> <tbody> <tr> <td>3000 2000</td> <td>200 200</td> <td>40 20 40 20</td> <td>2 1</td> </tr> <tr> <td>3000 2000</td> <td>200 200</td> <td>40</td> <td>2 1 1</td> </tr> </tbody> </table>	1,000s	100s	10s	1s	3000 2000	200 200	40 20 40 20	2 1	3000 2000	200 200	40	2 1 1	$3,242 + 2,213$	$3,242 + 2,213$
1,000s	100s	10s	1s													
3000 2000	200 200	40 20 40 20	2 1													
3000 2000	200 200	40	2 1 1													
	To add 4-digit numbers with regrouping	$3,356 + 2,435 =$ <table border="1" data-bbox="638 837 1030 1029"> <thead> <tr> <th>Th</th> <th>H</th> <th>T</th> <th>O</th> </tr> </thead> <tbody> <tr> <td>3000 2000</td> <td>300 400</td> <td>50 30 50 30</td> <td>6 3 6 3</td> </tr> <tr> <td>3000 2000</td> <td>300 400</td> <td>50 30</td> <td>6 3 6 3</td> </tr> </tbody> </table>	Th	H	T	O	3000 2000	300 400	50 30 50 30	6 3 6 3	3000 2000	300 400	50 30	6 3 6 3	$3,356 + 2,435 =$	$3,356 + 2,435 =$
Th	H	T	O													
3000 2000	300 400	50 30 50 30	6 3 6 3													
3000 2000	300 400	50 30	6 3 6 3													

Year 5

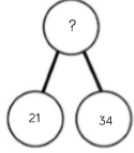
	Key Skill / Concept	Concrete	Pictorial	Abstract																		
	To add numbers with up to 5 digits using regrouping	See above.		<table border="1" data-bbox="1612 1197 2027 1412"> <tbody> <tr> <td></td> <td>3</td> <td>2</td> <td>4</td> <td>6</td> <td>1</td> </tr> <tr> <td>+</td> <td></td> <td>4</td> <td>3</td> <td>5</td> <td>2</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		3	2	4	6	1	+		4	3	5	2						
	3	2	4	6	1																	
+		4	3	5	2																	

	To add decimals with the same number of decimal places (up to 3 d.p.)	<p>Using place value counters to support</p> 	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> <th>Thousandths</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths							$\begin{array}{r} 3.45 \\ + 4.14 \\ \hline \end{array}$
Hundreds	Tens	Ones	Tenths	Hundredths	Thousandths											
	To add decimals with different numbers of decimal places (up to 2 d.p.)	<p>$1.3 + 3.52 =$</p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Ones</th> <th>Tenths</th> <th>Hundredths</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>3</td> <td> </td> </tr> <tr> <td>3</td> <td>5</td> <td>2</td> </tr> </tbody> </table>	Ones	Tenths	Hundredths	1	3		3	5	2		$\begin{array}{r} 1.3 \\ + 3.52 \\ \hline \end{array}$			
Ones	Tenths	Hundredths														
1	3															
3	5	2														

Year 6

	Key Skill / Concept	Concrete	Pictorial	Abstract																								
	To add whole numbers with up to 7 digits using regrouping			<table border="1" style="width: 100%; text-align: center;"> <tbody> <tr> <td> </td> <td>4</td> <td>7</td> <td>6</td> <td>1</td> <td>3</td> <td>2</td> <td>5</td> </tr> <tr> <td>–</td> <td> </td> <td>9</td> <td>3</td> <td>8</td> <td>0</td> <td>5</td> <td>2</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		4	7	6	1	3	2	5	–		9	3	8	0	5	2								
	4	7	6	1	3	2	5																					
–		9	3	8	0	5	2																					
	To add decimals with different numbers of decimal places up to 3 d.p. using regrouping.																											

Conceptual Variation: Different ways to represent the same calculation.



?	
21	34

Word problems:
 In year 3, there are 21 children and in year 4, there are 34 children.
 How many children in total?

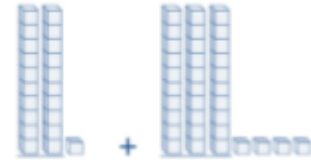
$21 + 34 = 55$. Prove it

Calculate the sum of twenty-one and thirty-four.

$$\begin{array}{r} 21 \\ +34 \\ \hline \end{array}$$

$21 + 34 =$

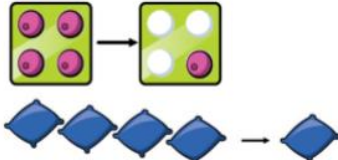
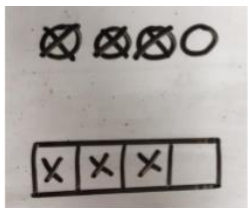
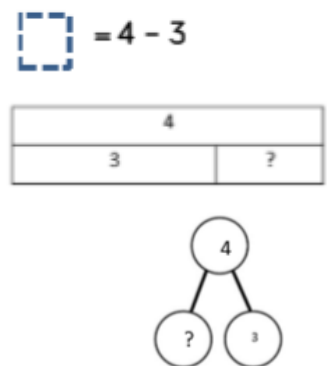
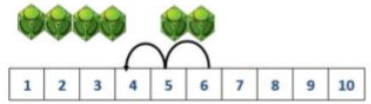
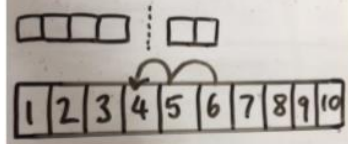
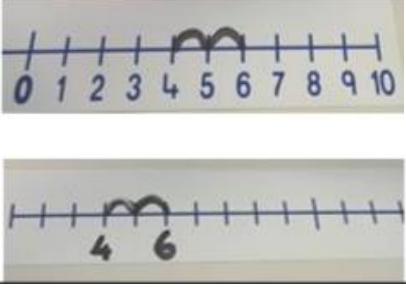
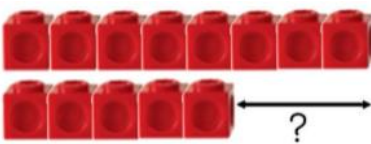
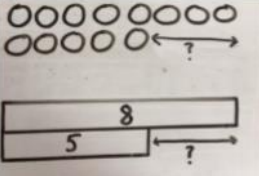
 $= 21 + 34$

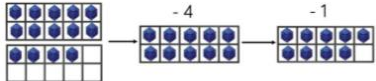
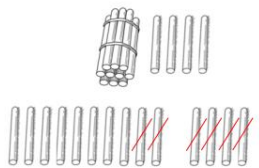

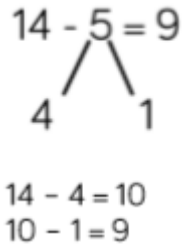
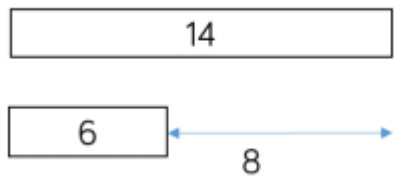
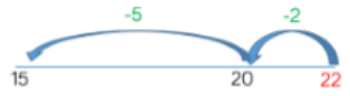
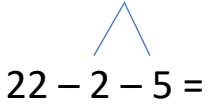
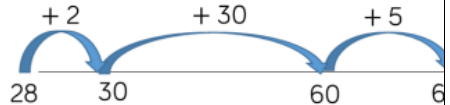


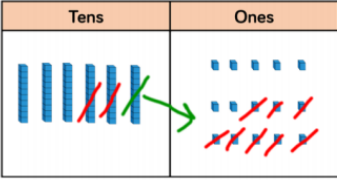



Missing digit problems:

10s	1s
● ●	●
● ● ●	?
?	5

Subtraction:

Year 1:				
	Concept / Key Skill	Concrete	Pictorial	Abstract
To take away one digit from 1 digit number.	To take away ones	<p>To physically take away or remove individual objects from a whole or set. $4 - 3 = 1$</p> 	<p>$4 - 3 = 1$</p> 	<p>$4 - 3 =$</p> 
	To count back on a number line	<p>$6 - 2 = 4$</p> 		
	To find the difference	<p>Find the difference between 8 and 5</p> 	<p>Find the difference between 8 and 5</p> 	<p>Find the difference between 8 and 5</p> <p>$8 - 5$, the difference is <input type="text"/></p>

<p>To take away a 1 digit number from 2 digit number to 20.</p>	<p>To subtract ones crossing ten using tens frame</p>	<p>14 - 5</p>  <p>14 - 4 - 1 = 9</p> <p>14 - 6</p>  <p>=</p>	<p>14 - 5</p> 	<p>14 - 5</p>  <p>14 - 5 = 9</p> <p>14 - 4 = 10</p> <p>10 - 1 = 9</p> <p>14 - 6</p> 																																																		
<p>Year 2</p>																																																						
<p>TO - O (crossing the 10's boundary)</p>	<p>To count back using number lines.</p>	<p>22 - 7 =</p> <table border="1" data-bbox="627 917 1120 1133"> <tbody> <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> <tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td></tr> <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> </tbody> </table> <p>Find 22 and count back 7 squares.</p>	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	<p>22 - 7 =</p> 	<p>22 - 7 =</p>  <p>22 - 2 - 5 =</p>
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																																													
	<p>To find the difference by counting on</p>		<p>65 - 28</p> 																																																			

TO – TO	To use mental strategies to subtract 2 digit from 2 digit numbers	$65 - 28 =$ Take away 20 Take away 8 	$51 - 12$ Use the number line to subtract 12 from 51  Subtract 10 Subtract 2	$63 - 17 = 46$  $63 - 10 = 53$ $53 - 7 = 46$ Take away tens first. $63 - 17 = 46$  $63 - 7 = 56$ $56 - 10 = 46$ Take away ones first.
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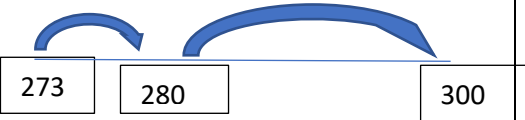
Pupils do not need to learn formal written methods for addition and subtraction in year 2, but column addition and column subtraction could be used as an alternative way to record two-digit calculations at this stage. For calculations such as $26 + 37$, pupils can begin to think about the 2 quantities arranged in columns under place-value headings of tens and ones. They can use counters or draw dots for support:

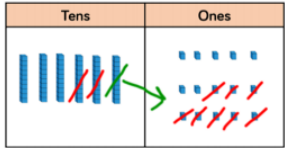
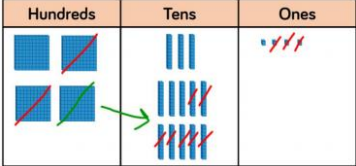
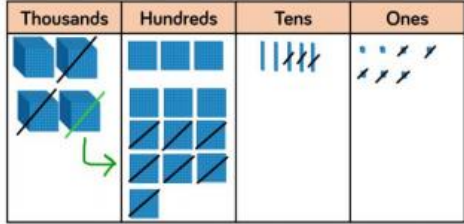


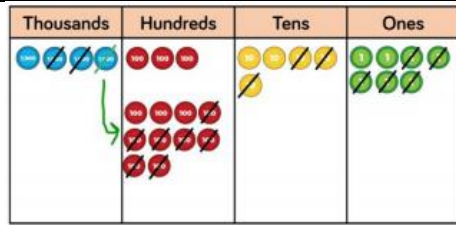
Figure 21: adding 2 two-digit numbers using 10s and 1s columns

(DfE Ready to Progress Guidance June 2020)

Year 3:

	To subtract from multiples of 100	$300 - 273$ 		$300 - 273 = 27$ $273 + 7 = 280$ $280 + 20 = 300$
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	To introduce column methods for subtraction of TO – TO	<p>65 – 28</p> 	<p>65 – 28 (regroup 65 into 50 and 15)</p> $\begin{array}{r} 60 \quad 5 \\ \underline{20} \quad 8 \\ 40 \quad 13 \end{array}$ $\begin{array}{r} 50 \quad 15 \\ \underline{20} \quad 8 \\ 30 \quad 7 \end{array}$	$\begin{array}{r} 5 \quad 1 \\ \cancel{6}5 \\ - 28 \\ \hline 37 \end{array}$
	To use column subtraction for HTO – HTO (without regrouping)	<p>435 – 213</p>		
	Column method for subtraction of HTO – HTO (with regrouping)		<p>435 – 273</p> $\begin{array}{r} 400 \quad 30 \quad 5 \\ \underline{-200} \quad 70 \quad 3 \\ 200 \quad 60 \quad 2 \end{array}$ $\begin{array}{r} 300 \quad 130 \\ \underline{-200} \quad 70 \\ 100 \quad 60 \end{array}$	$\begin{array}{r} 3 \quad 1 \\ \cancel{4}35 \\ - 273 \\ \hline 162 \end{array}$
Year 4				
	To subtract ThHTO - ThHTO		<p>4357 - 2735 = 1622</p> $\begin{array}{r} 3000 \quad 1300 \quad 50 \quad 7 \\ \underline{2000} \quad 700 \quad 30 \quad 5 \\ 1000 \quad 600 \quad 20 \quad 2 \end{array}$	$\begin{array}{r} 3 \quad 1 \\ \cancel{4}357 \\ - 2735 \\ \hline 1622 \end{array}$

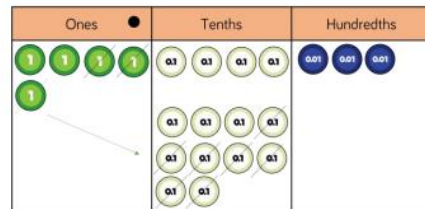


Year 5

To subtract numbers with more than 4 digits

	2	9	3	13	8	2
-	1	8	2	5	0	1
	1	1	1	8	8	1

To subtract number with up to 3 decimal places

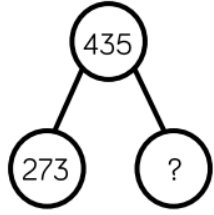
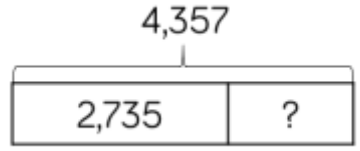
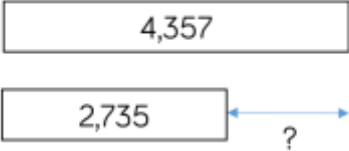


$$\begin{array}{r}
 41 \\
 5.43 \\
 - 2.7 \\
 \hline
 2.73
 \end{array}$$

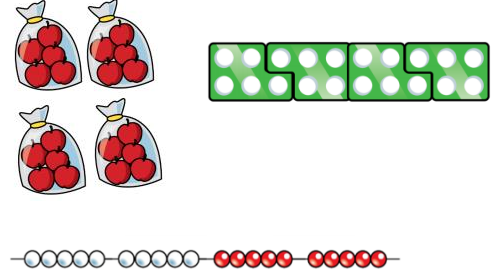
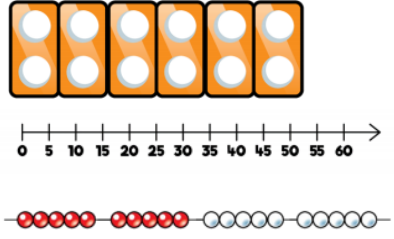
Year 6

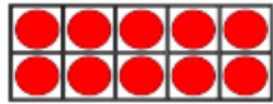
Consolidate methods taught in previous years and apply to a wider variety of problems

Different representations

 <p>Part-whole models</p>	 <p>Bar models showing subtraction</p>	 <p>Bar models to find the difference</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;">Presenting calculations within word problems.</div> <p>Word problems</p>

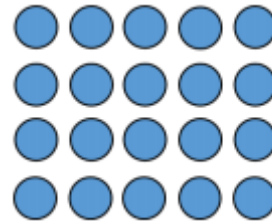
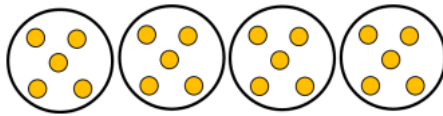
Multiplication

Year 1			
<p>To solve one step word problems using multiples of 2, 5 and 10.</p>			
Year 2			
<p>To recall multiplication facts for 2, 5 and 10 times tables.</p>			



To solve one step word problems involving tables facts

One bag holds 5 apples.
How many apples do 4 bags hold?



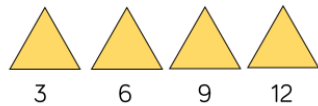
$$5 + 5 + 5 + 5 = 20$$

$$4 \times 5 = 20$$

$$5 \times 4 = 20$$

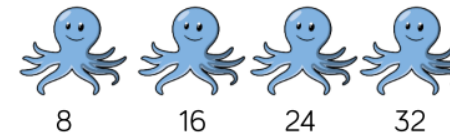
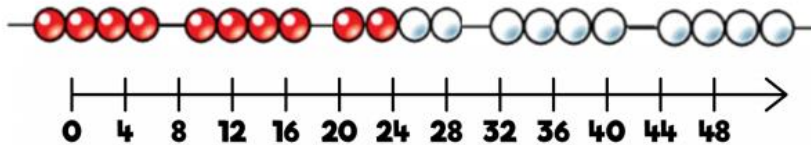
Year 3

To recall multiplication and division facts for 3, 4 and 8 times tables.



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



To multiply multiples of ten by 2, 3, 4, 5 and 8.

30×4

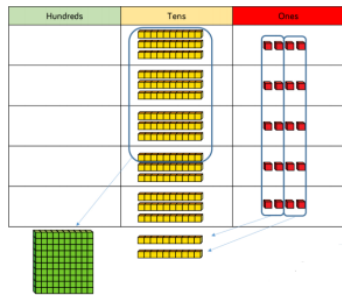


$3 \times 4 = 12$



$$30 \times 4 = 120$$

$$34 \times 5 = 170$$



$$34 \times 5 = 170$$

$$30 \times 5 = 150$$

$$4 \times 5 = 20$$

$$34 \times 5 = 170$$

	H	T	O	
		3	4	
x			5	
<hr/>				
		2	0	(5 × 4)
+	1	5	0	(5 × 30)
<hr/>				
	1	7	0	

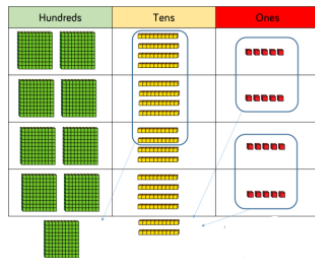
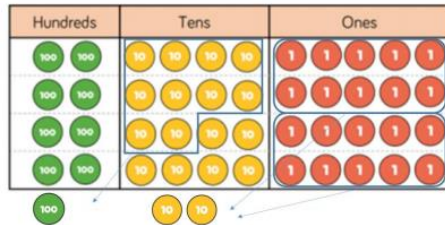
	H	T	O	
		3	4	
x			5	
<hr/>				
	1	7	0	
	1	2		

TO recall multiplication and division facts up to 12 x 12

See above for use of manipulatives and how to develop mastery of multiplication tables.

To use expanded and short written methods for multiplication of 3 digit by 1 digit numbers

$$245 \times 4 = 980$$



	H	T	O
	2	4	5
x			4
<hr/>			
	9	8	0
	1	2	

Year 5

To use short multiplication to multiply 4 digit by 1 digit numbers

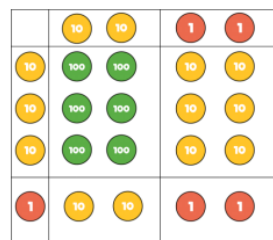
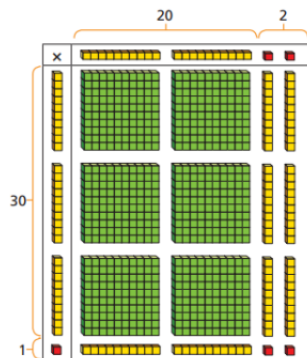
$$1,826 \times 3 = 5,478$$



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

To use the grid method to multiply 2 digit by 2 digit numbers

$$22 \times 31 = 682$$

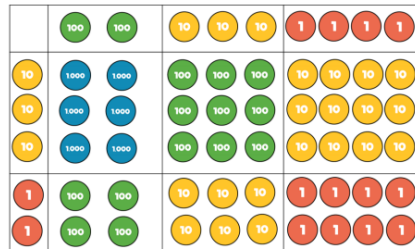


x	20	2	
30	600	60	660
1	20	2	<u>+ 22</u>
			682

					<table border="1"> <tr><td></td><td>H</td><td>T</td><td>O</td></tr> <tr><td></td><td></td><td>2</td><td>2</td></tr> <tr><td>x</td><td></td><td>3</td><td>1</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td></td><td></td><td>2</td><td>2</td></tr> <tr><td></td><td>6</td><td>6</td><td>0</td></tr> <tr><td colspan="4"><hr/></td></tr> <tr><td></td><td>6</td><td>8</td><td>2</td></tr> </table>		H	T	O			2	2	x		3	1	<hr/>						2	2		6	6	0	<hr/>					6	8	2
	H	T	O																																		
		2	2																																		
x		3	1																																		
<hr/>																																					
		2	2																																		
	6	6	0																																		
<hr/>																																					
	6	8	2																																		

To multiply 3 digit by 2 digit numbers

$$234 \times 32 = 7,488$$



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

Th	H	T	O
	2	3	4
x		3	2
<hr/>			
	4	6	8
17	10	2	0
<hr/>			
7	4	8	8

Year 6


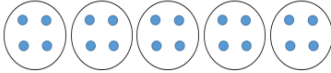
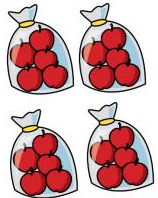
To multiply 4
digit by 2
digit
numbers

$$2,739 \times 28 = 76,692$$



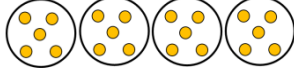
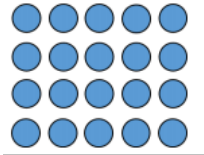
TTh	Th	H	T	O
	2	7	3	9
×			2	8
2	1	9	1	2
₂	₅	₃	₇	
5	4	7	8	0
₁		₁		
7	6	6	9	2
				₁

Division

Year 1

	<p>To solve simple problems by sharing amounts into equal groups.</p>			<p>In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally.</p>
	<p>To solve simple problems by grouping and counting in groups of 2, 5 and 10.</p>	<p>There are 20 apples altogether. They are put in bags of 5. How many bags are there?</p> 		

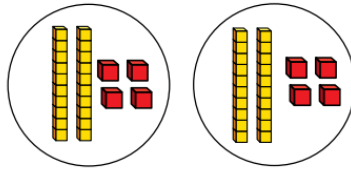
Year 2

		<p>There are 20 apples altogether. They are put in bags of 5. How many bags are there?</p> <hr/>  	 	$20 \div 5 = 4$
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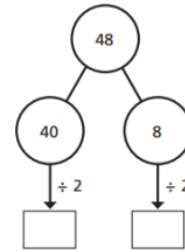
To divide 2 digit by 1 digit numbers (no exchange)

$$48 \div 2 = 24$$

Tens	Ones
10 10	1 1 1 1
10 10	1 1 1 1



Part-whole models can provide children with a clear written method that matches the concrete representation.



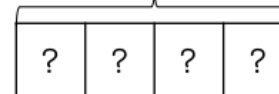
Year 3

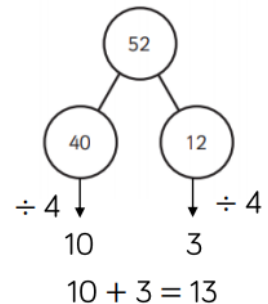
To divide 2 digit by 1 digit numbers (Sharing with exchange)

$$52 \div 4 = 13$$

Tens	Ones
10	2
10	12
10	12
10	12

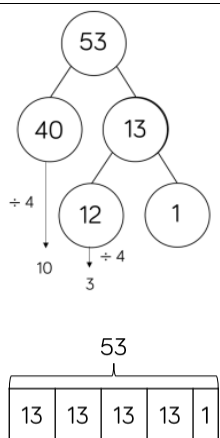
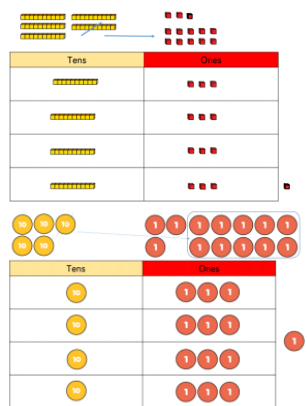
52





To divide 2 digit by 1 digit with remainders

$$53 \div 4 = 13 \text{ r}1$$

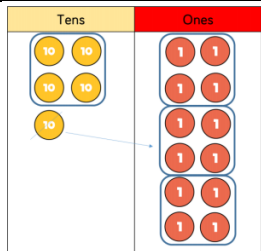


Year 4

To divide 2 digit by 1 digit (grouping)

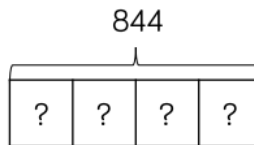
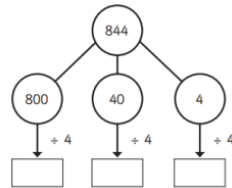
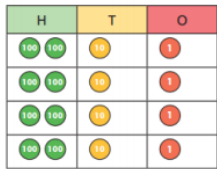
$$52 \div 4 = 13$$

		1	3	
	4	5	12	



To divide 3
digit by 1
digit (sharing)

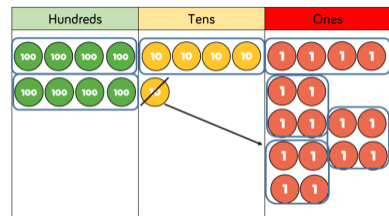
$$844 \div 4 = 122$$



Year 5

To divide 3
digit by 1
digit
(grouping)

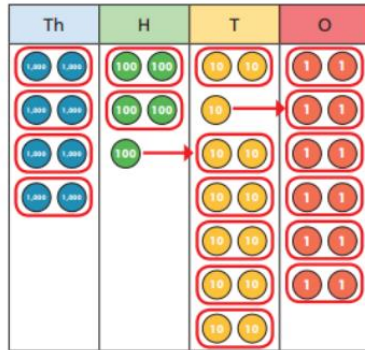
$$856 \div 4 = 214$$



		2	1	4
	4	8	5	16

To divide 4 digit by 1 digit (grouping)

$$8,532 \div 2 = 4,266$$



	4	2	6	6
2	8	5	3	2

Year 6

To divide multi digit by 2 digits (Long division)

$$432 \div 12 = 36$$

		0	3	6
	12	4	3	2

$$3959 \div 37$$

```

      107
    37 3959
      37
      ---
         25
         59
         77
         ---
            45
            99
            77
            ---
               22
               45
               39
               ---
                  4
  
```


To express remainders as a fraction of the divisor

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

$$\begin{aligned} 372 \div 15 &= 24 \text{ r } 12 \\ 372 \div 15 &= 24 \frac{12}{15} \\ &= 24 \frac{4}{5} \end{aligned}$$