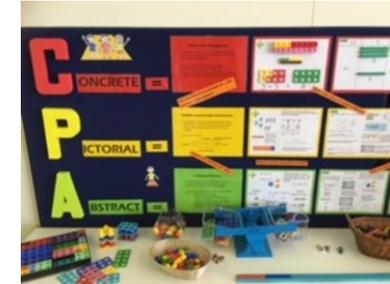
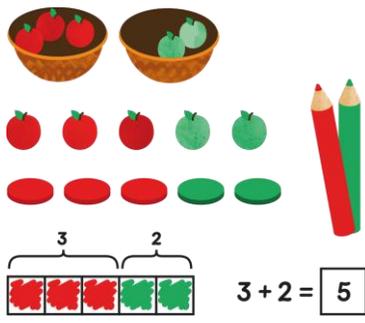


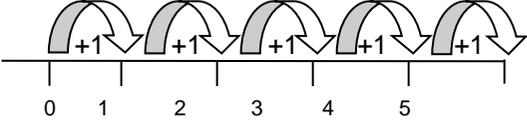
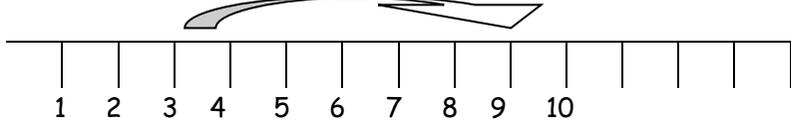
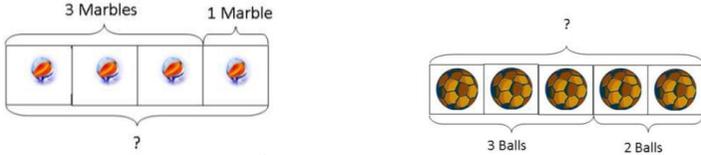
# Mathematics



## CALCULATION POLICY



Revised June 2018

1	<p>What is 3 add 2?</p> <p>There are 4 people on the bus. 1 more person gets on. How many are on the bus now?</p> <p>Count 4 cakes. Count 3 cakes. How many cakes altogether?</p> <p>What is the sum of 4 and 5?</p> <p>What must I add to 4 to make 10?</p>	<p>Count on add and one more than How many? two more than, ten more than, how many altogether? How many more? Addition, plus, +, double, near double, sum, total</p>	<p><i>Plenty of discussion and practical work</i></p> <p><b>Number tracks</b> and <b>marked number lines</b> to count on, in ones and then larger jumps eg 2's 5's 10's eg What is 4+5?</p>  <p><b>Marked number lines</b> to count on, in single jumps</p>   <p><b>BAR MODEL AT STAGE 1</b></p> 	<ul style="list-style-type: none"> <li>• Children will mainly use concrete apparatus and practical activities to merge sets and count on from a number to find a total.</li> <li>• It is important that children have a clear knowledge of the order of numbers.</li> <li>• Children will still be doing a lot of practical work and may also still use pictorial representations but there should be a move towards numbers tracks lines and grids as a visual resource.</li> <li>• Children should recognise that addition can be done in any order.</li> <li>• Calculations should be U + U or a multiple of 10 + U or TU</li> <li>• Number lines with digits written on will be given to children.</li> <li>• Number bonds to 20 to be used.</li> </ul>
	<b>Examples</b>	<b>Vocabulary</b>	<b>How it will look in written form</b>	<b>Notes</b>

2

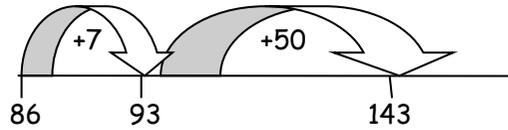
What is the sum of 86 and 57?

Increase 48 by 22

Add 69 to 74

One hundred more

Empty number lines: eg  $86+57 =$



Partition numbers

$$159 + 114 = 100+100+50+10+9+ = 200 + 60 + 13 = 273$$

$$159 = 100 + 50 + 9$$

$$+ 114 = 100 + 10 + 4$$

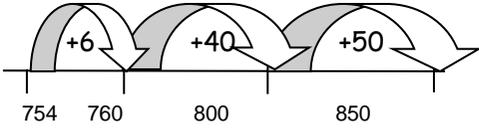
$$= 200 + 60 + 13$$

From this stage onwards, ALWAYS add the units first.

BAR MODELLING AT STAGE 2 Increase 48 by 22

?	
48	22

- Children should continue to use the horizontal number line. They should partition numbers into T and U and experience **adding the units first**. (Including vertical methods)
- They should be calculating: TU+TU, HTU+TU then HTU+HTU. These should be done first without crossing any boundaries.
- The tens boundaries should be crossed.
- Use related facts up to 100.
- Know that the numbers cannot be in any order. (largest number first)
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems
- (End of Milestone 1 Y2 expectations)

	Examples	Vocabulary	How it will look in written form	Notes
<b>3</b>	<p>Add 96 to 754</p> <p>What is the sum of 26 and 39?</p> <p>Increase 48 by 22</p> <p>What is 37 more than 46?</p>		<p>Empty number lines: eg <math>754 + 96 =</math></p>  <p> <math>754</math>  <math>+ 96</math>  <hr/> <math>10 = 4 + 6</math>  <math>+ 140 = 50 + 90</math>  <math>+ 700 = 700 + 0</math>  <hr/> <math>850</math> </p>	<ul style="list-style-type: none"> <li>• Children should continue to use the horizontal number line.</li> <li>• They should be working on calculations where the hundreds and thousands boundaries need to be crossed.</li> <li>• Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</li> <li>• They should be calculating: TU-TU, HTU-TU then HTU-HTU.</li> </ul>

4

Increase 190 by 37

What is the total of 229 and 39?

Which 3 numbers could have a total of 450?

Column method to be used for addition calculations from decimal to more than 4-digit numbers.

$$\begin{array}{r} 597 \\ +475 \\ \hline 972 \\ \hline 1 \quad 1 \end{array}$$

$$\begin{array}{r} 21436 \\ +8743 \\ \hline 30179 \\ \hline 11 \end{array}$$

Add negative integers e.g  $-4 + -3 = -7$  (Y6 expectations)

**BAR MODELLING AT STAGE 4**

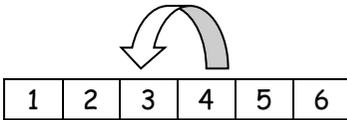
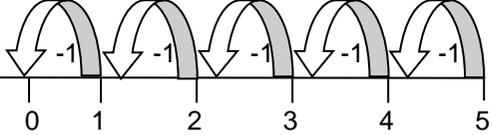
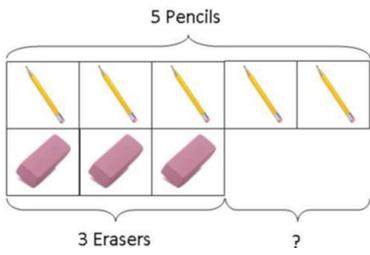
Which 3 numbers could have a total of 450?

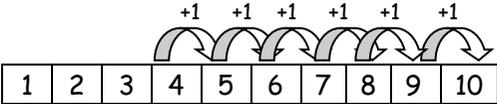
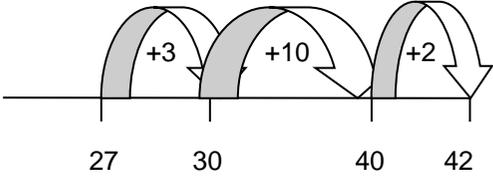
450		
?	?	?

Increase 190 by 37

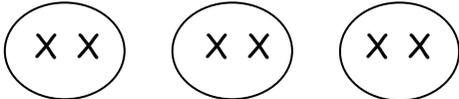
?	
190	37

- Children continue to use the same columnar methods but they should be carrying out HTU+HTU and ThHTU + ThHTU.
  - These ideas should be extended to working with decimals up to 3 decimal places.
  - Children should be encouraged to check using inverse operation and rounding.
  - Children should be carrying out the following types of calculation: HTU - HTU and ThHTU - ThHTU.
  - The children should also extend these ideas to working with decimals.
  - Children to use inverse operation and rounding to check a calculation.
- (End of Milestone 2 end of Y4 expectations)

Stage	Examples	Vocabulary	How it will look in written form	Notes
<b>1</b>	<p>There are 7 children. Three go out. How many are left?</p> <p>We made 6 mince pies. We ate 2. How many mince pies are left?</p>	<p>Count back (from, to), take (away), difference, leave, how many are left/left over? one less, two less... ten less...</p>	<p>Mostly <b>pictorial representations</b>:</p>  <p>7 take away 3</p> <p>leading to 6 objects 'take away' 2 objects :</p>  <p><b>Simple number tracks</b> to count back: what is 1 less than 4?</p>  <p><b>Marked number lines</b> to count back in ones</p>  <ul style="list-style-type: none"> <li>Peter has 5 pencils and 3 erasers. How many more pencils than erasers does he have?</li> </ul> 	<ul style="list-style-type: none"> <li>Children will mainly use concrete apparatus to take a smaller number away from a larger one, then find what is left by counting back from the larger number.</li> <li>Introduce the term difference but do not confuse with counting on at this stage.</li> <li>Oral countdowns will also be used to aid counting back skills.</li> <li>Number bonds to 20 to be used.</li> <li>Subtract numbers from up to 20.</li> </ul>

2	<p>10 take away 4. Take 2 from 7. 7 subtract 3. 8 less than 9.</p> <p>Robber questions: (take away smaller number) 51 - 4</p> <p>Mind the gap questions: 51 - 39 (count on)</p>	<p>Count back (from, to), -, subtract, take (away), difference, minus, leave, how many are left/left over? one less, two less, ten less...</p> <p><b>End of Y2 expectations</b></p>	<p><b>Number tracks and marked number lines</b> introduce complementary addition.</p>  <p>Develop <b>complementary addition</b>. What is the difference between 42 and 27? (Only use this method when the child has a secure understanding of subtraction.)</p> 	<ul style="list-style-type: none"> <li>• Children will still be doing a lot of concrete work to complete subtraction calculations.</li> <li>• Calculations should be U-U, TU - U and TU - TU</li> <li>• Number lines will be provided with digits written on. Children will gradually move onto empty number lines.</li> <li>• Count on to find the difference.</li> <li>• Use related facts up to 100.</li> <li>• Know that the numbers cannot be in any order. (largest number first)</li> <li>• Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</li> </ul>
	<b>Examples</b>	<b>Vocabulary</b>	<b>How it will look in written form</b>	<b>Notes</b>
3	<p>8 added to a number is 18. What is the number? 63 subtract 40. 10 less than 43. 100 less than 437.</p> <p>How many less than 28 is 12?</p>	<p>... one hundred less how many less is... than...? estimate -, subtract, take away, difference, minus, leave, how many are left/left over? &lt;, less than, fewer than, smaller than, subtract, subtraction, take away, difference, minus, decrease, leave, how many are left/left over? Estimate.</p>	<p>Filling in of <b>missing boxes</b>:</p> $36 - \square = 20$ <p><b>Vertical methods:</b></p> $93 - 47$ $80 + 13$ $\begin{array}{r} -40 + 7 \\ \hline 40 + 5 = 45 \end{array}$	<ul style="list-style-type: none"> <li>• Subtract numbers with up to three digits, using formal written methods of columnar subtraction.</li> <li>• Estimate the answer to a calculation and use inverse operations to check answers.</li> <li>• Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.</li> <li>• They should be calculating: TU-TU, HTU-TU then HTU-HTU. These should be done first without crossing any boundaries.</li> <li>• <b>Introduce vertical subtraction (NB Begin crossing boundaries by partitioning before using compact method).</b></li> </ul>

<b>4</b>	127 take away 35. 678 subtract 105. How many less than 305 is 95?	<b>Year 4 expectations</b>	<b>Columnar compact method</b>  $\begin{array}{r} 81 \\ 1693 \\ -478 \\ \hline 1215 \end{array}$ $\begin{array}{r} \phantom{6} \phantom{15} \phantom{1} \\ 2763 \\ \phantom{0} \phantom{0} \phantom{0} \\ \hline 10.75 \\ \phantom{0} \phantom{0} \phantom{0} \\ \hline 16.88 \end{array}$	<ul style="list-style-type: none"> <li>• Use compact columnar method.</li> <li>• Children should be carrying out the following types of calculation: HTU - HTU and ThHTU - ThHTU.</li> <li>• The children should also extend these ideas to working with decimals.</li> <li>• Children to use inverse operation and rounding to check a calculation.</li> </ul>
	Subtract negative integers e.g. $-4 - -6 = +2$ (Year 6 expectations)			

Stage	Examples	Vocabulary	How it will look in written form	Notes
<b>1</b>	How many groups of two are there?	Add, groups, equal, how many groups of the same number? counting in 2s	<p><b>Mostly pictorial and practical representations:</b></p>  <p>How many groups of 2 are there?</p> <p>Use of concrete apparatus for the children to physically count and see e.g, pairs of socks, shoes</p>	<ul style="list-style-type: none"> <li>• Children in FS tend to focus on addition, and addition strategies, so the links to multiplication are limited. Much of it comes in the form of repeated addition of small groups of numbers.</li> </ul>
Stage	Examples	Vocabulary	How it will look in written form	Notes

# 2

What is six lots of 2?

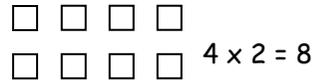
5 multiplied by 2 is ...

How many wheels are there on 3 cars?

Count on, counting in 2s, 5s, 10s, groups of, lots of, times, how many altogether?

Lots of, groups of x, times, multiply, multiplied by, multiple of, once, twice, three times etc.. repeated addition, array row, column, double, group in pairs, threes... tens. etc.. repeated addition, array, row, column, double, group in pairs, threes... tens, multiplication, product

**Describing arrays:**



$2 \times 4 = 8$

**Repeated addition:**

$5 + 5 + 5 = 3$  lots of 5

OR 3 times 5 =  $3 \times 5$

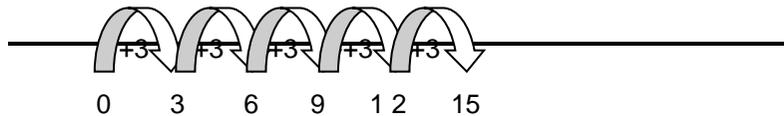
OR 5 times 3 =  $5 \times 3$

$= 3 + 3 + 3 + 3 + 3 = 5$  lots of 3



Filling in missing boxes:  $8 \times 2 = \square$   
 $\square = 8 \times 2$

**Number lines**



Emily has 7 stickers, Joe has six times as many stickers

7 7 7 7 7 7

Joe's Stickers					
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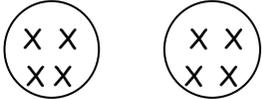
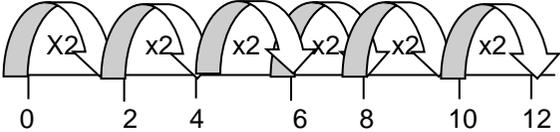
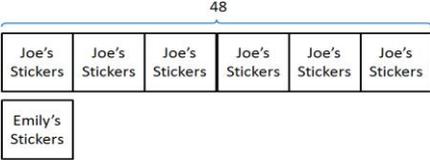
Emily's Stickers

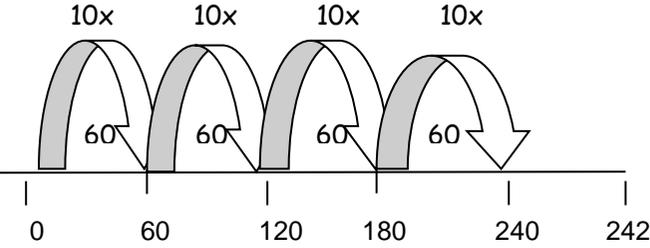
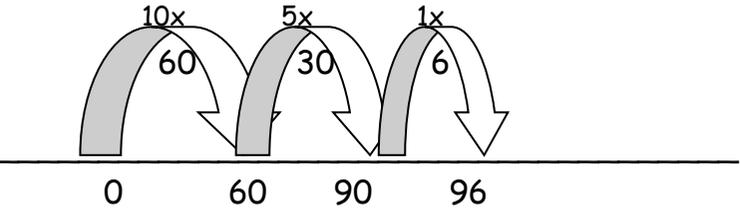
7

- Children will still be doing a lot of concrete work and may also still use pictorial representations.
- Their experience of 'multiplication' still has many connections to repeated addition.
- Children will count in 2s, 5s and 10s. Number grids can be used to show patterns.
- They should be introduced to the 'x' symbol for multiplication
- When children are ready they will move onto TUxU on a number line.
- Children will begin to move on to learn simple times table facts by heart (2s, 5s 10s).
- They will be introduced to arrays and shown the link between repeated addition and multiplication.
- Show that multiplication of two numbers can be done in any order (commutative)

**Year 2 expectations**

Stage	Examples	Vocabulary	How it will look in written form	Notes
<b>3</b>	Double 32. What is the product of 25 and 4? Multiply 31 by 8. Calculate 345 x 9	Lots of, groups of x, times, multiply, multiplied by, multiple of, once, twice, three times etc.. repeated addition, array, row, column, double, group in pairs, threes... tens, multiplication, product	<p><b>Grid method - HTU x U and TU x TU</b></p> $  \begin{array}{r c c}  & 70 & 2 \\  \hline  30 & 2100 & 60 \\  \hline  3 & 210 & 6  \end{array}  = 2160  $ $  \begin{array}{r}  216 \\  + 2376 \\  \hline  \end{array}  $ <p>Check with estimation e.g. 33 x 72 is slightly more than 30 x 70 (2100)</p>	<ul style="list-style-type: none"> <li>• Children should continue doing a lot of work on rapid mental recall of times tables facts - now being introduced to 6, 7, 8 and 9 times tables.</li> <li>• They should use doubling strategies and place value facts to help multiply by 10 or 100.</li> <li>• Use grid method initially with TU x U and then TU x TU.</li> <li>• Children will continue to use previous methods and move to the grid method when ready.</li> <li>• Multiply two-digit and three-digit numbers by a one-digit number using formal written layout.</li> </ul>

Stage	Examples	Vocabulary	How it will look in written form	Notes
1	<p>Getting children to share out objects to a group. e.g. Can we share these cakes out? If I can see 12 wheels how many bikes are there? Share 10 carrots between 5 children.</p>	<p>Sharing, sorting, set Count out, share out, left, how many...?, sort, group, set, sharing, grouping</p>	<p>Mainly practical activities with <b>pictorial representations</b>: e.g. <math>8 \div 4 = ?</math> said as <b>8 divided by 4, that means "how many groups of 4 can we make from 8?"</b></p> <p><b>Grouping</b> - How many groups of 4 are there in 8? Repeated subtraction.</p>  <p><b>Sharing</b> - If 8 is shared into 4 groups how many in each group?</p> 	<ul style="list-style-type: none"> <li>• Children will mainly use concrete apparatus and practical activities to divide.</li> <li>• They will also use real life and role play sessions to put the meaning across.</li> <li>• Children will still be doing practical work with concrete apparatus and will use more pictorial representations.</li> <li>• Questions will be given as real life examples and still include lots of role play</li> </ul>
Stage	Examples	Vocabulary	How it will look in written form	Notes
2	<p>Share 18 between 2. Divide 6 by 3. How many groups of 10 will make 80?</p>	<p>Share, share equally, one each....,group in pairs, threes, tens, equal groups of, divide, divided by, divided into, left, left over, how many...?, group, set</p>	<p><b>Pictorial representations</b></p> <p><b>Grouping:</b></p> <p>How many twos make 12?</p>  <p>Joe has 6 times as many stickers as Emily. Joe has 48 stickers. How many stickers does Emily have?</p> <p>We know that Joe has 48 stickers in total.</p> 	<ul style="list-style-type: none"> <li>• Children will still use many ideas from previous stage but should begin to move on to using visualisation strategies.</li> <li>• This leads to a simple written form of division based on early times table facts (2, 5 &amp; 10).</li> <li>• Calculations should be <math>TU \div U</math> and should include some with remainders.</li> <li>• Number lines with digits written on will be used.</li> <li>• Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.</li> </ul> <p style="text-align: right;"><b>Year 2 expectations</b></p>

Stage	Examples	Vocabulary	How it will look in written form	Notes
3	<p>There are 64 children in Year 4. How many teams of 6 can be made?</p> <p>I have 62 cakes and 7 boxes. Each box holds 8 cakes. How many boxes can I fill?</p>	<p>group in pairs, threes, tens, equal groups of, divide, divided by, divided into, left, left over, how many...?, group, set, remainder, divisible by</p>	<p><b>Grouping</b> where the groups are the divisor multiplied by 2, 5 or 10 as appropriate</p> <p>e.g. <math>242 \div 6 = 40 \text{ r}2</math></p>  <p>e.g. <math>93 \div 6</math></p> 	<ul style="list-style-type: none"> <li>• Children begin to use more formal methods of recording division calculations.</li> <li>• They continue to experience remainders that involve rounding up or down and the use of multiplication as an inverse operation.</li> <li>• The methods are now more focused on the grouping approach rather than sharing.</li> <li>• Calculations tend to involve HTU ÷ U.</li> <li>• They will use knowledge of place value to divide whole numbers and decimals by 10, 100 and 1000.</li> </ul>

Stage	Examples	Vocabulary	How it will look in written form	Notes
4	A train ticket costs £7. I have £240. How many tickets can I buy?	Share, share equally, one each, two each....group in pairs, threes, tens, equal groups of, divide, divided by, divided into, left, left over, how many...?, group, set, remainder, divisible by, quotient	<p><b>Short division - up to 3 digit number divided by a 1 digit number.</b></p> $432 \div 5 = 86 \text{ r}2 \text{ or } 86 \frac{2}{5}$ $\begin{array}{r} 86 \text{ r}2 \\ 5 \overline{)432} \end{array}$	<ul style="list-style-type: none"> <li>Know and use times tables to 12 X 12.</li> <li>Use short division method with remainders.</li> </ul> <p style="text-align: center;"><b>Year 4 expectations</b></p>
5	A ticket to the concert costs £15. £430 is collected in the box office. How many tickets were sold?	As above	<p><b>Long division</b></p> $\begin{array}{r} 28 \text{ r}12 \\ 15 \overline{)432} \\ \underline{300} \\ 132 \\ \underline{120} \\ 12 \end{array}$ $\begin{array}{r} 28.8 \\ 15 \overline{)432} \\ \underline{30} \\ 132 \\ \underline{120} \\ 120 \\ \underline{120} \\ 0 \end{array}$ <p>For more examples refer to National Curriculum 2014 Maths appendix</p>	<ul style="list-style-type: none"> <li>Use long division</li> <li>Look further at remainders written as fractions and decimals. They also need to be able to interpret the calculator display in the context of money. Year 5 children should progress to calculations of the form HTU ÷ TU.</li> <li>Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.</li> </ul>