Ursuline

Catholic Primary School

Calculation Policy

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Calculations Policy

Introduction

Here at Ursuline Catholic Primary School children are introduced to the processes of calculation by building a sequence following a C-P-A approach. The C-P-A approach stands for Concrete - Pictorial – Abstract. This means that throughout the school, we see children using concrete equipment and pictures to support their understanding of more abstract concepts.

Over time children learn how to *use models and images*, such as Dienes, place value counters, bar models and tens frames, to **support their mental and informal written methods of calculation**. As children's mental methods are strengthened and refined, so too are their informal written methods. These methods become more efficient and succinct and lead to efficient written methods that can be used more generally. By the end of Year 6 children are equipped with mental and written methods that they understand and can use correctly.

When faced with a calculation, children are able to decide which method is most appropriate and have strategies to check its accuracy. They will do this by asking themselves:

- Can I do this in my head?
- Can I do this in my head using drawing or jottings?
- Do I need to use a pencil and paper procedure?

At whatever stage in their learning, and whatever method is being used, **it must still be underpinned by a secure and appropriate knowledge of number facts,** along with those mental skills that are needed to carry out the process and judge if it was successful.

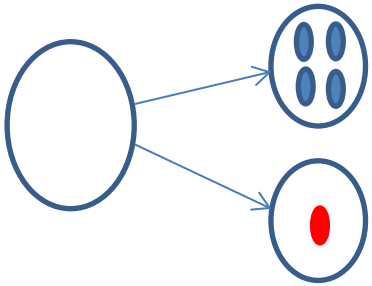
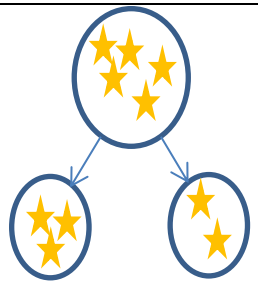
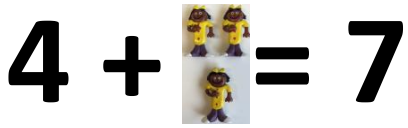
The overall aim is that when children leave primary school they:

- Have a secure knowledge of number facts and a good understanding of the four operations;
- are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and particular strategies to special cases involving bigger numbers;
- make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;
- have an efficient and reliable written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally; which leads to a formal written method.

ADDITION

EYFS

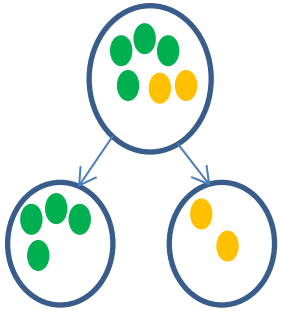
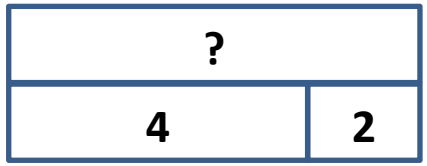
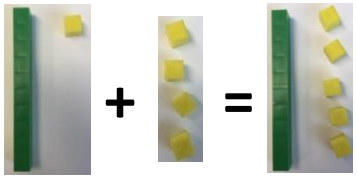
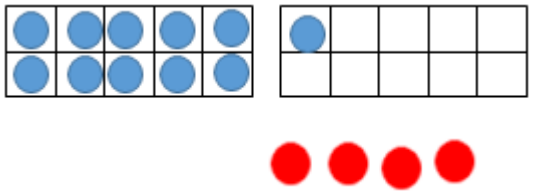
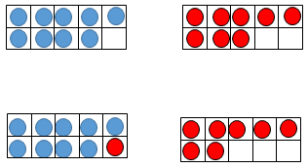
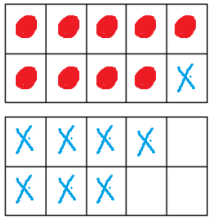
Maths ELG: Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

	Concrete	Pictorial	Abstract
Add one more to a given number	**4 + 1 =** 		**4 + 1 =** ☐ What is one more than 4?
Add two single digit numbers to find an answer Counting two groups out to find a total	**3 + 2 =** 		**3 + 2 =** ☐
Add two single digit numbers to find an answer Counting on from the biggest number	**3 + 4 =**  *Children should be able to make the decision to count from the biggest number.*	**3 + 4 =** 	**3 + 4 = is calculated as** **4 + 3 = 7**

Year 1

Pupils should be taught to:

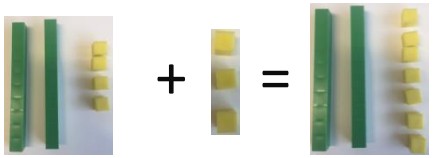
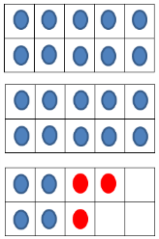
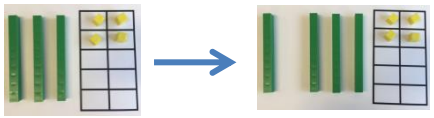
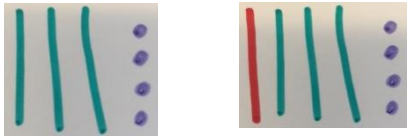
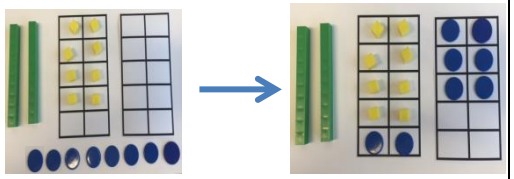
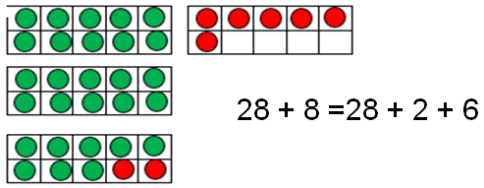
- ***read, write and interpret mathematical statements involving addition (+) and equals (=) signs***
- ***represent and use number bonds and related addition facts within 20***
- ***add one-digit and two-digit numbers to 20, including 0***
- ***solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems such as 7 = ? + 3***

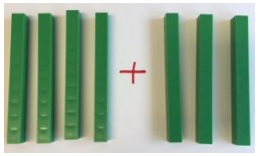
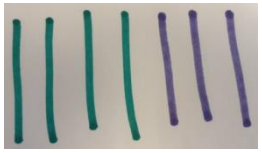
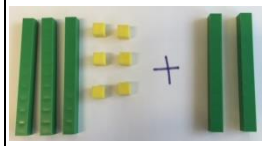
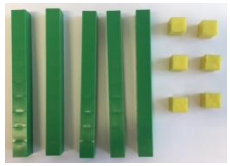
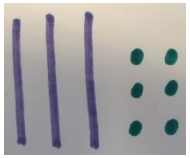
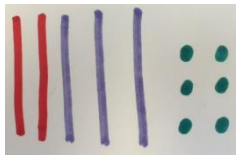
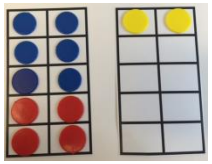
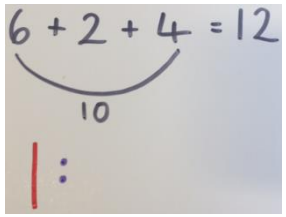
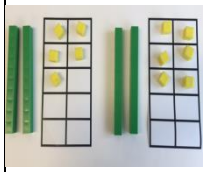
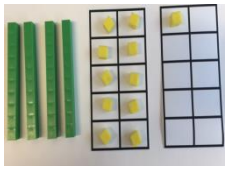
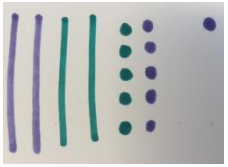
	Concrete	Pictorial	Abstract
Bonds to 5, 10, 6, 7, 8 and 9	**4 + 2 = 6** 	**4 + 2 = 6** 	**4 + 2 =** ☐ 
Adding TO + O (using bonds)	**11 + 4 = 15** 	**11 + 4 is seen as 10 + 5 = 15** 	**11 + 4 =** ☐
Addition of O + O crossing boundary of 10	**8 + 9 =** *Using counters/cubes with tens frames*  Leading to addition by partitioning through 10 e.g. 9 + 1 + 7	**8 + 9 =** *Drawing counters with tens frames* 	**8 + 9 = 9 + 1 + 7 = 17** **1 7**

Year 2

Pupils should be taught to:

- ***recall and use addition facts to 20 fluently, and derive and use related facts up to 100***
- ***add and subtract numbers, including:***
  - ***a two-digit number and 1s***
  - ***a two-digit number and 10s***
  - ***2 two-digit numbers***
  - ***adding 3 one-digit numbers***

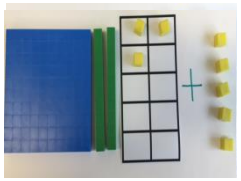
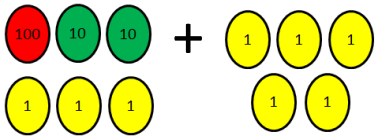
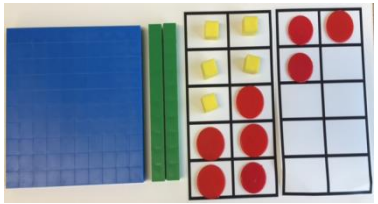
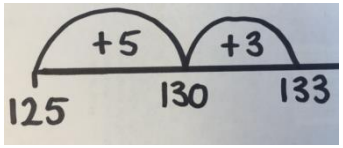
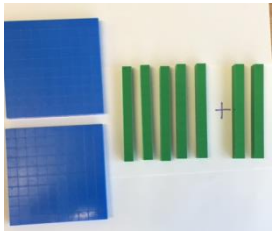
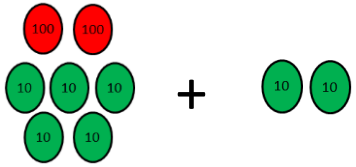
	Concrete	Pictorial	Abstract
Addition of TO + O using bonds not crossing tens boundary	**24 + 3 = 27** 	**24 + 3 = 27** *Drawing out counters with tens frames.* 	**24 + 3 = 27** **4 + 3 = 7** **20 + 7 = 27** *Leading to using bonds without partitioning* **25 + 3 =** ☐
Addition of TO + 10	**34 + 10 = 44** 	**34 + 10 = 44** 	**34 + 10 = 44** *Using bonds of 3 tens add 1 ten is 4 tens.*
Addition of TO + O crossing tens boundary	**28 + 8 = 36** 	**28 + 8 = 36**  28 + 8 =28 + 2 + 6	**28 + 8 = 36** **2 6**

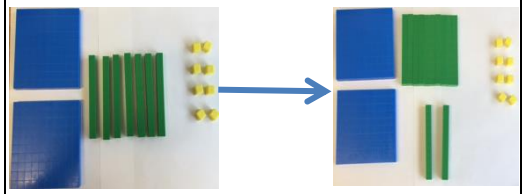
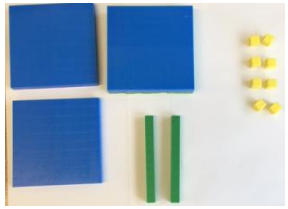
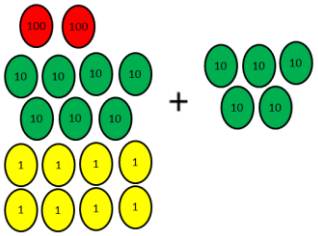
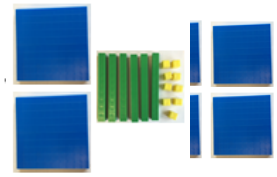
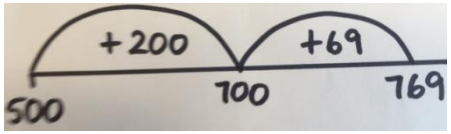
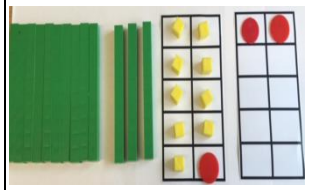
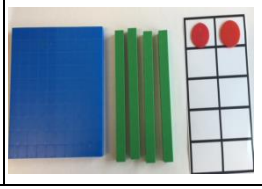
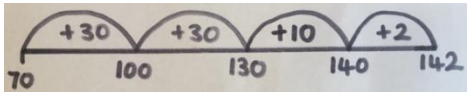
Multiple of 10 + multiple of 10 using bonds	**40 + 30 = 70**  *Using knowledge of 4 + 3 = 7*	**40 + 30 = 70** 	**40 + 30 = 70** *Using bonds without images.*
Addition of any TO + multiples of 10	**36 + 20 = 56**  	**36 + 20 = 56**  	**36 + 20 = 56** *Using bond of 30 + 20 = 50 then add 6.*
Addition of three single digits *Making decisions using bonds and doubles knowledge*	**6 + 2 + 4 = 12** 	**6 + 2 + 4 = 12** 	**6 + 2 + 4 = 10 + 2 = 12** 10 *Using doubles knowledge* **3 + 5 + 5 = 10 + 3** 10
Addition of any TO + TO (within 100)	**25 + 26 = 51**  	**25 + 26 = 51** 	**25 + 26 = 51** 20 + 20 = 40 5 + 6 = 11 40 + 11 = 51 *Leading on to adjusting to make a multiple of 10.* 25 + 26 = 51 30 + 21 = 51

Year 3

Pupils should be taught to:

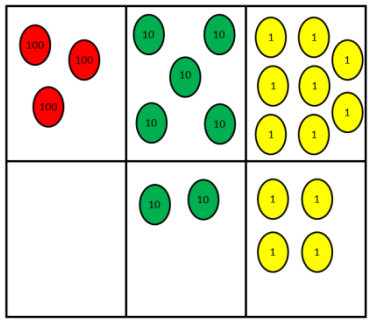
- ***add numbers mentally, including:***
  - ***a three-digit number and 1s***
  - ***a three-digit number and 10s***
  - ***a three-digit number and 100s***
- ***add numbers with up to 3 digits, using formal written methods of columnar addition***
- ***solve problems, including missing number problems, using number facts, place value, and more complex addition***

	Concrete	Pictorial	Abstract
Addition of HTO + O (using bonds)	**123 + 5 = 128** 	**123 + 5 = 128** 	**123 + 5 = 120 + 8**
Addition of HTO + O (crossing tens boundary)	**125 + 8 = 133** 	**125 + 8 = 133** 	**125 + 8 = 133** 125 + 5 + 3 = 133
Addition of HTO + T (using bonds)	**250 + 20 = 270** 	**250 + 20 = 270** 	**250 + 20 = 200 + 70** *Leading to any HTO + multiple of 10 (not crossing the ten boundary)* **234 + 30 = 200 + 60 + 4**

Addition of HTO + T (crossing tens boundary)	**278 + 50 = 328**  *Children to understand the exchange of 10 tens for one hundred.* 	**278 + 50 = 328** 	**278 + 50 = 328** 270 + 50 + 8 = 328
HTO + Hundreds	**269 + 500 = 769** 	**269 + 500 = 769** 	**269 + 500 = 769** 200 + 500 + 69 = 769
Addition of any TO + TO *Using partitioning*	**79 + 63 = 142**  	**79 + 63 = 142** 	**79 + 63 = 142** 70 + 60 = 130 9 + 3 = 9 + 1 + 2 130 + 12 = 142

<table>
<tr><td></td><td colspan="2">From Summer term of Year 3 formal methods of addition should be introduced to learners. Children should still have access to, and continue to use both concrete resources and visual representations when necessary.</td></tr>
<tr><td>Addition of two numbers (up to three digits) using columnar addition

Expanded vertical method</td><td>358 + 24 = 382

<table>
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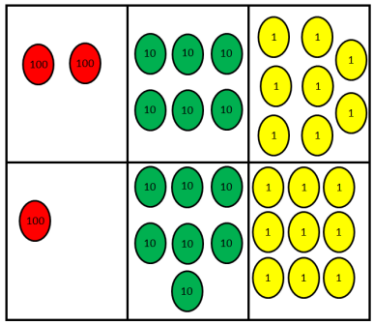
<tr><td>+</td><td></td><td>2</td><td>4</td></tr>
<tr><td></td><td></td><td>1</td><td>2</td></tr>
<tr><td></td><td></td><td>7</td><td>0</td></tr>
<tr><td></td><td>3</td><td>0</td><td>0</td></tr>
<tr><td></td><td>3</td><td>8</td><td>2</td></tr>
</table></td><td>268 + 179 = 447

 
</td></tr>
<tr><td>Exceeding <u>children may begin to use the formal columnar method.</u>

Addition of two numbers (up to three digits) using columnar addition

Formal column method</td><td>487 + 256 = 743

<table>
<tr><td></td><td>4</td><td>8</td><td>7</td></tr>
<tr><td>+</td><td>2</td><td>5</td><td>6</td></tr>
<tr><td></td><td>7</td><td>4</td><td>3</td></tr>
<tr><td></td><td>1</td><td>1</td><td></td></tr>
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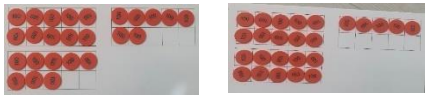
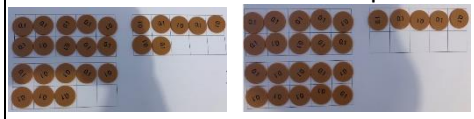
<table>
<tr><td></td><td>2</td><td>6</td><td>8</td></tr>
<tr><td>+</td><td>1</td><td>7</td><td>9</td></tr>
<tr><td></td><td></td><td>1</td><td>7</td></tr>
<tr><td></td><td>1</td><td>3</td><td>0</td></tr>
<tr><td></td><td>3</td><td>0</td><td>0</td></tr>
<tr><td></td><td>4</td><td>4</td><td>7</td></tr>
</table></td></tr>
</table>

Year 4

Pupils should be taught to:

- ***add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate***
- ***estimate and use inverse operations to check answers to a calculation***
- ***solve addition two-step problems in contexts, deciding which operations and methods to use and why***

Add a multiple of 1000 or 100 to a 4-digit number 1800 + 700 	1700 + 1400 	1800 + 700 200 500 1700 + 1400 1100 + 300
Calculate mentally - rounding up/down and adjusting - doubling - adding near doubles - using number bond knowledge		1376 + 1598 1374 + 2 → 1374 + 1600
Add numbers to one decimal place 1.8 + 0.7 	1.8 + 0.7 	1.8 + 0.7 0.2 0.5
Add numbers using columnar where necessary		5879 + 3785 = 9664 (1 1 1) 12·73 + 8·39 = 21·12 (1 1 1)

Year 5

Pupils should be taught to:

- ***add whole numbers with more than 4 digits, including using formal written methods (columnar addition)***
- ***add numbers mentally with increasingly large numbers***
- ***solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why***

Use of mental methods, where appropriate	Children should be taught to complete mental calculations by: - rounding up/down and adjusting - doubling - adding near doubles - using number bond knowledge - adding without bridging 1, 10, 100 or 1000 Use mixed decimal and whole (9 + 1.9) Used mixed decimal 1dp and 2dp (1.82 + 0.3, 1.5 + 0.07)	Examples **1445 + 2999** 1445 + 3000 – 1 **1299 + 1299** Double 1300 - 2 **443 + 445** Near double 443 + 2 **12.36 + 5.24** 0.36 + 0.24 = 0.6 17 + 0.6 = 17.6 **36.25 + 23.43** Add each place value column individually
Addition of two numbers (more than four digits) using columnar addition *Formal method*	Formal method (using carrying) with more than four digits $\begin{array}{r} 55825 \\ +\ 37486 \\ \hline 93312 \\ \scriptstyle 1\ 1\ 1 \end{array}$ $\quad$ $\begin{array}{r} 75879 \\ +\ 9486 \\ \hline 85365 \\ \scriptstyle 1\ 1\ 1\ 1 \end{array}$	Use formal method to solve two-step problems in contexts. $\begin{array}{r} 12{\cdot}73 \\ +\ 8{\cdot}39 \\ \hline 21{\cdot}12 \\ \scriptstyle 1\ \ 1\ \ 1 \end{array}$ $\quad$ $\begin{array}{r} £44{\cdot}73 \\ +£\ 8{\cdot}39 \\ \hline £53{\cdot}12 \\ \scriptstyle 1\ \ 1\ \ 1 \end{array}$

Year 6

Pupils should be taught to:

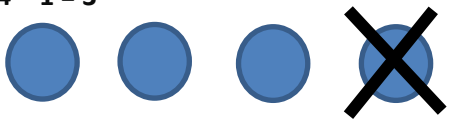
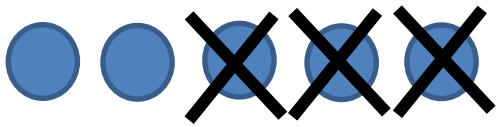
- ***perform mental calculations, using increasingly large numbers***
- ***use their knowledge of the order of operations to carry out calculations involving the 4 operations***
- ***solve addition multi-step problems in contexts, deciding which methods to use and why***
- ***solve problems involving addition***

Use of mental methods, where appropriate	Children should be taught to complete mental calculations by: - rounding up/down and adjusting - doubling - adding near doubles - using number bond knowledge - adding without bridging 1, 10, 100 or 1000 Use mixed wholes Use mixed whole and decimals Use mixed decimals up to 3 dp	Examples **1745 + 2999** 1745 + 3000 – 1 **1399 + 1399** Double 1400 - 2 **1343 + 1345** Near double 1343 + 2 **12.36 + 5.24** 0.36 + 0.24 = 0.6 17 + 0.6 = 17.6 **36.25 + 23.43** Add each place value column individually
As Year 5, continue to use formal methods of addition, progressing to larger numbers, solving multi-step problems and applying methods to real life contexts. Continue calculating with decimals (including those with a different number of decimal places)		
Apply both mental and formal methods to solve calculations	**6 + 7 × 8 = 62** because multiplication first then addition when there are no brackets as long as the symbol moves with the number **2780 – 910 + 1220** can be reordered to 2780 + 1220 – 910= 3090 *Use rules of BIDMAS*	

SUBTRACTION

EYFS

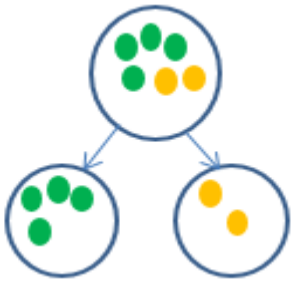
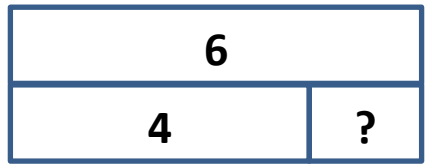
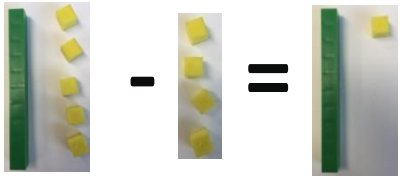
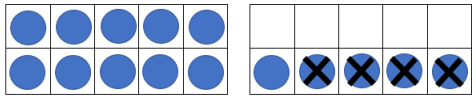
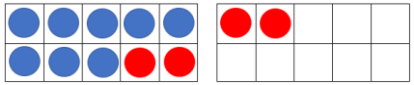
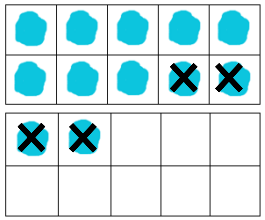
Maths ELG: Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

	Concrete	Pictorial	Abstract
Subtract one less from a given number	**4 – 1 = 3** *Take one thing away* 	**4 – 1 = 3** 	**4 - 1 =** ☐ What is one less than 4?
Count out a given number and subtract an amount	**5 – 3 = 2** *Take two things away* 	**5 – 3 = 2** 	**5 – 3 =** ☐
Count back from a given amount	**5 – 3 = 2** *Count out 5 things and count back 1, 2, 3. Then count the remaining objects.* 	**5 – 3 = 2**  **3 2 1**	**5 – 3 =** ☐ **5 –** ☐ **= 2**

Year 1

Pupils should be taught to:

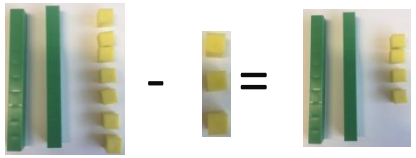
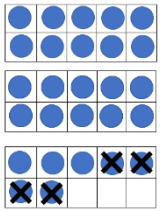
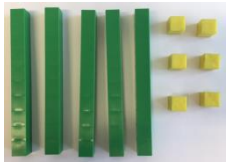
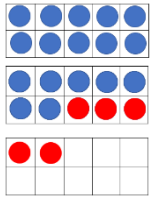
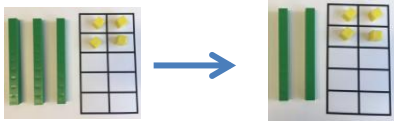
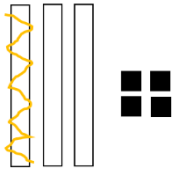
- ***read, write and interpret mathematical statements involving subtraction (–) and equals (=) signs***
- ***represent and use number bonds and related subtraction facts within 20***
- ***subtract one-digit and two-digit numbers to 20, including 0***
- ***solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9***

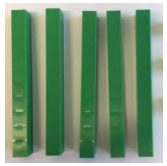
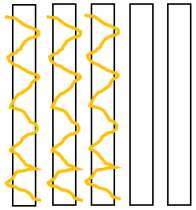
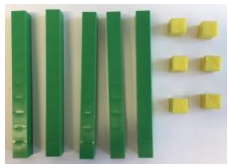
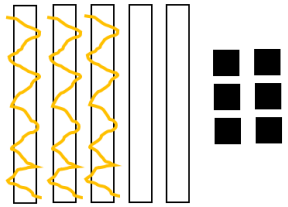
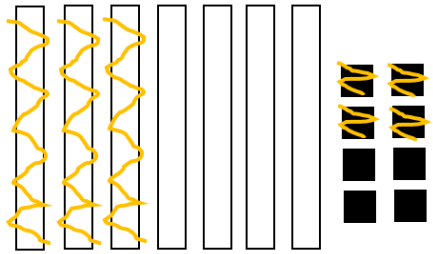
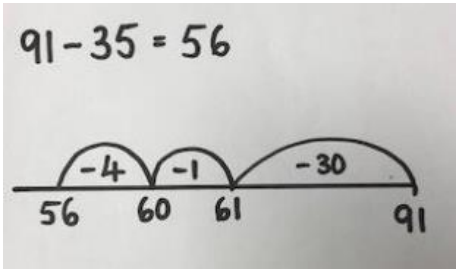
	Concrete	Pictorial	Abstract
Bonds to 5, 6, 7, 8, 9, 10	**6 – 2 = 4** 	**6 – 2 = 4** 	**6 -2 =** ☐ 
Subtracting TO – O (using bonds)	**15 – 4 = 11** 	**15 - 4 = 11** 	**15 – 4 =** ☐
Subtracting TO – O crossing the boundary of 10	**12 – 4 =** *Using counters/cubes with tens frames*  Leading to subtraction by partitioning through 10 e.g. 12 – 2 – 2 = 8	**12 - 4 =** 	**12 – 4 =** 2 2 **12 – 2 – 2 = 8**

Year 2

Pupils should be taught to:

- ***recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100***
- ***subtract numbers using concrete objects, pictorial representations, and mentally, including:***
  - ***a two-digit number and 1s***
  - ***a two-digit number and 10s***
  - ***2 two-digit numbers***
  - ***adding 3 one-digit numbers***

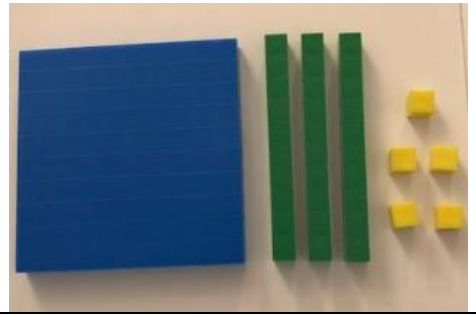
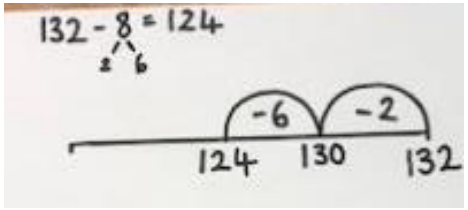
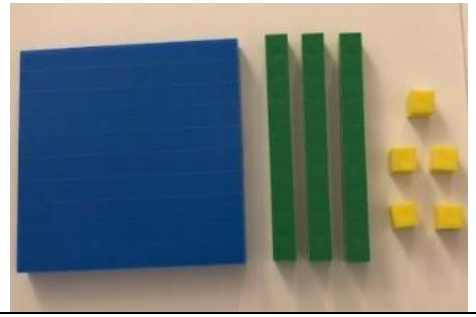
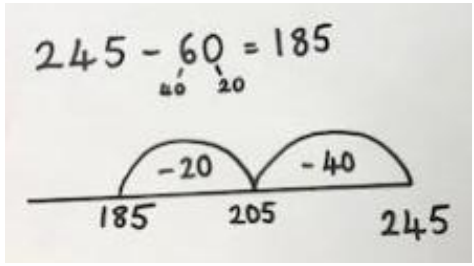
	Concrete	Pictorial	Abstract
Subtraction of TO – O using bonds not crossing tens boundary	**27 - 3 = 24** 	**27 – 3 = 24** *Drawing out counters with tens frames* 	**27 - 3 = 24** **7 - 3 = 4** **20 + 4 = 24** *Leading to using bonds without partitioning* **25 - 3 = □**
Subtraction of TO – O crossing the boundary (partitioning the single digit)	**32 – 5 =** *Model exchanging a ten for 10 ones.* 	**32 -5 =** *Draw out on tens frames.* 	**32 – 5 = □** **2 3**
Subtract TO – 10	**34 - 10 = 24** 	**34 – 10 = 24** 	**34 – 10 = 24** *Using bonds of 3 – 1 = 2*

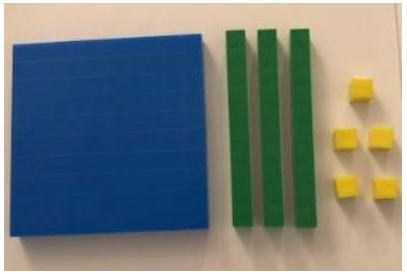
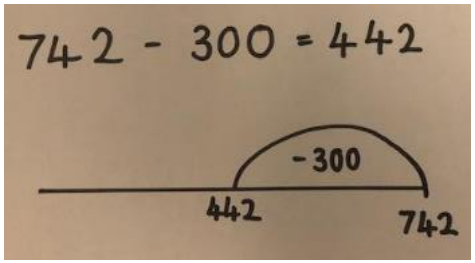
Multiple of T – Multiple of T (using bonds)	**50 – 30 =**  *Take away 3 tens*	**50 – 30 =** 	**50 – 30 =**  *Using bonds* **70 – 30 = 40 because 7 – 4 = 3**
Subtract from any TO – multiple of T	**56 – 30 =**  *Take away 3 tens*	**56 – 30 =** 	**56 – 30 =** *Using bonds* **76 – 20 = 56 because 7 – 2 = 5**
Subtraction of TO -TO (using bonds)	**78 – 34 =**  *Take three tens and four ones away*	**78 – 34 =** 	**78 – 34 = 44** because 7 – 3 = 4 and 8 – 4 = 4 **95 – 43 = 52** because 9 – 4 = 5 and 5 – 3 = 2
Subtract any TO – TO *Using partitioning*	**72 – 26 =** Use dienes to model 72 – 20 – 2 – 4 = 46		**78 – 49 = 29** 78 – 40 – 8 – 1 = 29

Year 3

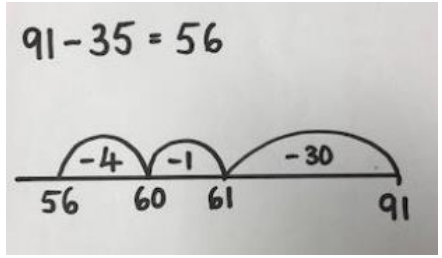
Pupils should be taught to:

- ***subtract numbers mentally, including:***
  - ***a three-digit number and 1s***
  - ***a three-digit number and 10s***
  - ***a three-digit number and 100s***
- ***subtract numbers with up to 3 digits, using formal written methods of columnar addition and subtraction***
- ***solve problems, including missing number problems, using number facts, place value, and more complex subtraction***

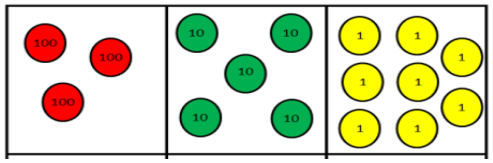
	Concrete	Pictorial	Abstract
Subtract HTO – O (using bonds leading to partitioning)	135 – 2 = 133 		148 – 5 = 143 152 – 7 = 152 - 2 – 5 = 145
Subtract HTO – T (using bonds leading to partitioning)	135 – 20 = 115 		248 – 20 = 228 162 – 70 = 92 *162 – 60 = 102* *102 – 10 = 92*

<table>
<tr>
<td>Subtract HTO – H (using bonds)</td>
<td>635 – 400 = 235
  </td>
<td colspan="2"> 
</td>
<td>478 – 200 = 278</td>
</tr>
<tr>
<td>Subtract any TO – TO

Using partitioning</td>
<td>72 – 26 = 46

Use dienes to model 72 – 20 – 2 – 4 = 46</td>
<td colspan="2"> 
</td>
<td>78 – 49 = 29

78 – 40 – 8 – 1 = 29</td>
</tr>
<tr>
<td>Subtraction of two numbers, HTO – HTO

Using expanded method</td>
<td colspan="2">358 – 173 =
 

Show using place value counters (modelling exchange of ten 10s for one 100)</td>
<td colspan="2">343 -165 =
200 140
~~300~~ ~~40~~ 7
100 60 5

Children to rewrite the calculation after exchanging.
200 140 7
100 60 5
100 80 2</td>
</tr>
<tr>
<td><u>Exceeding children may begin to use formal columnar method.</u>

Subtraction of two numbers, HTO – HTO

Using formal method</td>
<td colspan="3">- 7 9 6
5 8 1
2 1 5

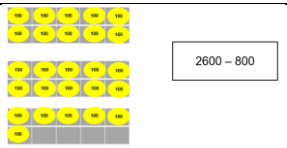
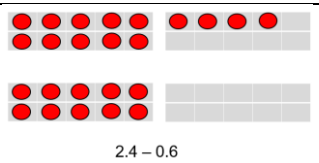
5 1
- 6 3 5
2 8 2
3 5 3</td>
</tr>
</table>

Children should also be taught to calculate the difference when two numbers are close in range e.g. 114 – 98, counting on 98 + 2 = 100 then 100 + 14 = 114, therefore the difference is 16.

Year 4

Pupils should be taught to:

- ***subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate***
- ***estimate and use inverse operations to check answers to a calculation***
- ***solve subtraction two-step problems in contexts, deciding which operations and methods to use and why***

Subtraction of multiples 10/100/1000		2600 – 800 or 2600 – 800 = 2600 – 1000 + 200 600 200
Use of mental methods, where appropriate	Children should be taught to complete mental calculations by: - rounding up/down and adjusting - counting up - using number bond knowledge - subtracting without bridging 1, 10, 100 or 1000	Example 532 – 199 532 – 200 + 1 308 – 289 = 19 (found by 1 + 10 + 8) 289 + 1 + 10 + 8 = 308 507 – 57 507 – 7 – 50 5839 – 1725 *Subtract each column individually using place value knowledge*
Subtract a pair of numbers to 1 dp		2.4 – 0.6 0.4 0.2
<u>Learners should have a solid understanding of expanded method of subtraction (Year 3)</u> **Subtraction of two numbers (up to four digits) using columnar subtraction** *Formal method*	Formal method (using borrowing) with numbers up to four digits.	Leading to using columnar method to solve problems using decimals up to 2 places. $\begin{array}{r} {}^{4}\cancel{5}\,{}^{14}\cancel{5}\,{}^{10}\cancel{1}\,{}^{1}2 \\ -\ 3\,7\,4\,8 \\ \hline 1\,7\,3\,4 \end{array}$ $\begin{array}{r} {}^{2}\cancel{£}\,{}^{10}3\,{}^{1}1 \bullet 2\,7 \\ -\ £\,1\,4 \bullet 8\,1 \\ \hline £\,1\,6 \bullet 4\,6 \end{array}$

Year 5

Pupils should be taught to:

- ***subtract whole numbers with more than 4 digits, including using formal written methods (columnar subtraction)***
- ***subtract numbers mentally with increasingly large numbers***
- ***solve subtraction multi-step problems in contexts, deciding which methods to use and why***

Use of mental methods, where appropriate	Children should be taught to complete mental calculations by: - rounding up/down and adjusting - counting up - using number bond knowledge - subtracting without bridging 1, 10, 100 or 1000 (including decimals) Use mixed decimal and whole (9 – 1.9) Used mixed decimal 1dp and 2dp (1.52 – 0.3, 1.5 – 0.07)	Examples 4532 – 1999 4532 – 2000 + 1 £10 - £7.71 = £2.29 £7.71 + 29p = £8 + £2 = £10 2507 – 57 2507 – 7 – 50 75839 – 41725 8.67 – 0.6 = 8.07 *Subtract each column individually using place value knowledge*
Subtraction of two numbers (more than four digits) using columnar subtraction *Formal method*	Formal method (using borrowing) with numbers up to four digits. $\begin{array}{r} {}^{4}5\,{}^{14}5\,{}^{10}1\,{}^{1}2\,5 \\ -\;\;3\,7\,4\,8\,3 \\ \hline 1\,7\,3\,4\,2 \end{array}$ $\begin{array}{r} {}^{4}5\,{}^{14}5\,{}^{10}1\,{}^{1}2\,9 \\ -\;\;\;\;7\,4\,8\,6 \\ \hline 4\,7\,3\,4\,3 \end{array}$	Using formal method to solve two-step problems in contexts, including decimals. $\begin{array}{r} {}^{2}£\,3\,{}^{10}1\,{}^{1}\cdot 2\,7 \\ -\;£\,1\,4\cdot 8\,1 \\ \hline £\,1\,6\cdot 4\,6 \end{array}$

Year 6

Pupils should be taught to:

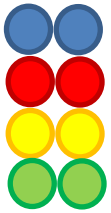
- ***perform mental calculations, including with increasingly large numbers***
- ***use their knowledge of the order of operations to carry out calculations involving the 4 operations***
- ***solve subtraction multi-step problems in contexts, deciding which methods to use and why***
- ***solve problems using subtraction***

Use of mental methods, where appropriate	Children should be taught to complete mental calculations by: - rounding up/down and adjusting - counting up - using number bond knowledge - subtracting without bridging 1, 10, 100 or 1000 (including decimals) Use mixed wholes Use mixed whole and decimals Use mixed decimals up to 3 dp	Examples 74532 – 19996 74532 – 20000 + 4 £10 - £7.71 = £2.29 £7.71 + 29p = £8 + £2 = £10 308 – 289 = 19 (found by 1 + 10 + 8) 289 + 1 + 10 + 8 = 308 2507 – 57 2507 – 7 – 50 75839 – 41725 7.57 – 0.07 = 7.5 6.982 – 0.08 = 6.902 *Subtract each column individually using place value knowledge*
As Year 5, continue to use formal methods of subtraction, progressing to larger numbers, solving multi-step problems and applying methods to real life contexts. Continue calculating with decimals (including those with a different number of decimal places)		
Apply both mental and formal methods to solve calculations	See addition section for BIDMAS rules.	

MULTIPLICATION

EYFS

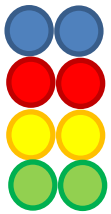
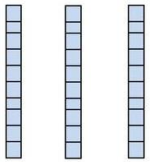
Maths ELG: They solve problems, including doubling, halving and sharing.

	Concrete	Pictorial	Abstract
Begin to count in 2s *Some children may also begin to count in 5s and 10s.*	Count objects in pairs/groups of 2. 	Use pictures of groups of 2. Model counting them. 	Children to write counting sequences. 2, 4, 6, 8, 10

Year 1

Pupils should be taught to:

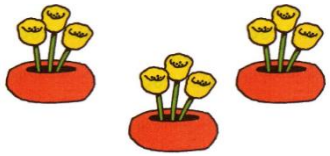
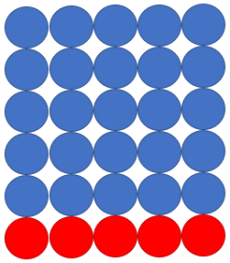
- ***solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher***

	Concrete	Pictorial	Abstract
Count in 2s, 5s and 10s	Count objects in pairs/groups of 2/5/10.  	Use pictures of objects in pairs/groups of 2/5/10.  	2, 4, 6, 8, ☐, 12, 14, ☐ 15, 20, ☐, 30, 35, ☐, 45 30, 40, ☐, 60, ☐, 80, 90

Year 2

Pupils should be taught to:

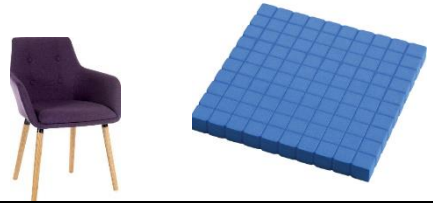
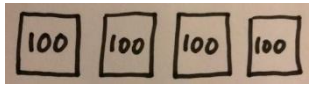
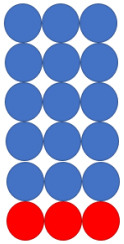
- ***recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers***
- ***calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×) and equals (=) signs***
- ***solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication facts, including problems in contexts***

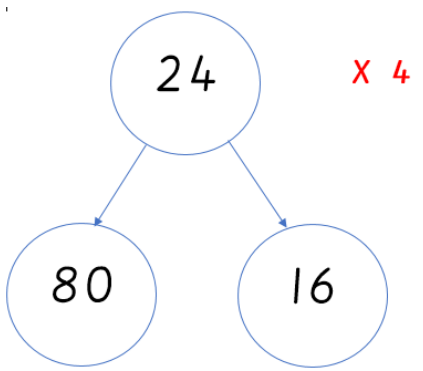
Use mathematical language with children e.g. factor, multiple, product.	**Concrete**	**Pictorial**	**Abstract**
Count in 3s	Count objects in groups of 3. 	Use pictures of objects in groups of 3. 	3, 6, 9, 12, ☐, 18, 21, ☐
Recall and use facts for 2, 5 and 10 ***Children to learn using anchor facts***	Count objects in groups (2, 5 and 10)  	Use images to show facts of 2, 5 and 10  2 2 2 2 2 2	2 X 5 = ☐ use facts to show inverse 5 X 2 = 10 10 ÷ 2 = 5 10 ÷ 5 = 2 2 is a factor of 10 5 is a factor of 10 10 is a multiple of 2 and 5

Year 3

Pupils should be taught to:

- ***recall and use multiplication facts for the 3, 4 and 8 multiplication tables***
- ***write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods***
- ***solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects***

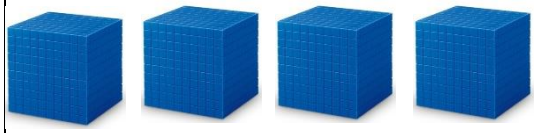
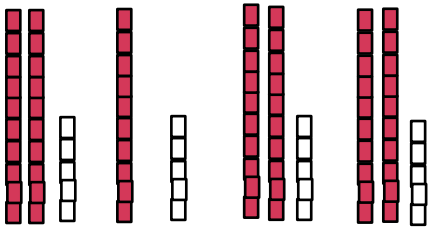
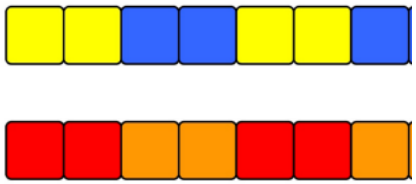
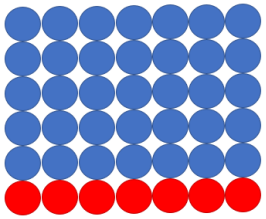
	Concrete	Pictorial	Abstract
Count in 4s, 8s, 50s and 100s	Count objects in groups of 4s, 8s, 50s and 100s. 	Use pictures of objects in groups of 4, 8, 50 and 100. 	12, 16, 20, ☐, 28, ☐, 36
Recall and use facts for 3, 4 and 8 ***Children to learn using anchor facts***	Count objects in groups (3, 4 and 8)  e.g. use match sticks to make triangles and count in 3s.	Use images to show facts of 3, 4 and 8  3 3 3 3 3 3 3 3	3 X 4 = ☐ use facts to show inverse 4 X 3 = 12 12 ÷ 4 = 3 12 ÷ 3 = 4 3 is a factor of 12 4 is a factor of 12 12 is a multiple of 3 and 4

Multiply TO X O ***(O only 2, 3, 4, 5, 8)***	13 X 4 = | X	10	3
---	---	---
4	40	12 | 40 + 12 = 52	24 X 4 = 2 4 X 4 8 0 1 6 9 6	24 X 4 = 

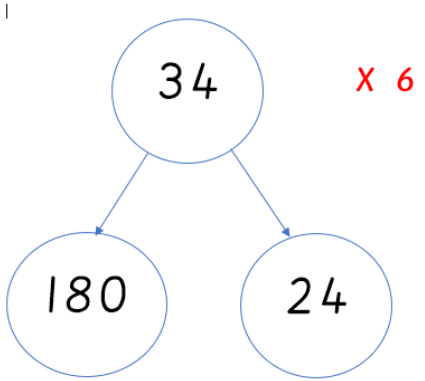
Year 4

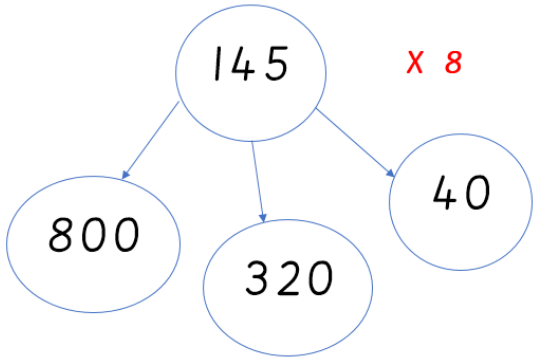
Pupils should be taught to:

- ***recall multiplication facts for multiplication tables up to 12 × 12***
- ***use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together 3 numbers***
- ***recognise and use factor pairs and commutativity in mental calculations***
- ***multiply two-digit and three-digit numbers by a one-digit number using formal written layout***
- ***solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects***

	Concrete	Pictorial	Abstract
Count in 25s, 250s and 1000s	Count objects in 25s, 250s and 1000s. 	Use pictures of objects/values to count in 25s, 250s and 1000s. 	25, 50, 75, ☐, 125, ☐
Recall and use facts for 7, 9, 11 and 12 ***Children to learn using anchor facts***	Count objects in groups (7, 9, 11 and 12) 	Use images to show facts of 7, 9, 11 and 12  7 7 7 7 7 7 7 7 7	7 X 6 = ☐ use facts to show inverse 6 X 7 = 42 42 ÷ 6 = 7 42 ÷ 7 = 6 6 is a factor of 42 7 is a factor of 42 42 is a multiple of 6 and 7

<table>
<tr><td>Multiply a given number by 10 and 100</td><td colspan="3">This objective is covered in the topic of fractions.</td></tr>
<tr><td>Multiply TO X O (grid method)

All methods to be taught alongside each other.</td><td>
<table>
<tr><td>X</td><td>20</td><td>3</td></tr>
<tr><td>8</td><td>160</td><td>24</td></tr>
</table>
</td><td>
<table>
<tr><td>X</td><td>1</td><td>4</td></tr>
<tr><td></td><td></td><td>7</td></tr>
<tr><td></td><td>7</td><td>0</td></tr>
<tr><td></td><td>2</td><td>1</td></tr>
<tr><td></td><td>9</td><td>1</td></tr>
</table>
</td><td> 
</td></tr>
<tr><td>Multiply HTO X O (grid method)

All methods to be taught alongside each other.</td><td>
<table>
<tr><td>X</td><td>200</td><td>30</td><td>7</td></tr>
<tr><td>8</td><td>1600</td><td>240</td><td>56</td></tr>
</table>
</td><td>
<table>
<tr><td>X</td><td>1</td><td>2</td><td>4</td></tr>
<tr><td></td><td></td><td></td><td>6</td></tr>
<tr><td></td><td>6</td><td>0</td><td>0</td></tr>
<tr><td></td><td>1</td><td>2</td><td>0</td></tr>
<tr><td></td><td></td><td>2</td><td>4</td></tr>
<tr><td></td><td>7</td><td>4</td><td>4</td></tr>
</table>
</td><td> 
</td></tr>
</table>

Year 5

Pupils should be taught to:

- ***multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers***
- ***multiply numbers mentally, drawing upon known facts***
- ***multiply whole numbers and those involving decimals by 10, 100 and 1,000***
- ***solve problems involving multiplication, including using their knowledge of factors and multiples, squares and cubes***
- ***solve problems involving multiplication including understanding the meaning of the equals sign***

<table>
<tr><td colspan="3">Before any formal methods of multiplication are taught, the following objectives should be covered using BMS resources;
- Identify multiples and factors
- Prime, square, cube and common
- Multiplying by 10, 100 and 1000
- Know and apply facts (6 X 7 = 42 used to calculate 0.6 X 0.7 = 0.42)</td></tr>
<tr><td>Multiply 4dgt X 1dgt

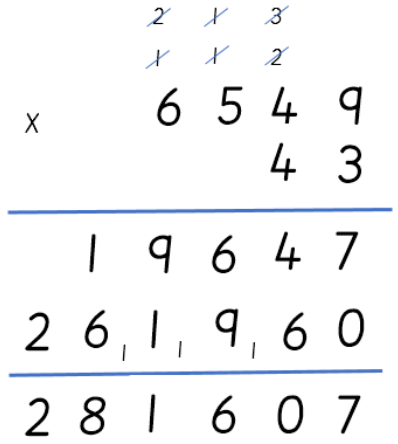
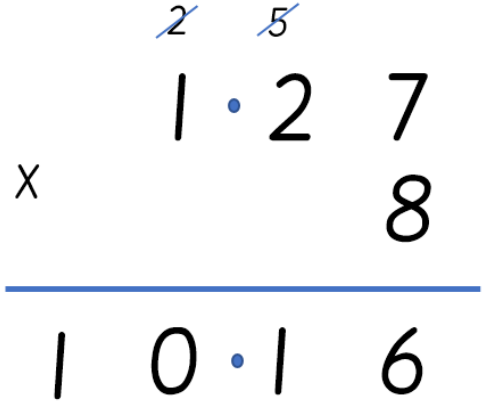
Recap previous methods taught, expected children should be introduced to the formal method in summer term of Year 5.</td><td>4134 x 7
28
210
700
28000
28938</td><td>2 2
4134 x 7
28938</td></tr>
</table>

Multiply 2dgt X 2dgt	*Used to model place value to ensure secure understanding when using expanded method* X | 80 | 4 20 | 1600 | 80 7 | 560 | 28	84 X 27 28 560 80 1600 2268	84 X 27 588 1680 2268
Multiply up to 4dgt X 2dgt	386 X 37 2702 11580 14282	6549 X 43 19647 261960 281607	

Year 6

Pupils should be taught to:

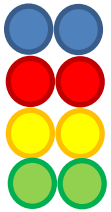
- ***multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication***
- ***perform mental calculations, including with mixed operations and large numbers***
- ***use their knowledge of the order of operations to carry out calculations involving the 4 operations***
- ***solve problems involving multiplication***

Multiply 4dgt X 2dgt	
Multiply 1dgt (up to two decimal places) X whole number *Use this method to solve problems involving various units of measure (e.g. money, capacity etc.)*	

DIVISION

EYFS

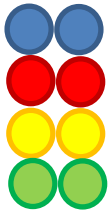
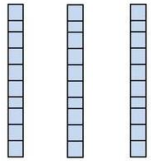
Maths ELG: They solve problems, including doubling, halving and sharing.

	Concrete	Pictorial	Abstract
Begin to count in 2s *Some children will also count in 5s and 10s.*	Count objects in pairs/groups of 2. 	Use pictures of groups of 2. Model counting them. 	Children to write counting sequences. 2, 4, 6, 8, 10

Year 1

Pupils should be taught to:

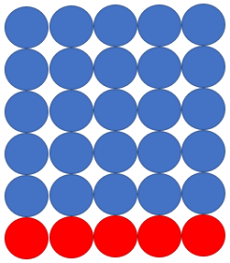
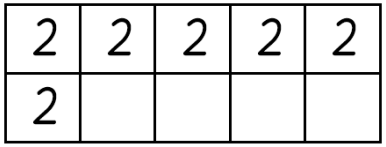
- ***solve one-step problems involving division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher***

	Concrete	Pictorial	Abstract
Count in 2s, 5s and 10s	Count objects in pairs/groups of 2/5/10.  	Use pictures of objects in pairs/groups of 2/5/10.  	2, 4, 6, 8, ☐, 12, 14, ☐ 15, 20, ☐, 30, 35, ☐, 45 30, 40, ☐, 60, ☐, 80, 90

Year 2

Pupils should be taught to:

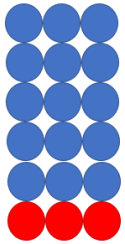
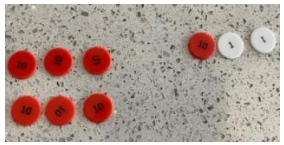
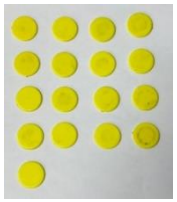
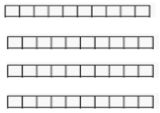
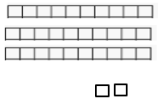
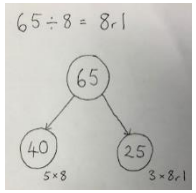
- ***recall and use division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers***
- ***calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs***
- ***solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts***

	Concrete	Pictorial	Abstract
Recall and use facts for 2, 5 and 10 ***Children to learn using anchor facts***	Count objects in groups (2, 5 and 10)  	Use images to show facts of 2, 5 and 10   	2 X 5 = ☐ use facts to show inverse 5 X 2 = 10 10 ÷ 2 = 5 10 ÷ 5 = 2 2 is a factor of 10 5 is a factor of 10 10 is a multiple of 2 and 5

Year 3

Pupils should be taught to:

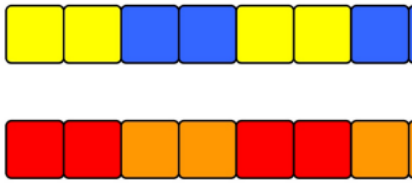
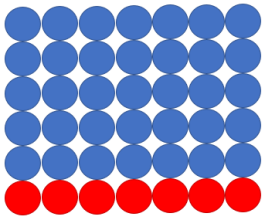
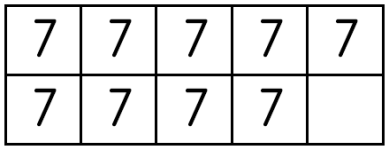
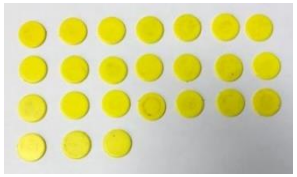
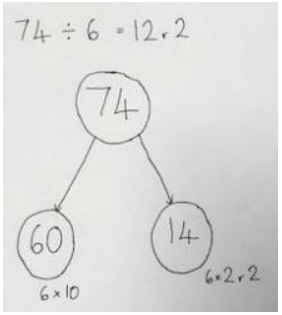
- ***recall and use division facts for the 3, 4 and 8 multiplication tables***
- ***write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods***
- ***solve problems, including missing number problems, involving division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects***

	Concrete	Pictorial	Abstract
Recall and use facts for 3, 4 and 8 ***Children to learn using anchor facts***	Count objects in groups (3, 4 and 8) 	Use images to show facts of 3, 4 and 8  3 3 3 3 3 3 3 3	3 X 4 = ☐ use facts to show inverse 4 X 3 = 12 12 ÷ 4 = 3 12 ÷ 3 = 4 3 is a factor of 12 4 is a factor of 12 12 is a multiple of 3 and 4
Division TO ÷ O (2, 3, 4, 5, 8, 10) *Including remainders*	72 ÷ 3 = 24 17 ÷ 4 = 4 r 1  	72 ÷ 4   	17 ÷ 4 = 4 r ☐ ☐ ÷ 5 = 6 r 2

Year 4

Pupils should be taught to:

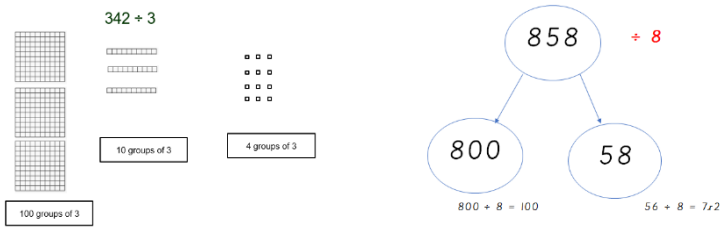
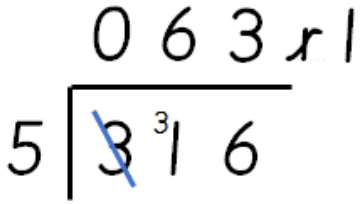
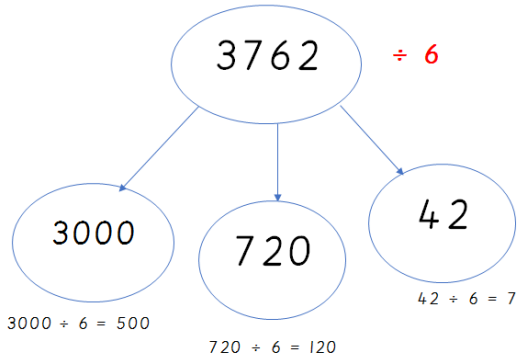
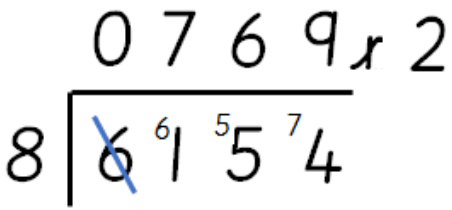
- ***recall division facts for multiplication tables up to 12 × 12***
- ***use place value, known and derived facts to divide mentally***
- ***recognise and use factor pairs and commutativity in mental calculations***
- ***multiply two-digit and three-digit numbers by a one-digit number using formal written layout***
- ***solve problems involving multiplying and adding, including using the distributive law to multiply two-digit numbers by 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects***

	Concrete	Pictorial	Abstract
Recall and use facts for all numbers 2-12 ***Children to learn using anchor facts***	Count objects in groups (7, 9, 11 and 12) 	Use images to show facts of 7, 9, 11 and 12   	7 X 6 = ☐ use facts to show inverse 6 X 7 = 42 42 ÷ 6 = 7 42 ÷ 7 = 6 6 is a factor of 42 7 is a factor of 42 42 is a multiple of 6 and 7
Division TO ÷ O *Including remainders*	24 ÷ 7 = 3 r 3 	 	43 ÷ 7 = 6 r ☐ ☐ ÷ 9 = 5 r 2

Year 5

Pupils should be taught to:

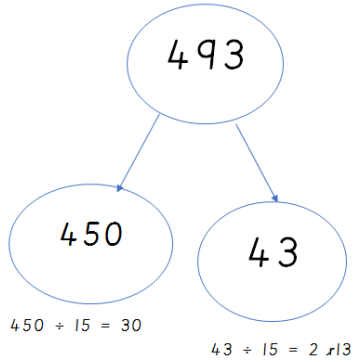
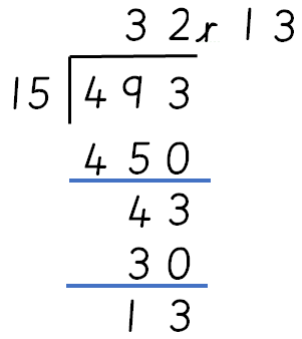
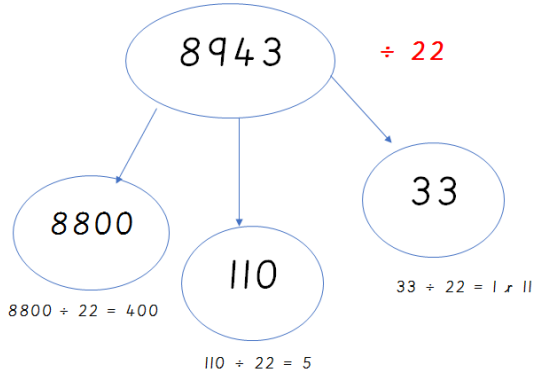
- ***divide numbers mentally, drawing upon known facts***
- ***divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context***
- ***divide whole numbers and those involving decimals by 10, 100 and 1,000***
- ***solve problems involving division, including using their knowledge of factors and multiples, squares and cubes***
- ***solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign***
- ***solve problems involving division, including scaling by simple fractions and problems involving simple rates***

<table>
<tr><td colspan="3">Before any formal methods of division are taught, the following objectives should be covered using BMS resources;
- Identify multiples and factors
- Prime, square, cube and common
- Dividing by 10, 100 and 1000
- Know and apply facts (42 ÷ 7 = 6 used to calculate 0.42 ÷ 0.7 = 0.6)</td></tr>
<tr><td>Divide 3dgt ÷ 1dgt</td><td>858 ÷ 8 = 107 r 2
 
</td><td>316 ÷ 5 = 63 r 1
 
</td></tr>
<tr><td>Divide 4dgt ÷ 1dgt</td><td>3762 ÷ 6 = 627
 
</td><td>6154 ÷ 8 = 769 r 2
 
</td></tr>
</table>

Year 6

Pupils should be taught to:

- ***divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context***
- ***divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context***
- ***perform mental calculations, including with mixed operations and large numbers***
- ***use their knowledge of the order of operations to carry out calculations involving the 4 operations***
- ***solve problems involving division***

Division of 3dgt ÷ 2dgt	493 ÷ 15 = 32 r 13 	493 ÷ 15 = 32 r 13 
Division of 4dgt ÷ 2dgt	8943 ÷ 22 = 406 r 11 	8943 ÷ 22 = 406 r 11