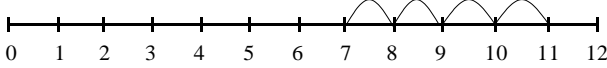
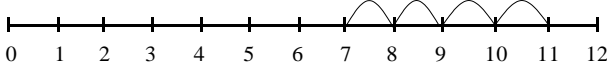
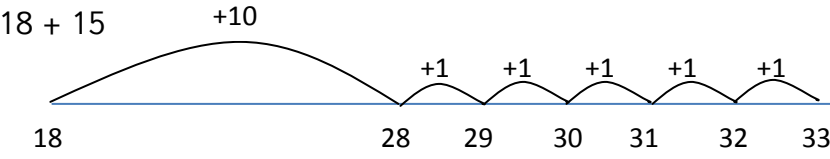
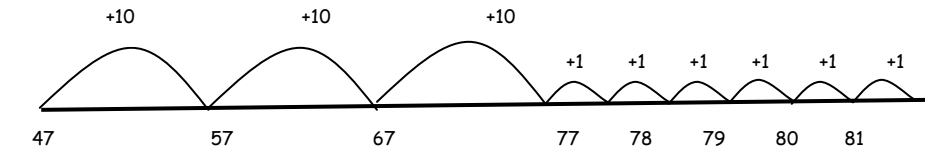
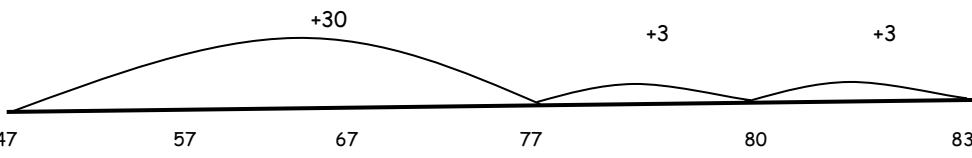
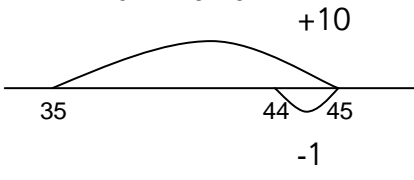


# Shavington Primary School



Progression of Written  
Calculation

# Progression of Calculations through Key Stage 1.

Addition	
Rec.	<p>Children will develop a knowledge of 'one more than', 'one less than' and 'how many altogether' when combining groups of objects. Children will use a number line to count on.</p>  <p>0 1 2 3 4 5 6 7 8 9 10 11 12</p> <p>Begin to write simple number sentences (<math>U + U = U</math> e.g. <math>3 + 2 = 5</math>) and solve simple problems. Addition through songs and adding objects through the use of stories. Counting on on a number line with objects and apparatus.</p>
Year 1	<p>Children use a numbered line to count on in ones. Children use number lines and practical resources to support calculation and teachers <i>demonstrate</i> the use of the number line.</p> <p><math>7 + 4</math></p>  <p>0 1 2 3 4 5 6 7 8 9 10 11 12</p> <p><math>18 + 15</math></p>  <p>18 28 29 30 31 32 33</p>
Year 2	<p>Children use a numbered line to count on in tens and ones</p> <p><math>47 + 36</math></p>  <p>47 57 67 77 78 79 80 81</p> <p>Develop this to counting in multiples of 10 and 1</p> <p><math>47 + 36</math></p>  <p>47 57 67 77 80 83</p> <p><b>Add 9 or 11 by adding 10 and adjusting by 1</b> e.g. Add 9 by adding 10 and adjusting by 1</p>  <p>35 44 45</p> <p>+10 -1</p>

# Subtraction

**Rec.**

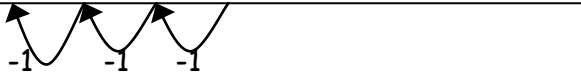
One more and one less than on a number line with the use of apparatus.  
 Subtraction through songs and subtracting objects through the use of stories.  
 Write simple number sentence: U-U= U e.g  $5-3=2$   
 Counting back on a number line with objects and apparatus

**Year  
1**

They use number lines and practical resources to support calculation. Teachers *demonstrate* the use of the number line.

$6 - 3 = 3$

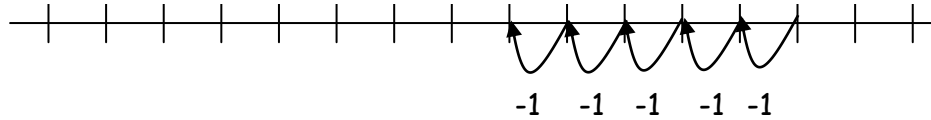
0 1 2 3 4 5 6 7 8 9 10



Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones.

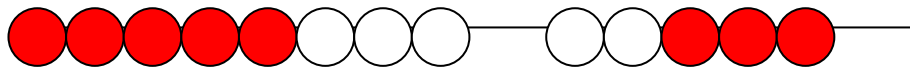
$13 - 5 = 8$

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15



Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.

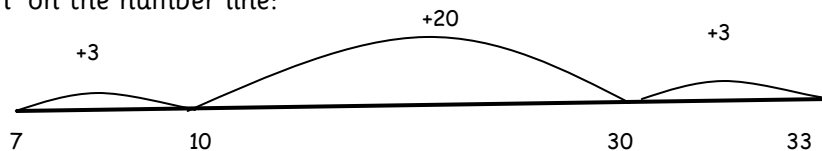
$13 - 5 = 8$



**Year  
2**

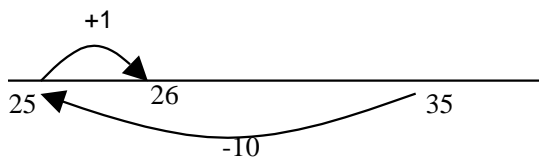
Begin to introduce the term 'finding the difference', so that children can now begin to 'count on' on the number line:

$33 - 7 =$



Subtract 9 or 11. Begin to subtract 19 or 21:

$35 - 9 = 26$



# Multiplication

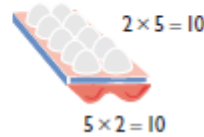
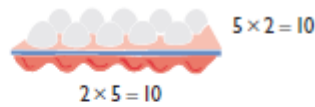
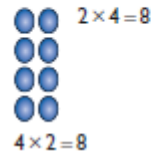
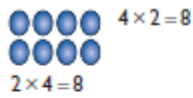
**Rec.**

Children will double practically double with apparatus.  
 Children will group into 2's

Year  
1

Children will experience equal groups of objects and will count in 2s and 10s and begin to count in 5s.

Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, They will work on practical problem solving activities involving equal sets or groups.



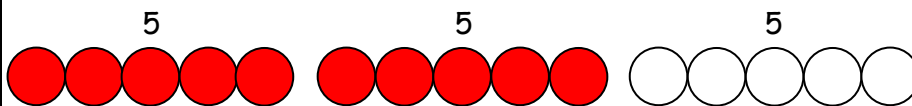
Repeated Addition

Repeated addition can be shown easily on a number line:

$5 \times 3 = 5 + 5 + 5$

and on a bead bar:

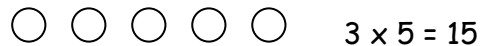
$5 \times 3 = 5 + 5 + 5$



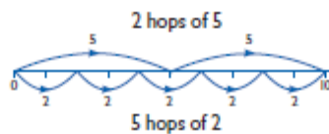
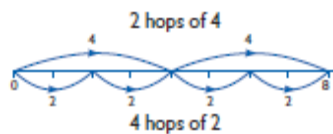
Arrays

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of commutative law ( $3 \times 5 = 5 \times 3$ ).

Year  
2



$5 \times 3 = 15$



Division

Rec.  
Year  
1

Children will develop their understanding of division and use jottings to support calculation



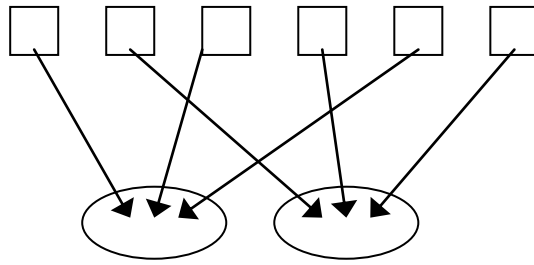
Understand equal groups and share items out in play and problem solving.

They will count in 2s and 10s and later in 5

Children will develop their understanding of division and use jottings to support calculation

Sharing equally

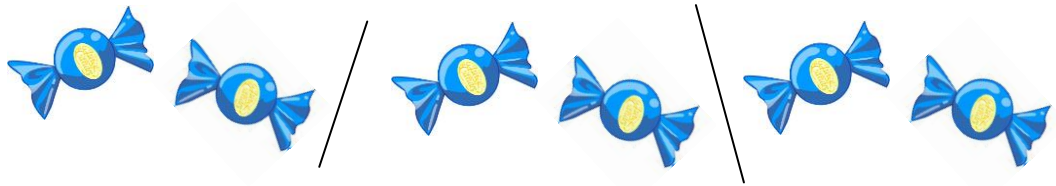
6 sweets shared between 2 people, how many do they each get?



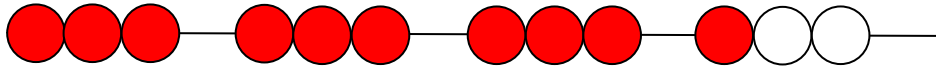
Year  
2

Grouping.

There are 6 sweets, how many people can have 2 sweets each?



The bead bar will help children with interpreting division calculations such as  $10 \div 5$  as 'how many 5s make 10?'



# Progression of Calculations through Key Stage 2.

Addition															
Year 3	<p>Use expanded column addition to add two or three 3-digit numbers or three 2-digit numbers</p> <p>Partition the number into tens and units and begin to calculate using vertical column method.</p> $83 + 42 = 125$														
	$\begin{array}{r} 80 + 3 \\ \underline{40 + 2} \\ 120 + 5 = 125 \end{array}$														
Year 4	<p>Column addition for 3-digit and 4-digit numbers</p> <p><b><u>Extend to decimals but only in the context of money.</u></b></p> $367 + 185 = 431$														
	<table style="width: 100%; border: none;"> <tr> <td style="text-align: right; padding-right: 20px;"><math>367</math></td> <td style="text-align: right;"><math>23.40</math></td> </tr> <tr> <td style="text-align: right;"><math>+185</math></td> <td style="text-align: right;"><math>+ 7.23</math></td> </tr> <tr> <td style="text-align: right;"><math>12</math></td> <td style="text-align: right;"><math>.03</math></td> </tr> <tr> <td style="text-align: right;"><math>140</math></td> <td style="text-align: right;"><math>.60</math></td> </tr> <tr> <td style="text-align: right;"><math>\underline{400}</math></td> <td style="text-align: right;"><math>10.00</math></td> </tr> <tr> <td style="text-align: right;"><math>552</math></td> <td style="text-align: right;"><math>\underline{20.00}</math></td> </tr> <tr> <td></td> <td style="text-align: right;"><math>30.63</math></td> </tr> </table>	$367$	$23.40$	$+185$	$+ 7.23$	$12$	$.03$	$140$	$.60$	$\underline{400}$	$10.00$	$552$	$\underline{20.00}$		$30.63$
$367$	$23.40$														
$+185$	$+ 7.23$														
$12$	$.03$														
$140$	$.60$														
$\underline{400}$	$10.00$														
$552$	$\underline{20.00}$														
	$30.63$														
Year 5	<p>Use column addition to add two or three whole numbers with up to 5 digits</p> <p>Use column addition to add any pair of two-place decimal numbers including amounts of money.</p> $\begin{array}{r} 3587 \\ + 675 \\ \underline{\quad} \\ 4262 \\ \small{111} \end{array}$ <p>Revert to expanded methods if the children experience any difficulty.</p> <p>Extend to up to two places of decimals (same number of decimal places) and adding several numbers (with different numbers of digits).</p> $\begin{array}{r} 72.8 \\ +54.6 \\ \underline{\quad} \\ 127.4 \\ \small{11} \end{array}$														
Year 6	<p>Use column addition to add numbers with up to 5 digits.</p> <p>Extend to numbers with any number of digits and decimals with 1, 2 and/or 3 decimal places.</p> $13.86 + 9.481 = 23.341$														
	$\begin{array}{r} 13.860 \\ + 9.481 \\ \underline{\quad} \\ 23.341 \\ \small{111} \end{array}$														

## Subtraction

Year 3	<p>Partitioning and decomposition for subtracting pairs of up to three-digit numbers.</p> $89 - 57 = \begin{array}{r} 80 + 9 \\ 50 + 7 \\ \hline 30 + 2 = 32 \end{array}$ <p>Begin to exchange: <math>71 - 46 =</math></p> $\begin{array}{r} 60 \\ \cancel{70} + 11 \\ - 40 + 6 \\ \hline 20 + 5 = 25 \end{array}$												
Year 4	<p>Use expanded column subtraction for 3-digit and 4-digit numbers</p> $754 - 86 =$ <p>Step 1 <math>\begin{array}{r} 700 + 50 + 4 \\ - \quad 80 + 6 \end{array}</math></p> <p>(adjust from T to U)</p> <p>Step 2 <math>\begin{array}{r} 700 + 40 + 14 \\ - \quad 80 + 6 \end{array}</math></p> <p>(adjust from H to T)</p> <p>Step 3 <math>\begin{array}{r} 600 + 140 + 14 \\ - \quad 80 + 6 \end{array}</math></p>												
Year 5	<p>Use compact or expanded column subtraction to subtract numbers with up to 5 digits.</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="padding: 0 5px;">H</th> <th style="padding: 0 5px;">T</th> <th style="padding: 0 5px;">U</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">23</td> <td style="text-align: center;">145</td> <td style="text-align: center;">12</td> </tr> <tr> <td style="text-align: center;">-</td> <td style="text-align: center;">168</td> <td style="text-align: center;">8</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">8</td> <td style="text-align: center;">4</td> </tr> </tbody> </table> <p>Use complementary addition on a number line for subtractions where the larger number is a multiple or near multiple of 1000.</p> <p>Use compact column for subtractions of decimals with up to two places incl. amounts of money</p> <p><b><u>Choose the most efficient method in any given situation</u></b></p>	H	T	U	23	145	12	-	168	8	1	8	4
H	T	U											
23	145	12											
-	168	8											
1	8	4											
Year 6	<p>Use compact column subtraction to subtract numbers with up to 6 digits.</p> <p>Use number line for subtractions where the larger number is a multiple or near multiple of 1000 or 10,000.</p> <p>Use column subtraction for subtractions of decimal numbers with up to three places including money.</p>												
Multiplication													
Year 3	<p>Use partitioning (column multiplication) to multiply 2-digit and 3-digit numbers by single digit numbers.</p> <table style="margin-left: auto; margin-right: auto;"> <tbody> <tr> <td style="text-align: right;"><math>30 + 8</math></td> <td></td> </tr> <tr> <td style="text-align: right;"><math>\times \quad 7</math></td> <td></td> </tr> <tr> <td style="text-align: right;"><math>\underline{56}</math></td> <td style="text-align: right;"><math>8 \times 7 = 56</math></td> </tr> <tr> <td style="text-align: right;"><math>\underline{210}</math></td> <td style="text-align: right;"><math>30 \times 7 = 210</math></td> </tr> <tr> <td style="text-align: right;"><math>\underline{\underline{266}}</math></td> <td></td> </tr> </tbody> </table>	$30 + 8$		$\times \quad 7$		$\underline{56}$	$8 \times 7 = 56$	$\underline{210}$	$30 \times 7 = 210$	$\underline{\underline{266}}$			
$30 + 8$													
$\times \quad 7$													
$\underline{56}$	$8 \times 7 = 56$												
$\underline{210}$	$30 \times 7 = 210$												
$\underline{\underline{266}}$													

Year 4	Use an expanded vertical written method to multiply a one-digit by a 3-digit number. Use vertical method to multiply a 2-digit number by a number between 10 and 20 by partitioning.
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Year 5	<p>Use short multiplication to multiply a 1-digit number by a number with up to 4 digits</p> $\begin{array}{r} \text{H T U} \\ 463 \\ \times \quad 8 \\ \hline 3704 \\ \underline{52} \end{array}$ <p>Use expanded vertical multiplication to multiply 3-digit and 4-digits by a number between 11 and 20</p> $\begin{array}{r} 456 \\ \times 13 \\ \hline 18 \quad (3 \times 6) \\ 150 \quad (3 \times 50) \\ 1200 \quad (3 \times 400) \\ \hline 4560 \quad (10 \times 456) \\ \underline{5928} \\ 1 \end{array}$
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**Choose the most efficient method in any given situation**

Year 6	Use short multiplication to multiply a 1-digit number by a number with up to 4 digits Use expanded multiplication to multiply a 2-digit by a number with up to 4 digits
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**Division**

Year 3	<p>Perform divisions just above the 10<sup>th</sup> multiple using a number line and understanding how to give a remainder as a whole number. E.g. <math>72 \div 5 = 14 \text{ r } 2</math></p>
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Year 4	<p>Use additive chunking method to divide a 2-digit or a 3-digit number by a single-digit number. Introduce 'Coin Mathematics' – this is a way in which the children calculate the 'chunks' that they will use when dividing (they link to the coin values 1p, 2p, 5p, 10p, 50p £1)</p> <p>E.g. <math>147 \div 7 =</math></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <math>1 \times 7 = 7</math>  <math>2 \times 7 = 14</math>  <math>5 \times 7 = 35</math>  <math>10 \times 7 = 70</math>  <math>20 \times 7 = 140</math> </td> <td style="width: 50%; border: none;"> <math>147 \div 7 =</math>   <math>70 \text{ (10)}</math>  <math>+ 70 \text{ (10)}</math>  <math>\hline 140</math>  <math>7 \text{ (1)}</math>  <math>\hline 147</math> </td> </tr> </table> <p style="text-align: center; margin-top: 20px;"><math>10 + 10 + 1 = 21</math>    so    <math>147 \div 7 = 21</math></p>	$1 \times 7 = 7$ $2 \times 7 = 14$ $5 \times 7 = 35$ $10 \times 7 = 70$ $20 \times 7 = 140$	$147 \div 7 =$  $70 \text{ (10)}$ $+ 70 \text{ (10)}$ $\hline 140$ $7 \text{ (1)}$ $\hline 147$
$1 \times 7 = 7$ $2 \times 7 = 14$ $5 \times 7 = 35$ $10 \times 7 = 70$ $20 \times 7 = 140$	$147 \div 7 =$  $70 \text{ (10)}$ $+ 70 \text{ (10)}$ $\hline 140$ $7 \text{ (1)}$ $\hline 147$		



<p style="text-align: center;">Year 5</p>	<p>Use additive chunking division method to divide a number with up to 4 digits by a number less than 12. Use these coins to help with their calculations (HTU ÷ U and ThHTU ÷ U) using the 'Additive Chunking' method (division with remainders also).</p> <p>E.g. <math>1138 \div 7 =</math></p> $  \begin{array}{r}  1 \times 7 = 7 \\  2 \times 7 = 14 \\  5 \times 7 = 35 \\  10 \times 7 = 70 \\  20 \times 7 = 140 \\  50 \times 7 = 350 \\  100 \times 7 = 700  \end{array}  $ <p><math>1138 - 1134 = 4</math> (this is the remainder)  <math>100 + 50 + 10 + 2 = 162</math>      so      <math>1138 \div 7 = 162r4</math></p>
<p style="text-align: center;">Year 6</p>	<p>Use short division to divide a number with up to 4 digits by a 1-digit or a 2-digit number Use additive chunking to divide 3-digit and 4-digit numbers by 2-digit numbers. Coin Maths continued from previous years and additive chunking extended to ThHTU ÷ TU.</p> <p><math>976 \div 36</math></p> $  \begin{array}{r}  360 (10) \\  + 360 (10) \\  \hline  720 \\  + 360 (10) \text{ oops! Too big!} \\  \hline  1080 \\  720 \\  + 180 (5) \\  \hline  900 \\  + 72 (2) \\  \hline  972  \end{array}  $ <p><math>976 - 972 = 4</math> (this is the remainder)  <math>10 + 10 + 5 + 2 = 27</math>  so: <math>976 \div 36 = 27 r4</math>    or <math>27 \frac{4}{36}</math>    or <math>27 \frac{1}{9}</math></p>

# Maths Vocabulary Guide

Addition Vocabulary	
Rec	add, more, make, sum, total, altogether, more, sum, one more, ten more.
Year 1	<i>All of the above plus...</i> +, plus double, near double, two more... greater, units, ones, tens, count, count (up) to count on (from, to) how many...?
Year 2	<i>All of the above plus...</i> addition 100 more...
Year 3	<i>All of the above plus...</i> hundreds boundary, inverse.
Year 4	<i>All of the above.</i>
Year 5	<i>All of the above plus...</i> units boundary, tenths boundary
Year 6	<i>All of the above.</i>

Subtraction Vocabulary	
Rec	how many are left/left over? how many have gone? one less, two less... ten less... how many less is... than...? difference between is the same as
Year 1	<i>All of the above plus...</i> -, subtract, minus half, halve =, equals, sign, is the same as
Year 2	<i>All of the above plus...</i> one hundred less how much fewer is...? tens boundary
Year 3	<i>All of the above plus...</i> hundreds boundary, inverse
Year 4	<i>All of the above.</i>
Year 5	<i>All of the above plus...</i> subtraction, decrease units boundary, tenths boundary
Year 6	<i>All of the above.</i>

Multiplication Vocabulary	
Rec	'lots of', 'doubling'
Year 1	<i>All of the above plus...</i> groups of, x, multiply, times, add, steps of, jumps of, double
Year 2	<i>All of the above plus...</i> multiplied by multiple of once, twice, three times, four times, five times... ten times... times as (big, long, wide and so on) repeated addition array row, column
Year 3	<i>All of the above plus...</i> multiplication, multiply,
Year 4	<i>All of the above.</i>
Year 5	<i>All of the above plus...</i> Product, factor, squared, square root.
Year 6	<i>All of the above.</i>

Division Vocabulary	
Rec	share, share equally, groups of, divide, how many groups?
Year 1	double, halve one each, two each, three each...
Year 2	<i>All of the above plus...</i> group in pairs, threes... tens equal groups of $\div$ , $:$ , divided by, divided into, left, left over
Year 3	<i>All of the above plus...</i> division, divisible by remainder
Year 4	<i>All of the above plus...</i> factor, quotient inverse
Year 5	<i>All of the above.</i>
Year 6	<i>All of the above.</i>