

Calculation Policy


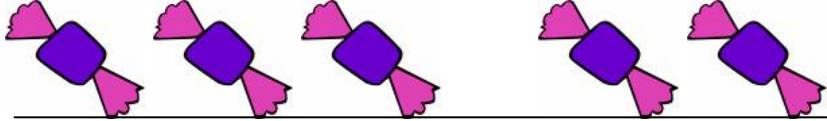

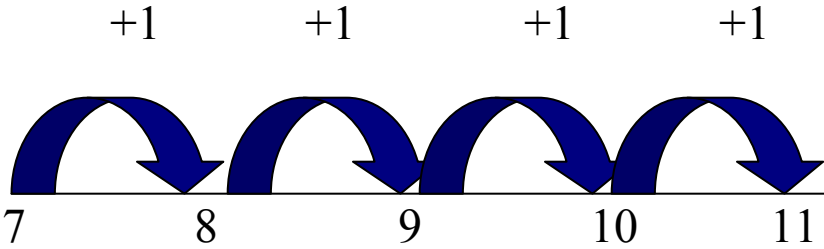
Approved by Governors: March 2015

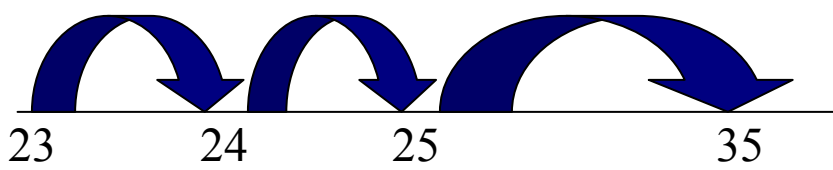
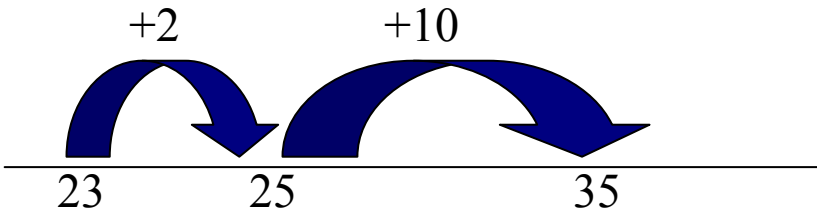
Introduction

Children are introduced to the process of calculation through practical, oral and mental activities. The stages used for pupils are linked to their level of understanding and not age related.

Note: It is important that children's mental methods of calculation are practised and secured alongside their learning and use of written methods.

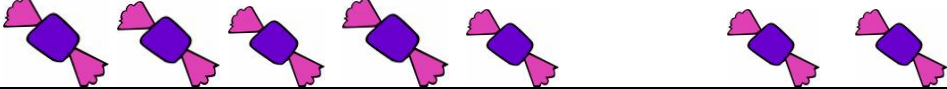


Addition

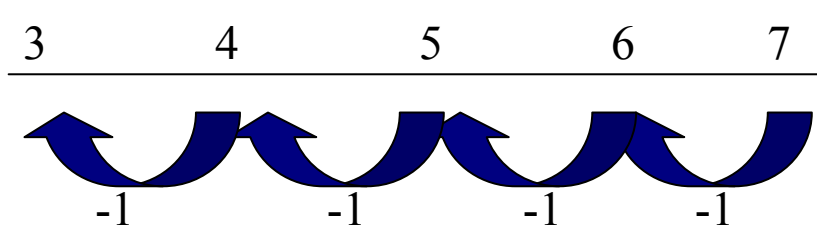
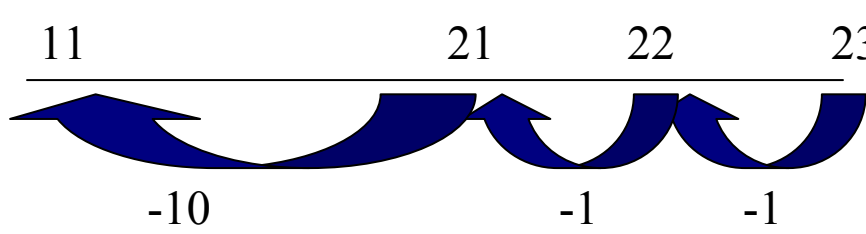
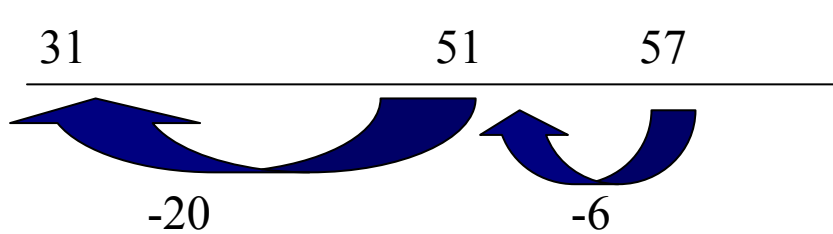
Stage 1	Practical application of counting and adding objects e.g. 3 cubes and 2 more – develop vocabulary
Stage 2	Record in pictures 
Stage 3	Record in pictures and add numbers  $3 + 2 = 5$
Stage 4	Relate pictures/dots to given numbers $6 + 4 =$ 
Stage 5	Use a number line or hundred square – record horizontally $7 + 4 =$  Largest number first

<p>Stage 6</p>	<p>Partition into tens and units and recombine Record horizontally $23 + 12 =$</p> <p style="text-align: center;"> $+1$ $+1$ $+10$ </p>  <p style="text-align: center;"> 23 24 25 35 </p> <p>Largest number first</p>
<p>Stage 7</p>	<p>Partition into tens and units and recombine. Use larger jumps than 6. Record horizontally $23 + 12 =$</p>  <p style="text-align: center;"> 23 25 35 </p> <p>Largest number first</p>
<p>Stage 8</p>	<p>Partition into tens and units then recombine – record horizontally</p> <p style="text-align: center;">$63 + 27$</p> <p style="text-align: center;">$3 + 7 = 10$</p> <p style="text-align: center;">$60 + 20 = 80$</p> <p style="text-align: center;">$80 + 10 = 90$</p>

Stage 9	<p>Introduce column addition using the expanded method.</p> $83 + 48 = 131$ $\begin{array}{r} 83 \\ +48 \\ \hline 11 \text{ (8 + 3)} \\ \underline{120} \text{ (40+80)} \\ 131 \end{array}$
Stage 10	<p>Formal, most efficient method showing carries below to ensure it is not omitted.</p> $\begin{array}{r} 358 \\ + \underline{73} \\ 1 1 \\ \hline 431 \end{array}$



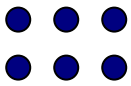
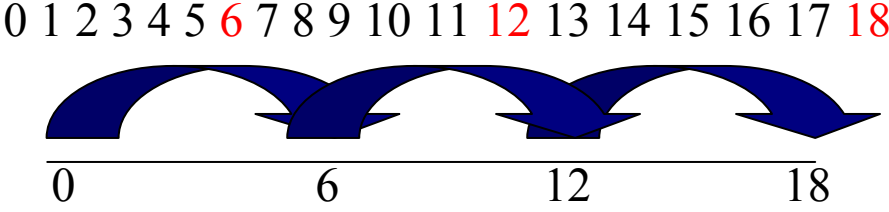
Subtraction

Stage 1	<p>Practical application of subtracting objects eg. 5 sweets, taking away 3 sweets – develop vocabulary</p>
Stage 2	<p>Record in pictures</p> 
Stage 3	<p>Record in pictures and add numbers</p> 
Stage 4	<p>Relate pictures/dots to given numbers</p> $6 \quad - \quad 4 \quad =$ 

<p>Stage 5</p>	<p>Use a number line or hundred square – record horizontally $7 - 4 =$</p> 
<p>Stage 6</p>	<p>Count back in tens and units – units first Record horizontally $23 - 12 =$</p> 
<p>Stage 7</p>	<p>Count back in tens and units – units first with bigger jumps than stage 6. Record horizontally $57 - 26 =$</p> 
<p>Stage 8</p>	<p>Partition, subtract units then tens – record horizontally $64 - 27$</p> <p style="text-align: center;">$64 - 7 = 57$ $57 - 20 = 37$</p>

Stage 9	Introduce column subtraction using partitioning $69 - 27 = 42$ $\begin{array}{r} -60 \quad 9 \\ \underline{20 \quad 7} \\ 40 + 2 = 42 \end{array}$
Stage 10	As stage 9 but with decomposition $54 - 37 = 17$ $\begin{array}{r} 40 \quad 1 \\ -50 \quad 4 \\ \underline{30 \quad 7} \\ 10 + 7 = 17 \end{array}$
Stage 11	As stage 10 including decimals and zeros $300 - 73$ $\begin{array}{r} 90 \\ 200 \quad + \quad 1 \\ \underline{300 \quad 00 \quad 0} \\ 70 \quad 3 \end{array}$ $200 + 20 + 7 = 227$
Stage 12	Formal, most efficient method showing decomposition $\begin{array}{r} / \\ \cancel{3} \cancel{5} 8 \\ - \underline{73} \\ 285 \end{array}$

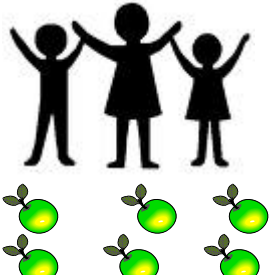
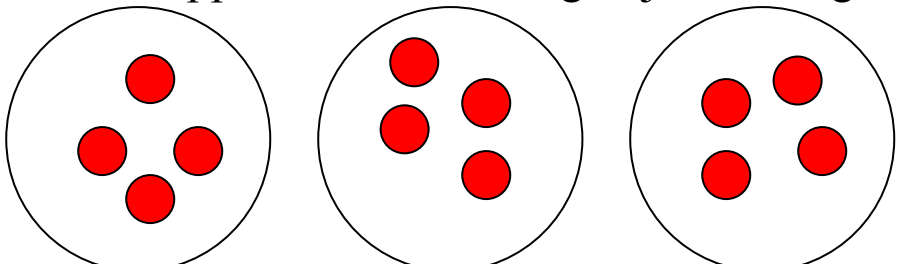
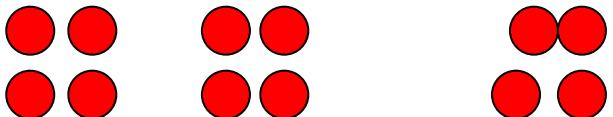

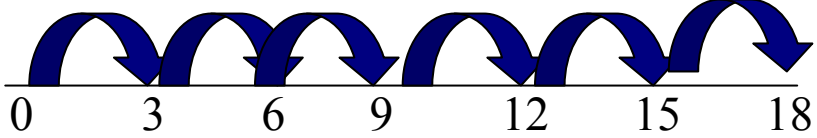
Multiplication

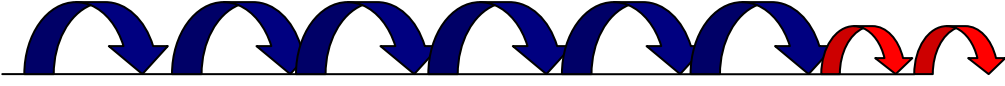
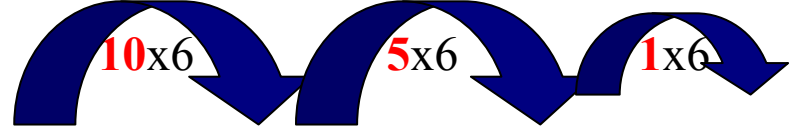
Stage 1	<p>Practical application of counting groups of the same size</p> 								
Stage 2	<p>Counting in groups using pictures</p> 								
Stage 3	<p>Arrays and repeated addition</p>  <p>2×3 or $2 + 2 + 2$</p>								
Stage 4	<p>Number lines</p>  <p>$6 \times 3 =$</p>								
Stage 5	<p>Grid method</p> <table style="border-collapse: collapse; margin-left: 100px;"> <tr> <td style="border-right: 1px solid black; padding: 5px;">x</td> <td style="padding: 5px;">10</td> <td style="padding: 5px;">5</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="border-top: 1px solid black; padding: 5px;">20</td> <td style="border-top: 1px solid black; padding: 5px;">10</td> <td style="border-top: 1px solid black; padding: 5px;">= 30</td> </tr> </table>	x	10	5			20	10	= 30
x	10	5							
	20	10	= 30						

<p>Stage 6</p>	<p>Grid method for more than one digit, use jottings for place value:</p> <p>67 x 34</p> $ \begin{array}{r} \text{X} \quad 60 \quad 7 \\ \hline 30 \quad 1800 \quad 210 \\ 4 \quad 240 \quad 28 \end{array} $ <p>6 x 3 = 18 60 x 3 = 180 60 x 30 = 1800</p>
<p>Stage 7</p>	<p>Grid method extended to decimals – use jottings as stage 6</p> $ \begin{array}{r c c c} \text{X} & 4 & 0.5 & 0.03 \\ \hline 3 & 12 & 1.5 & 0.09 \end{array} = 13.59 $
<p>Stage 8</p>	<p>Introduce efficient method using expanded column method</p> $ \begin{array}{r} 5 \ 6 \\ \text{X} \quad 3 \\ \hline 1 \ 8 \ (3 \times 6) \\ 1 \ 5 \ 0 \ (3 \times 50) \\ \hline 1 \ 6 \ 8 \end{array} $
<p>Stage 9</p>	<p>Efficient method</p> $ \begin{array}{r} 5 \ 6 \\ \text{X} \quad 3 \\ \hline 1 \ 6 \ 8 \end{array} $

<p>Stage 10</p>	<p>Extend to multiplying 3 digits by 2 digits using expanded method. Ensure children can use this method for decimals numbers as well</p> $ \begin{array}{r} 256 \\ \times 23 \\ \hline 18 \quad (3 \times 6) \\ 150 \quad (3 \times 50) \\ 600 \quad (3 \times 200) \\ 120 \quad (20 \times 6) \\ 1000 \quad (20 \times 50) \\ 4000 \quad (20 \times 200) \\ \hline 5888 \end{array} $
<p>Stage 11</p>	<p>Extend to multiplying 3 digits by 2 digits as well as decimal numbers using column method</p> $ \begin{array}{r} 256 \\ \times 23 \\ \hline 768 \\ 5120 \\ \hline 5888 \end{array} $ <p>Using 0 to hold place value when multiplying tens</p>

Division

<p>Stage 1</p>	<p>Sharing objects between people</p> 
<p>Stage 2</p>	<p>Practical application of sharing objects into groups</p> 
<p>Stage 3</p>	<p>Repeated subtraction Use language such as 'How many groups of/lots of 4 are in 12?'</p> <p>$12 \div 4 = 3$</p>  <p>I have 12 items, how many groups of 4 can I make from this?</p>
<p>Stage 4</p>	<p>Practical grouping e.g. PE</p>  <p>12 children get into teams of 4. How many teams are there?</p>
<p>Stage 5</p>	<p>Grouping on a number line How many 3s make 18? Make links to times tables.</p> 

<p>Stage 6</p>	<p>Grouping on a number line with remainders</p> <p>How many 3s in 20? How many left over?</p>  <p>0 3 6 9 12 15 18 19 20</p>
<p>Stage 7</p>	<p>Using the same method as stages 5 and 6 but with greater jumps. Add together the total number of jumps.</p> <p>$96 \div 6 = 16$</p>  <p>0 60 90 96</p>
<p>Stage 8</p>	<p>Chunking- develop the number line to count up in groups until we reach the number.</p> $96 \div 6 = 16$ $\begin{array}{r} 10 \times 6 = 60 \\ 5 \times 6 = 30 \\ + \quad 90 \\ \underline{1} \times 6 = 96 \\ 16 \end{array}$
<p>Stage 9</p>	<p>Using a formal method of division</p> $\begin{array}{r} 043r1 \\ 2 \\ 8 \overline{) 45} \end{array}$

<p>Stage 10</p>	<p>Using a formal method of division including decimal and fraction remainders</p> $ \begin{array}{r} 043.12 \\ 2 \quad 12 \\ 8 \quad 345.00 \end{array} $
<p>Stage 7</p>	<p>Developing to dividing by 2 digits using long division</p> <p>Answer = 23 r 7</p> $ \begin{array}{r} 16 \quad 375 \\ (10 \times 16) \quad 160 \\ (10 \times 16) + \underline{160} \\ \quad \quad \quad 320 \\ (2 \times 16) + \underline{32} \\ \quad \quad \quad 352 \\ (1 \times 16) + \underline{16} \\ \quad \quad \quad 368 \\ \quad \quad \quad 7 \text{ left over} \end{array} $