St Mary's Primary School

Calculation Policy

Key Stages 1 & 2

How to use the St Mary's Calculation Policy.

Structure:
The calculation policy shows the progression of the mental strategies / informal written formal written methods used across the school.

There is a formal written strategy column. For some year groups this may be blank as they are focusing on developing mental strategies and informal methods only. *Formal written methods for addition, subtraction and division start in Y3 and Y5 for formal multiplication.*

There is the expectation that models and images will be used to introduce, model and support children's learning. There are many resources available in the Maths folder (staff drive (k:)/ staff resources / Maths), in the terrapin and in individual classes. If you are unsure how some of them could be used or if you need additional resources, please ask a maths leader.

The additional information column is important to read as it includes relevant requirements from Curriculum 2014 and expectations for using the strategies.

If required, the range of numbers to be used has been stated and taken directly from the Curriculum 2014. If not, the numbers used should be in line with the Lancashire planning documents.

There may be more than one strategy for each column. Please read carefully to see whether the second or third listed strategy is progressive or is an additional strategy that also needs to be taught.

The diagrams included show examples of how the learning may look when it is modelled and/or recorded in children's books.

<u>Important information:</u>
Subtraction has been split into two mental/informal strategies of taking away (underneath the number line) and finding the difference (counting on above the number line)

Finding the difference number lines should be drawn from zero in Y2 and 3. This is so the children can visualise the whole amount and the difference between the parts.

For multiplication and division, there are references to a 'halving and doubling' appendix that is worth consulting, especially when you considering efficient strategies to multiply and divide by 2. As well as this the need for the close consideration of whether the question is linked to grouping or sharing

Making this document useful for planning:

Choosing a starting point for modelling and teaching the strategies is the key!
Don't just stick to your year group!
Are some strategies still relevant and necessary to practise and strengthen in fluency before moving on?
Are the children confident with certain strategies and ready to move on to the next step in the progression?

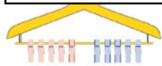
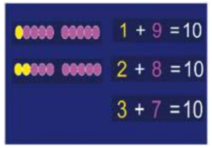
Understand what the children have covered before they have come to you and what they need to move onto.
Use APK and your assessments to help establish what the children can do before teaching the strategies. If there are strategies in the teaching progression that have been missed, the children may struggle to understand what they are doing.

Mental / informal vs a formal written method:
This often depends on the calculation or problem given and the numbers that it involves. What is your lesson focus?

The informal written methods become our mental strategies, whereas formal written methods are beyond our mental capacity.

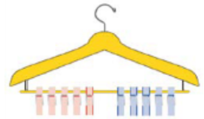
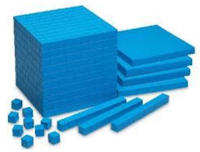
When they are solving problems, they will be able to CHOOSE the most efficient strategy to help them get to the end point of a problem.

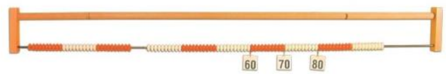
Addition

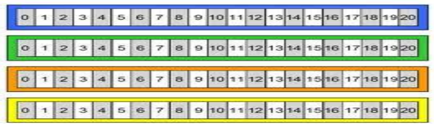
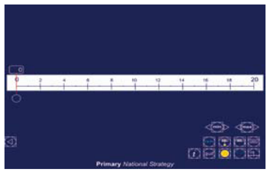
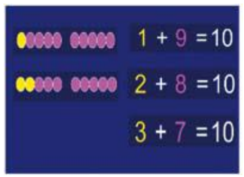
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
R	Children to understand addition as the combining of two or more groups resulting in a larger total. Initially, the children should be given the opportunity to record their addition sums in whichever way they wish by drawing, mark making, diagrams and other jottings. This can be recorded on paper, whiteboards, chalk, paint etc.    When the teacher feels that the children are ready, more 'formal recording' using the correct mathematical symbols (+ and =) can be introduced.		.   rings to add ractical resources. This is a key resource to support transition   Use coat hangers and pegs to teach number bonds and model addition and subtraction to 10.    Number facts TTP	Children should be given lots of opportunities to 'play with maths' by using mathematical language and practical resources before any recording is required. Children to be given opportunities to use practical resources to solve addition problems within real life contexts.

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr><td rowspan="2">1</td><td>Bead strings to be used as an introduction to number lines.

18 + 5 = 23


1 and 2-digit numbers to 20</td><td rowspan="2"></td><td rowspan="2">
Use number tracks and practical resources, e.g. counters, to represent addition in a practical context.


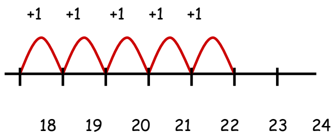





Number line ITP


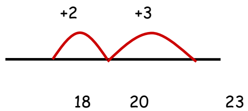
Number facts ITP

Counting ITP

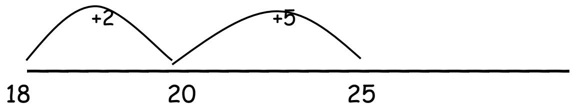
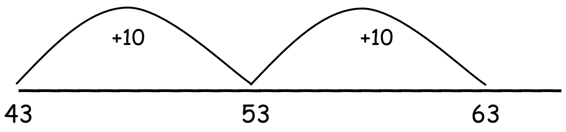
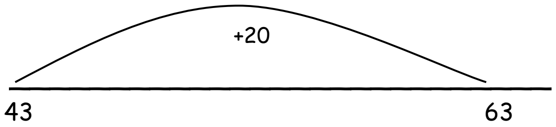
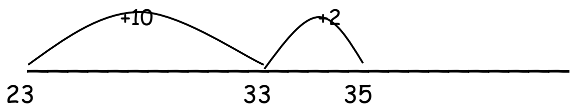
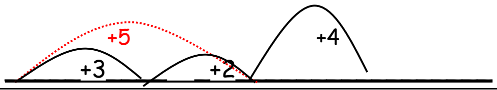
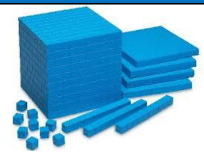
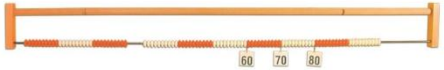
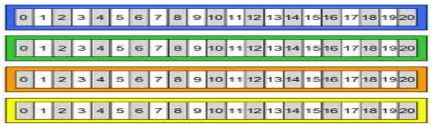
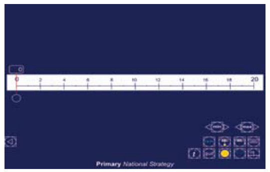
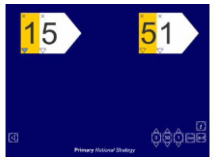
Number grid ITP</td><td rowspan="2">Understand and use the + symbol

Number bonds of all numbers to 20</td></tr>
<tr><td>Number lines (labelled)
18 + 5 = 23


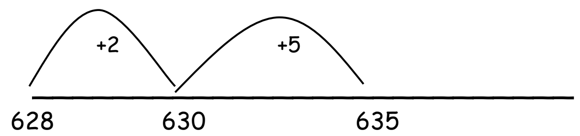
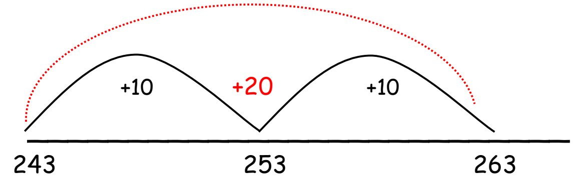
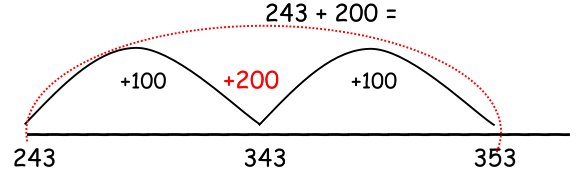
Children to then move on to adding on a number line using more efficient jumps.

E.g. 18 + 5 becomes 18 + 2 = 20, 20 + 3 = 23


1 and 2-digit numbers to 20</td></tr>
</table>

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
2	**<u>Number lines</u>** 2-digit numbers + ones: 18 + 7 =  2-digit numbers + multiples of tens: 43 + 20 =  Moving onto… 43 + 20 =  2-digit numbers + 2-digit numbers (Partition the smallest number) 23 + 12 =  Adding 3 one-digit numbers: 		       Number line ITP  Place Value ITP  Counting ITP  Number grid ITP	Fluently recall and use subtraction facts to 20 and derive and use related facts to 100 Using efficient jumps (E.g. less than 5 ones) Bridging to multiples of 10 or 100 Commutative law (E.g. 2 + 5 = 7, 5 + 2 = 7

	7 10 12 16 5 + 7 + 4 =			
	<u>Partitioning</u> 2-digit numbers + 2-digit numbers 23 + 12 = 20 + 3 + 10 + 2 = 20 + 10 = 30 = 3 + 2 = 5 = 30 + 5 = 35 or 23 + 12 = 20+10 3+2 30 5			

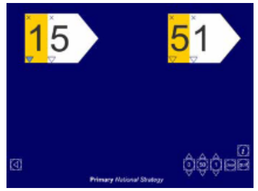
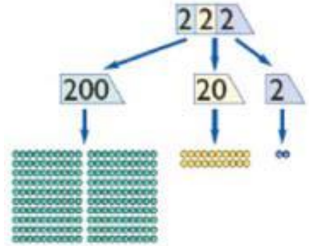
<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr><td rowspan="2">3</td><td><u>Number lines</u>
3-digit number + ones
628 + 7 =

3-digit number + multiples of tens
243 + 20 =

3-digit number + multiples of hundreds
243 + 200 =
</td><td rowspan="2"><u>Expanded vertical method</u>

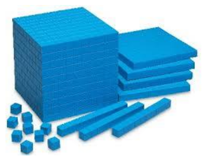
552 → 500 50 2
+ 245 → 200 60 5
817 700 110 7

<u>Compact vertical method</u>
552
+245
797

789 + 642 becomes

7 8 9
+ 6 4 2
1 4 3 1
1 1

Answer: 1431
Using up to 3-digit numbers + 3-digit numbers (including carrying)</td><td rowspan="2">
Place Value ITP


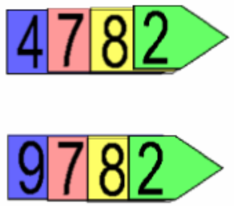
</td><td rowspan="2">Mental calculation with 2-digit numbers, the answers could exceed 100</td></tr>
<tr><td><u>Partitioning</u>
Up to 3 digit numbers
423 + 142 = 400 + 20 +3
+100 + 40 + 2
= 400 + 100 = 500
= 20 + 40 = 60
= 3 + 2 = 5
= 500 + 60 +5
= 565

or

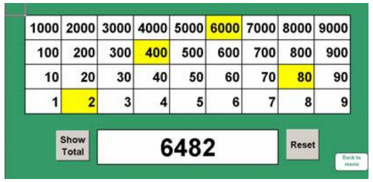
423 + 142 =
400+100 20+40 3+2
500 60 5</td></tr>
</table>

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr><td rowspan="2">4</td><td><u>Number lines</u>

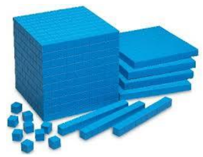
Use strategies in previous years and consolidate and strengthen fluency</td><td rowspan="2"><u>Compact vertical method</u>

Using up to 4-digit number - 4-digit number
(See Y3 for example)</td><td rowspan="2">
Arrow cards

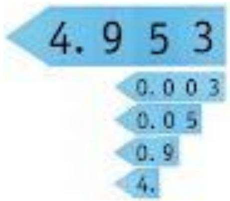
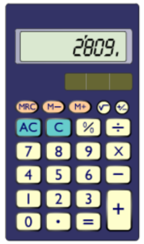
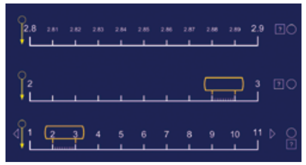
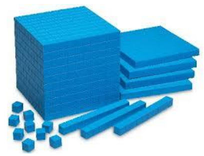
Continue to use practical resources where necessary to consolidate children's understanding of place value.

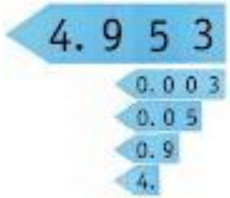

Place value board

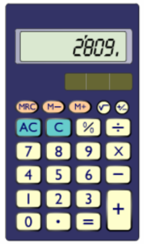

Place value interactive teaching program

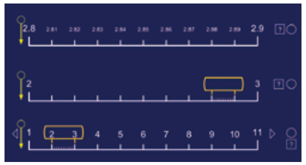
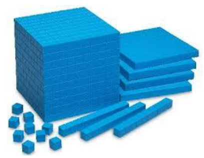
</td><td rowspan="2"></td></tr>
<tr><td><u>Partitioning</u>

Partitioning up to 4 digit numbers
(See Y3 for example)</td></tr>
</table>

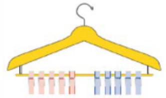
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
5	**<u>Number lines</u>** Use strategies in previous years and consolidate and strengthen fluency **<u>Partitioning decimals</u>** Ones and tenths Tens/ones and tenths 5.2 + 4.6 = 5 + 0.2 + 4 + 0.6 = 5 + 4 = 9 = 0.2 + 0.6 = 0.8 = 9 + 0.8 = 9.8 5.2 + 4.6 = 9.8 9 0.8	**<u>Compact vertical method</u>** See Y4 for example but extend to… Numbers with more than 4 digits Decimals 568.60 + 24.98 593.58 1 1	 Continue to use practical resources where necessary to consolidate children's understanding of place value. Use decimal arrow cards to support children's understanding of adding decimals.  Model using calculators to add large numbers including decimals.  Decimal number line ITP 	

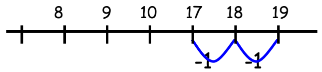
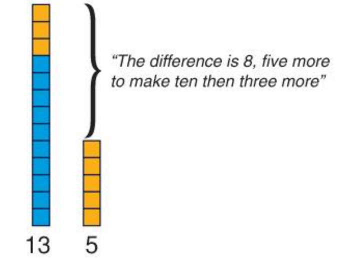
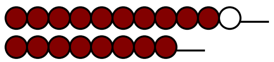
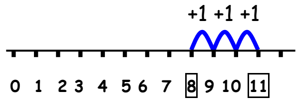
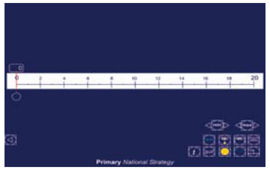
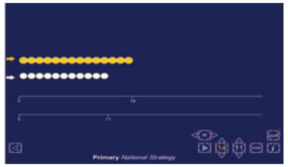
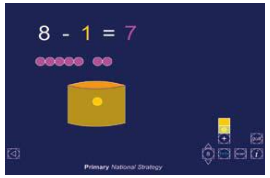
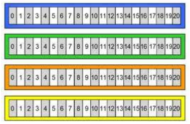
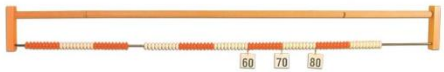
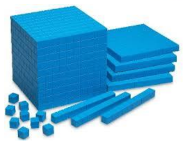
<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr><td>6</td><td>Use strategies in previous years and consolidate and strengthen fluency</td><td>Use strategies in previous years and consolidate and strengthen fluency</td><td>

Continue to use practical resources where necessary to consolidate children's understanding of place value.
Use decimal arrow cards to support children's understanding of adding decimals.


Model using calculators to add large numbers including decimals.

Decimal number line ITP
</td><td></td></tr>
</table>

Subtraction

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
R	Initially, the children should be given the opportunity to record their subtraction sums in whichever way they wish by mark making, diagrams and other jottings. This can be recorded on paper, whiteboards, chalk, paint etc.    I have five cakes. I eat two of them. How many do I have left?  When the teacher feels that the children are ready, more 'formal recording' using the correct mathematical symbols (- and =) can be introduced.		   Use bead strings to add using practical resources. This is a key resource to support transition  Use coat hangers and pegs to teach number bonds and model addition and subtraction to 10.   Number facts TTP 	Children should be given lots of opportunities to 'play with maths' by using mathematical language and practical resources before any recording is required

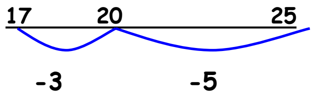
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
1	**<u>Bead strings</u>** to be used as an introduction to number lines **<u>to take away</u>**. 1 and 2-digit numbers to 20  19 - 2 = 17 **<u>Number lines to take away</u>**  **<u>Finding the difference</u>**  11 – 8 = 3  		 Number line ITP  Difference ITP  Number facts ITP  Counting ITP  Use number tracks and practical resources, such as counters, to represent subtraction sums in a practical context.  Use bead strings to subtract using practical resources.   	*Understand and use the – symbol* Inverses, number bonds of all numbers to 20 When **subtracting,** be clear whether you are using the strategy of taking away or finding the difference.

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr><td rowspan="2">2</td><td>

<u>Taking away on a number line</u>

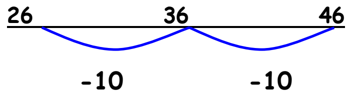
2-digit numbers – ones

25 – 8 = 17



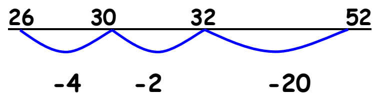
2-digit numbers – multiples of tens

46 – 20 = 26

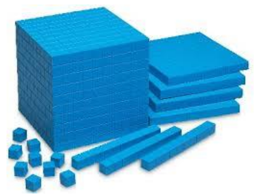


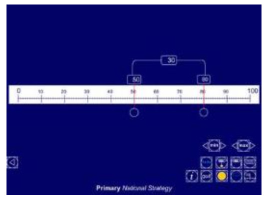
2-digit numbers – 2-digit numbers

52 – 26 = 26

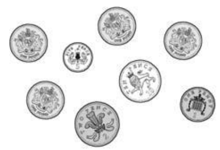


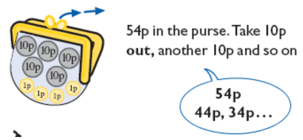
</td><td rowspan="2"></td><td rowspan="2">



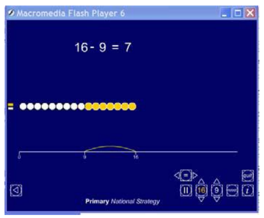


Number line ITP





Children solve problems with money involving finding change and know that it is linked to subtraction.



Difference ITP

Counting on and back ITP

</td><td rowspan="2">

Fluently recall and use subtraction facts to 20 and derive and use related facts to 100

Using efficient jumps (less than 5 ones)

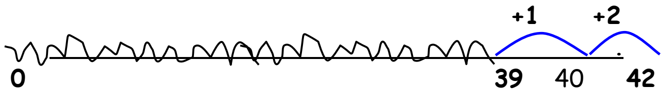
Bridging to multiples of 10 or 100

When **subtracting,** be clear whether you are using the strategy of taking away or finding the difference.

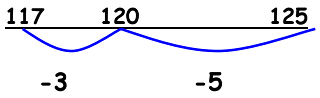
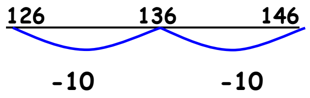
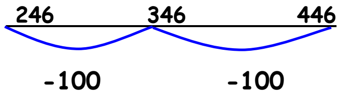
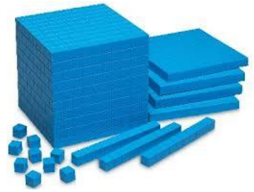
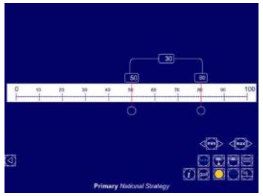
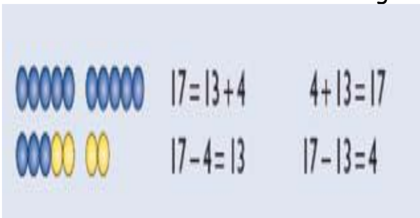
</td></tr>
<tr><td>

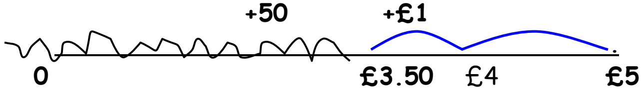
<u>Finding the difference</u>

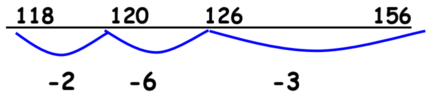
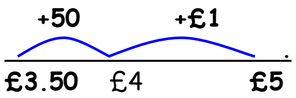
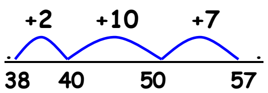
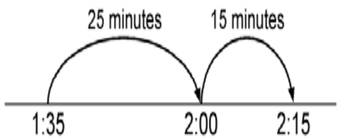
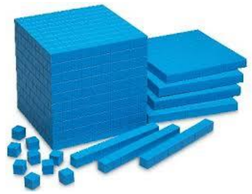
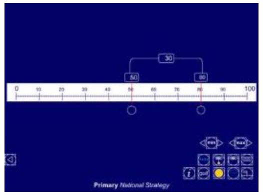
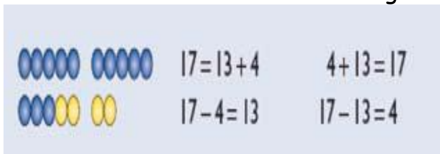
moving on to using an empty number line (close numbers)

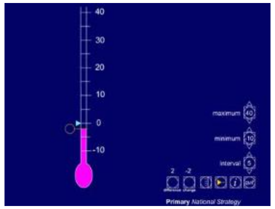
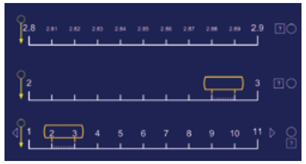
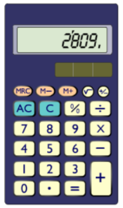


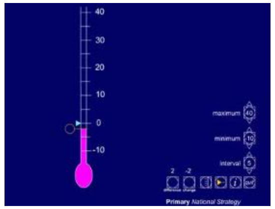
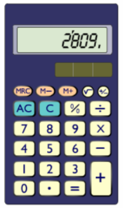
</td></tr>
</table>

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
3	**<u>Taking away on a number line</u>** (bridging and partitioning ONLY the 2nd) 3-digit numbers – ones **125 - 8 = 17**  3-digit numbers – multiples of tens **146 - 20 = 126**  3-digit number – multiples of hundreds **446 - 200 = 226** 	**<u>Expanded vertical method</u>** to be used as an introduction to… 556 → 500 50 6 -245→ 200 40 5 311 300 10 1 **<u>Compact vertical method</u>** 874 – 523 becomes **8 7 4** **– 5 2 3** **3 5 1** Answer: 351 Using up to 3-digit number - 3- digit number	  Number line ITP Number grid ITP  Ensure children have a secure understanding of inverse relationships.	Mental calculation with 2-digit numbers, the answers could exceed 100 Exchanging is not required until Year 4. Consider models and teaching resources to reflect this. More able may be extending using exchanging. See Year 4.

	<u>Finding the difference</u> on an empty number line money change £5 – 3.50 = £1.50  close numbers 57 – 38 = 19  			

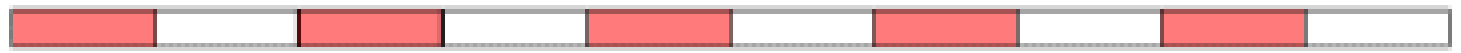
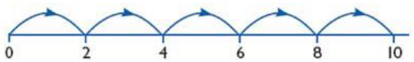
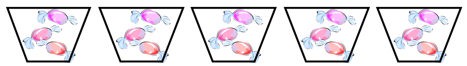
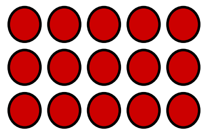
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
4	**<u>Taking away on a number line</u>** (bridging and partitioning ONLY the 2nd) **156 - 38 =**  **<u>Finding the difference</u>** on an empty number line (money change, close numbers) Money Change £5 - 3.50 = £1.50  Close numbers 57 -38 = 19  Time  	**<u>Compact vertical method</u>** 932 – 457 becomes $\begin{array}{cccc} & {}^{8} & {}^{12} & {}^{1} \\ & \cancel{9} & \cancel{3} & 2 \\ - & 4 & 5 & 7 \\ \hline & 4 & 7 & 5 \\ \hline \end{array}$ Answer: 475 Using up to 4-digit number - 4-digit number (including exchanging)	   Number line ITP  Number grid ITP  Ensure children have a secure understanding of inverse relationships.	

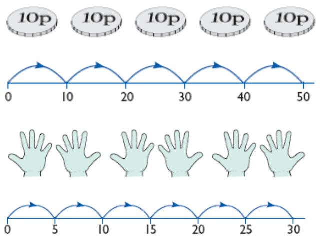
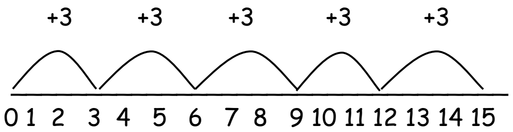
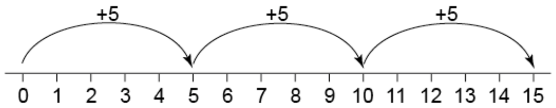
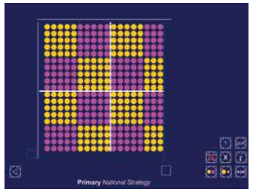
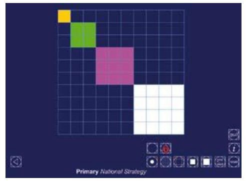
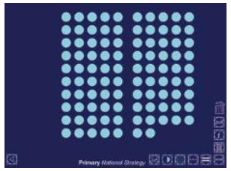
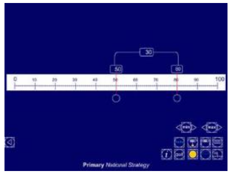
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
5	**<u>Taking away</u>** (see Y4 for example) **<u>Finding the difference</u>** (see Y4 for example)	**<u>Compact vertical method</u>** Numbers with more than 4 digits (including exchanging) Decimals (including exchanging) 68.6 – 24.9 = 43.7 $\begin{array}{r} 6\,{}^{7}\cancel{8}.{}^{1}6 \\ -\ \underline{2\,4.\,9} \\ \underline{4\,3.\,7} \end{array}$	 Thermometer ITP Finding the difference between positive and negative numbers  Decimal number line ITP  Model using calculators to subtract large numbers including decimals.	

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
6	Use strategies in previous years and consolidate and strengthen fluency	Use strategies in previous years and consolidate and strengthen fluency Decimals 68.6 – 24.98 = 43.62 $\begin{array}{r} 6\;{}^{7}\cancel{8}.{}^{15}\cancel{6}\,{}^{1}0 \\ -\;\underline{2\;4.\;9\;8} \\ \underline{4\;3.\;6\;2} \end{array}$	 Thermometer ITP Finding the difference between positive and negative numbers  Model using calculators to subtract large numbers including decimals.	

Multiplication

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
R	Initially, the children should be given the opportunity to record their counting or practical activities in whichever way they wish by mark making, diagrams and other jottings. This can be recorded on paper, whiteboards, chalk, paint etc.    E.g. There are 3 plates. Each plate has 2 cakes. How many cakes altogether?  Children to solve problems in context for example, answering questions like 'How many socks on the washing line?'  		Children to be given opportunities to use practical resources to count in steps of the same size within real life contexts.    	Children should be given lots of opportunities to 'play with maths' by using mathematical language and practical resources before any recording is required.

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
1	**<u>Skip counting</u>** (To help learn tables and help to count quickly)  0 2 4 6 8 10 12 14 16 18 20   5 10 15  		Children to use practical resources to solve problems within a context. There are 3 plates. Each plate has 2 cakes. How many cakes altogether?  There are 3 sweets in one bag. How many sweets are there in 5 bags?  Introduce arrays 	With the multipliers of 2, 5, 10

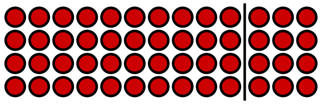
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
2	**<u>Skip counting</u>** moving on to.. **<u>Unitisation</u>** (One object that represents many.)  **<u>Repeated addition</u>**  		 Multiplication array ITP  Area ITP (good for creating own arrays)  Multiplication facts interactive teaching program  Counting ITP  Number line ITP	With the multipliers of 2, 5, 10 *Understand and use the x symbol* By the end of year 2 children should be able to recall 2, 5, 10 multiplication facts and their related division Commutative law (E.g. 2 x 5 = 10, 5 x 2 = 10)

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr>
<td>3</td>
<td>

<u>Partitioning</u>

<u>Arrays</u>

13 x 4 = 52



10 x 4 = 40   3 x 4 = 12

(Image to be used as a teaching model not an expectation for children to draw in their books)

<u>Grid method</u>

2-digit number x ones

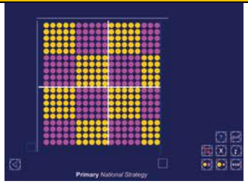
<table>
<tr><td>x</td><td>40</td><td>6</td></tr>
<tr><td>4</td><td>160</td><td>24</td></tr>
</table>

160
+ 24
184

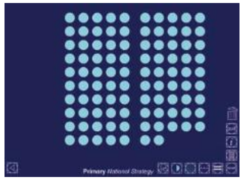
OR other informal methods of adding e.g. number lines

160 + 20 = 180 + 4 =184

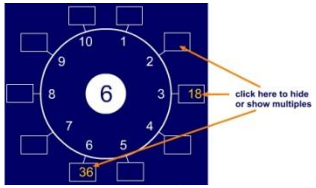
</td>
<td></td>
<td>



Multiplication array ITP

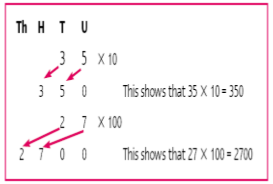


Counting ITP



Number dial ITP

Multiplication facts ITP



</td>
<td>

With the multipliers of 2, 3, 4, 5, 8, or 10

By the end of year 3 children should be able to recall 3, 4, 8 multiplication facts and their related division facts (inverses)

Commutative law (E.g. 8 x 3 = 24, 3 x 8 = 24)

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

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr>
<td>4</td>
<td>

<u>Grid Method</u>

2-digit number x ones

<table>
<tr><td>x</td><td>40</td><td>6</td></tr>
<tr><td>4</td><td>160</td><td>24</td></tr>
</table>

160
+ 24
184

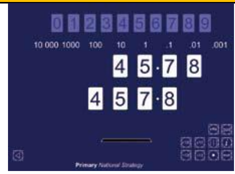
3-digit number x ones

453 x 4 =1812

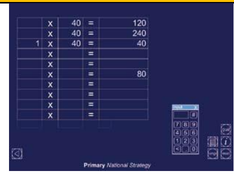
<table>
<tr><td>x</td><td>400</td><td>50</td><td>3</td></tr>
<tr><td>4</td><td>1600</td><td>200</td><td>12</td></tr>
</table>

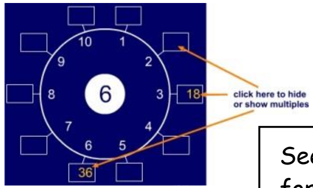
1600
200
+ 12
1812

</td>
<td></td>
<td>



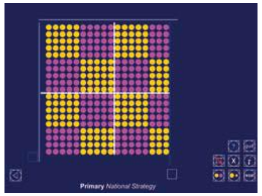
Moving digits ITP


Multiplication facts ITP

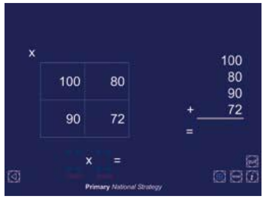


Number dial ITP

See also 'Gordon's ITP's' for multiplication grids


Multiplication array ITP


Number grid ITP



Multiplication grid ITP

</td>
<td>Using all multipliers up to 12

By the end of Y4 children should be able to recall multiplication facts and their related division facts up to their 12 times tables (inverses)</td>
</tr>
</table>

<table>
<tr><th>Year Group</th><th>Mental strategies / informal written methods</th><th>Formal written strategies</th><th>Models and Images</th><th>Additional information</th></tr>
<tr>
<td>5</td>
<td>

<u>Grid</u>

4-digit number x ones

2453 x 4 =1812

<table>
<tr><td>x</td><td>2000</td><td>400</td><td>50</td><td>3</td></tr>
<tr><td>4</td><td>8000</td><td>1600</td><td>200</td><td>12</td></tr>
</table>

8000
1600
200
+ 12
9812

2-digit number x 2-digit number

24 x 35 = 840

<table>
<tr><td>x</td><td>20</td><td>4</td></tr>
<tr><td>30</td><td>600</td><td>120</td></tr>
<tr><td>5</td><td>100</td><td>20</td></tr>
</table>

600
120
100
+ 20
840

3-digit number x 2-digit number

27 x 453 = 12231

<table>
<tr><td>x</td><td>400</td><td>50</td><td>3</td></tr>
<tr><td>20</td><td>8000</td><td>1000</td><td>60</td></tr>
<tr><td>7</td><td>2800</td><td>350</td><td>21</td></tr>
</table>

8000
2800
1000
350
+ 60
21
12231
1 1

Decimals

13.46 x 4 = 53.84

<table>
<tr><td>x</td><td>10</td><td>3</td><td>0.4</td><td>0.06</td></tr>
<tr><td>4</td><td>40</td><td>12</td><td>1.6</td><td>0.24</td></tr>
</table>

40.00
12.00
1.60
+ 0.24
53.84

Any variations up to 2 decimal places

</td>
<td>

<u>Short multiplication</u>

(multiplying by a single digit)

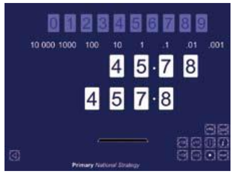
342 × 7 becomes

$$\begin{array}{r} 3\ 4\ 2 \\ \times\quad\ \ 7 \\ \hline 2\ 3\ 9\ 4 \\ \hline \scriptsize{2\ \ 1} \end{array}$$

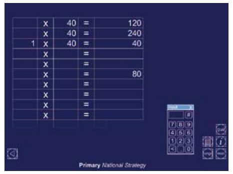
Answer: 2394

(including carrying)

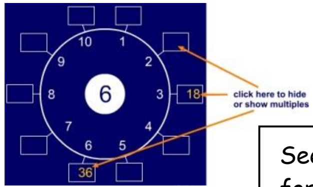
</td>
<td>



Moving digits ITP

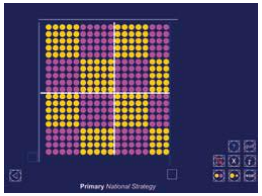


Multiplication facts ITP



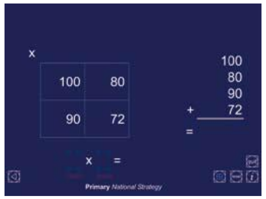
Number dial ITP

See also 'Gordon's ITP's' for multiplication grids



Multiplication array ITP

Number grid ITP



Multiplication grid ITP

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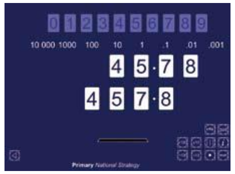
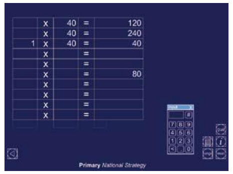
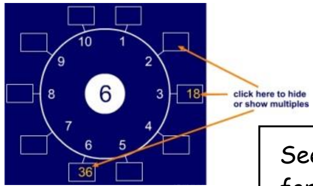
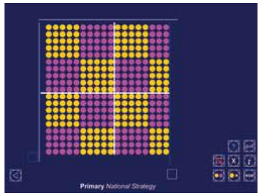
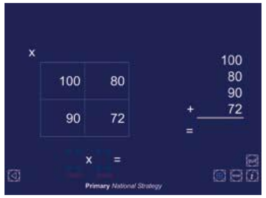
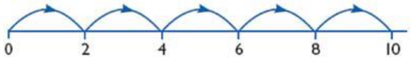
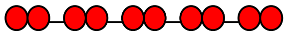
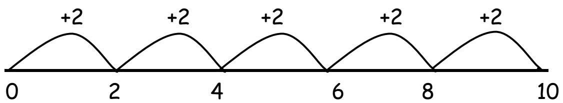
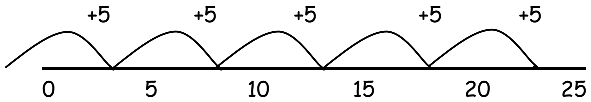
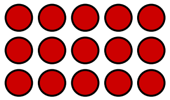
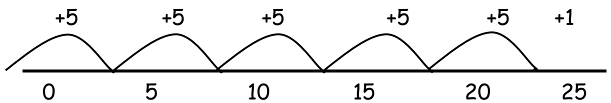
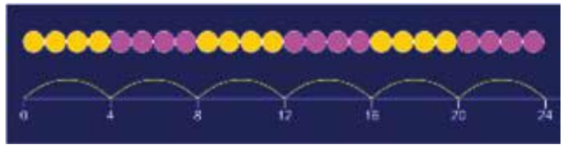
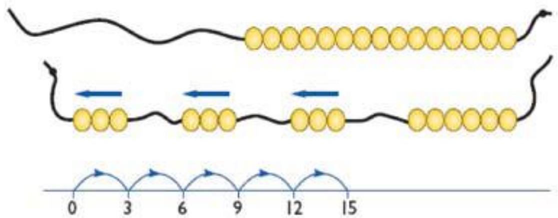
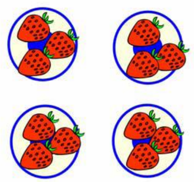
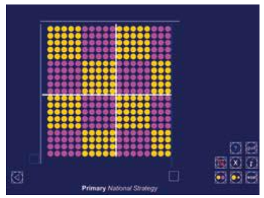
</table>

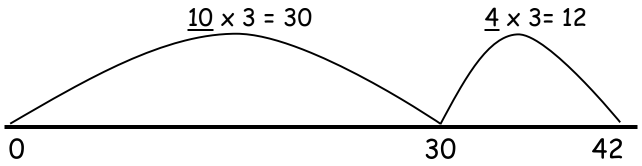
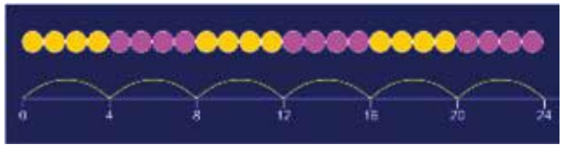
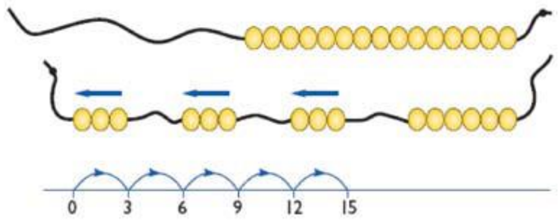
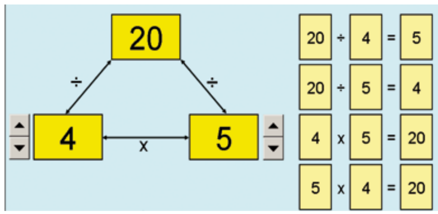
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
6	Use strategies in previous years and consolidate and strengthen fluency	**<u>Long multiplication</u>** (multiplying by a 2-digit number) 543 x 27 becomes 5 4 3 X 2 7 3 8 0 1 3 2 1 0 8 6 0 1 4 6 6 1 1 (including carrying)	 Moving digits ITP  Multiplication facts ITP  Number dial ITP See also 'Gordon's ITP's' for multiplication grids  Multiplication array ITP  Number grid ITP  Multiplication grid ITP	

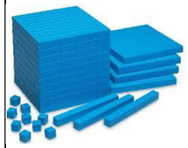
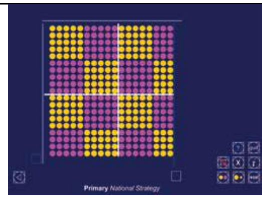
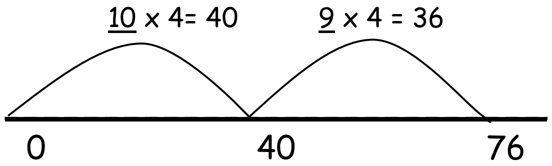
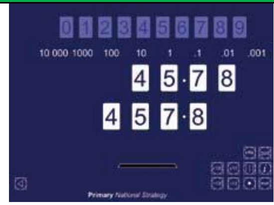
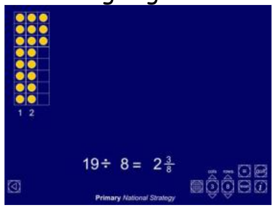
Division

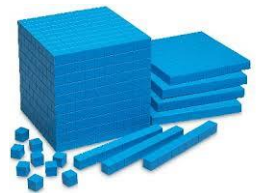
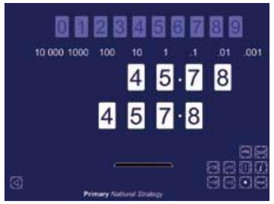
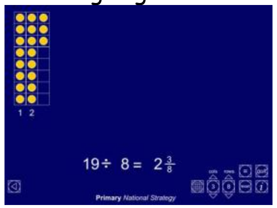
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
R	Initially, the children should be given the opportunity to record their sharing and grouping activities in whichever way they wish by mark making, diagrams and other jottings. This can be recorded on paper, whiteboards, chalk, paint etc.    The children should also be exposed to mental maths linked to their everyday experiences, for example 'If I have 10 socks, how many pairs of socks can I make?'   		Children to be given opportunities to use practical resources to share and group objects within real life contexts.       Children to understand division as sharing. Six cakes shared between two children:  	

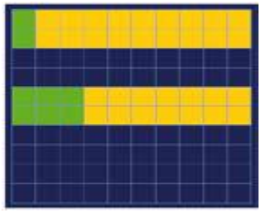
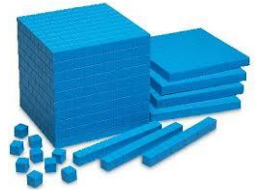
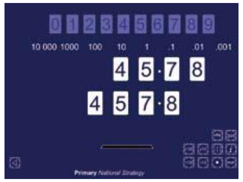
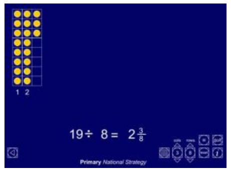
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
1	Using objects / images to **share** Six cakes shared between two children:  Using times table facts to solve simple division using a **bead string** leading to **Grouping** 10 ÷ 2 =  **<u>Number line using repeated addition</u>** 10 ÷ 2 = 		Children to be given opportunities to use practical resources to share objects into groups of the same size within real life contexts.   Grouping using objects:  	With the divisors of 2, 5, 10 When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page. Introduce the ÷ symbol Be clear on the strategy used to solve sharing or grouping problems

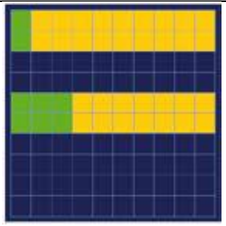
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
2	Using times table facts to solve simple division using a **<u>number line using repeated addition</u>** How many 5s in 25?  **<u>Arrays</u>** 15 ÷ 5 =  **<u>With remainders</u>** 26 ÷ 5 = 5 r 1 		 Grouping ITP  Use of bead strings and number lines to demonstrate 'groups'  Multiplication facts ITP  Sharing and grouping using practical resources  Multiplication array ITP	With the divisors of 2, 5, 10 *Understand and use the ÷ symbol* By the end of year 2 children should be able to recall 2, 5, 10 multiplication facts and their related division facts (inverses) When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page.

Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
3	Using times table facts to solve simple division using a **number line** Numbers should be beyond the times tables they know i.e. beyond 10x 	Introducing **short division** (dividing by a single digit) 98 ÷ 7 becomes $\begin{array}{r\|l} & 1\ \ 4 \\ \hline 7 & 9\ {}^{2}8 \end{array}$ Answer: 14 Ensure numbers used in these calculations are beyond what would be appropriate for mental strategies. E.g. beyond 20 times the divisor (63 ÷ 3 = 21) 2-digit number and ones (Show base 10!)	 Grouping ITP  Use of bead strings and number lines to demonstrate 'groups'  Multiplication facts ITP  Children to understand the relationship between x and ÷	With the divisors of 2, 3, 4, 5, 8, or 10 By the end of year 3 children should be able to recall 3, 4, 8 multiplication facts and their related division facts (inverses) When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page.

			  Multiplication array ITP	
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
4	Using times table facts to solve simple division including using a **<u>number line</u>** 76 ÷ 4 = 	**<u>Short division</u>** (dividing by a single digit) 2-digit number ÷ ones 98 ÷ 7 becomes $\begin{array}{r\|l} & 1\ \ 4 \\ \hline 7 & 9\ \ {}^{2}8 \end{array}$ Answer: 14 3-digit number ÷ ones	 Moving Digits ITP  Remainders ITP	Using all divisors up to 12 By the end of Y4 children should be able to recall multiplication facts and their related

	<u>Derive division facts</u> using times tables, extended to 3 digit numbers 2 x 3 = 6, 600 ÷ 3 = 200 Inverse, place value	432 ÷ 5 becomes $\begin{array}{r|l} & 8\ \ 6\ \ r\,2 \\ \hline 5 & 4\ \ 3\ \ {}^{3}2 \end{array}$ Answer: 86 remainder 2		division facts up to their 12 times tables (inverses) When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page.
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
5	**<u>Derive division facts</u>** using times tables, extended to beyond 3 digit numbers and decimals 2 x 3 = 6, 600 ÷ 3 = 200 5 x 7 = 35, 3.5 ÷ 5 = 0.7 Inverse, place value	**<u>Write remainders as fractions or decimals.</u>** 563 ÷ 4 = 35 $\begin{array}{r} 1\,4\,0.\ 7\,5 \\ \hline 4)5\ {}^{1}6\ 3.\ {}^{3}0{}^{2}0 \end{array}$ OR $\begin{array}{r} 1\ \ 4\,0\ r3 \\ \hline 4)5\ {}^{1}6\ 3 \end{array}$ $140\frac{3}{4}$	 Moving Digits ITP 	When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page.

		Introducing **factorisation** (using short division) to divide 2 digit numbers 840 ÷ 24 = 35 6 4 Identify factors of the 2 digit number. 840 ÷ 6 = Divide the number by 1 of the factors. $\underline{1\ 4\ 0}$ $6)8^{2}40$ 140 ÷ 4 = Divide the answer by the 2nd factor. $\underline{0\ 3\ 5}$ $4)1^{1}4\ {}^{2}0$	Remainders ITP  Area ITP can support understanding of division & fractions. Area ITP 	
Year Group	Mental strategies / informal written methods	Formal written strategies	Models and Images	Additional information
6	Use strategies in previous years and consolidate and strengthen fluency	**<u>Factorisation</u>** (short division) to divide 2 digit numbers 840 ÷ 24 = 35 6 4 Identify factors of the 2 digit number. 840 ÷ 6 = Divide the number by 1 of the factors. $\underline{1\ 4\ 0}$	 Moving digits ITP  Remainders ITP	When you are sharing by 2 (halving) then please refer to the doubling/halving strategy page.

		$6\overline{)8^{2}40}$ 140 ÷ 4 = Divide the answer by the 2nd factor. $\begin{array}{r} 0\,3\,5 \\ 4\overline{)1^{1}4\,{}^{2}0} \end{array}$	 Area ITP Area ITP can support division & fractions work	
		Long division 432 ÷ 15 becomes $\begin{array}{rrrrrr} & & & 2 & 8\cdot & 8 \\ 1 & 5 & 4 & 3 & 2\cdot & 0 \\ & & 3 & 0 & \downarrow & \downarrow \\ & & 1 & 3 & 2 & \\ & & 1 & 2 & 0 & \\ & & & 1 & 2 & 0 \\ & & & 1 & 2 & 0 \\ & & & & & 0 \end{array}$ Answer: 28·8		

Appendix 1:
Doubling and Halving

When multiplying and dividing by 2, children should be taught to use the strategies of doubling and halving. This will build on the learning from Key Stage 1 and Lower Key Stage 2. Children will need lots of practice partitioning numbers in different ways in order to halve any number.

36 x 2 = 72

Partition 30 6

Double and recombine $60 + 12 = 72$

$84 \div 2 = 42$

Partition $80 \quad 4$

Halve and recombine $40 + 2 = 42$

$58 \div 2 = 29$

$50 \quad 8$ or $40 \quad 18$

$25 + 4$ or $20 + 9$

This can then be extended when dividing and multiplying by 4. Teach children to halve and halve again or double and double again.

$36 \times 4 = 21$

Partition $30 \quad 6$

Double $60 \quad 12$

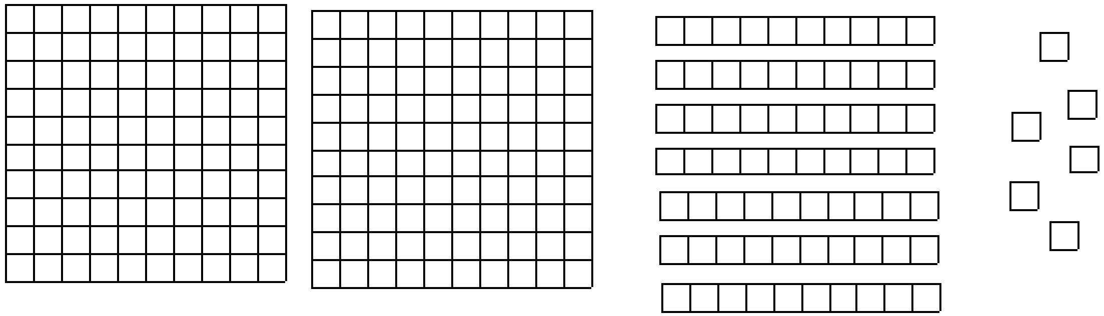
Double again and recombine 120 + 24 = 144

	84 ÷ 4 = 21	58 ÷ 2 = 14.5
Partition	80 4	50 8 or 40 18
Halve	40 2	25 4 or 20 9
Halve again and recombine	20 + 1 = 21	12.5 + 2 or 10 + 4.5

Appendix 2:
Teaching Short Division Using Base 10

This is an example script of how to teach short division using base 10. Base 10 will help children understand the concept of dividing using the short method of division.

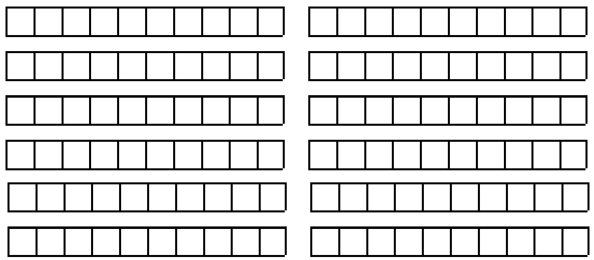
- We are going to use base ten blocks to represent 276.

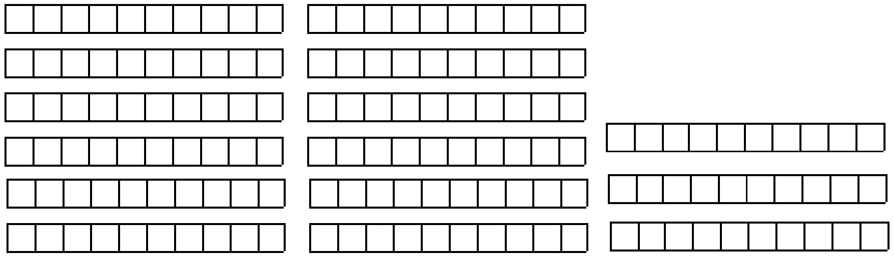


Let's begin with the hundreds. Since we are dividing by 6, we need to make groups containing 6 hundreds. Can this be done if we only have 2 hundreds?
No. When you cannot make groups from the current place, you will need to exchange and make groups from the next place.

So we write a 0, to show that there is 0 groups of 6 hundreds. If we exchange the 2 hundreds for tens, how many tens would we get? If we include the 7 tens, how many tens would that be altogether?
20 tens is equivalent to 2 hundreds. If we combine the 20 tens with 7 tens, we get 27 tens.

Since we are working with tens now, how many groups of 6 tens can we make from 27 tens?





Notice that there are 4 groups of 6 tens with 3 tens left over.

Since we have 4 groups of 6 tens, we place a 4 over the tens place in 276.

If one group of 6 tens is 60, what is 4 groups of 6 tens worth?
240. Encourage students to use their base ten blocks if necessary to count the value.

Remember that we began with 276 and want to divide it by 6. Since we have made four groups of 6 tens, we can take 240 away from 276.

How many tens and ones are left over when we take away the 4 groups of 6 tens?
3 tens and 6 ones are left over.

We can do this by writing 240 below 276 in our division problem and subtracting.

What is 276 -240? What is the value of the base ten blocks that you have left over? What do you notice about the two values?
36. This allows students to see the connection and validation between using the base ten blocks and the algorithm they are learning to use.

Since we cannot make any more groups of 6 tens with the remaining base ten blocks, we can exchange the 3 tens for how many ones?
30 ones. Be sure to show the students the exchanging of 3 tens for 30 ones.

How many ones will we now have?
We will have 36 ones.

How many groups of 6 ones can we make from 36 ones?
We can make 6 groups.

Where do you think we will write the 6 that represents the 6 groups?
The 6 is written above the ones place in 276.

Are there any ones left over? (If we did we would write this as a remainder.)
No.

What is the quotient of 276 ÷ 6?
46