
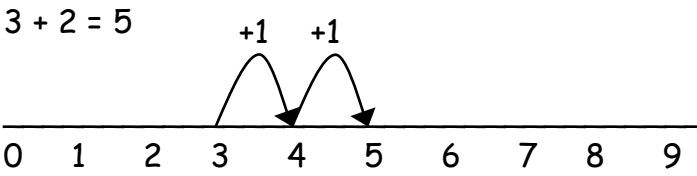


## Calculation Policy for Mathematics 2016-2017

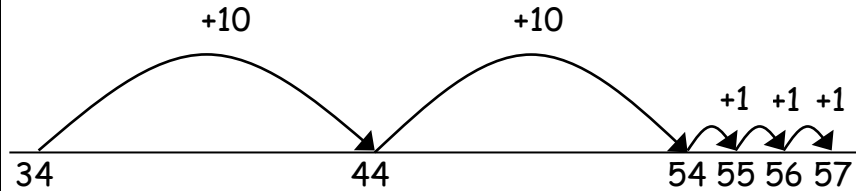
### Addition

The Different Stages	Number Development	Strategy - What it Looks Like
Stage 1: Counting sets of object	Move on to combining	
Stage 2: Combining 2 sets of objects		For example $6 + 2$ the children may get 6 cubes, then 2 more and count how many altogether.
Stage 3: Drawing pictures/dots - informal jottings. Then counting back	Single unit add single unit	 $4 + 2 = 6$ * * * * + * *
Stage 4: Counting on a number line with numbers on it.		$3 + 2 = 5$  0   1   2   3   4   5   6   7   8   9

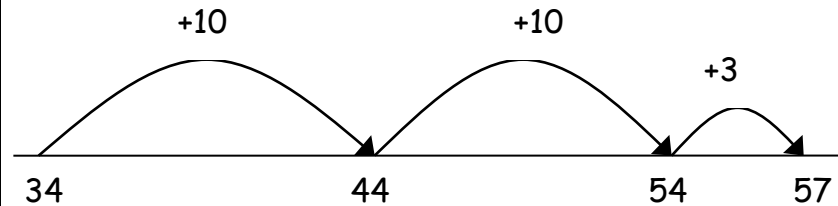
Stage 5:  
Steps in addition may be recorded on an empty number line. Steps often bridge through a multiple of ten.

- 1) Partition smaller number into tens and units
- 2) Add on the tens - progress to multiples of ten
- 3) Add on the units and groups of units

$$34 + 23 = 57$$

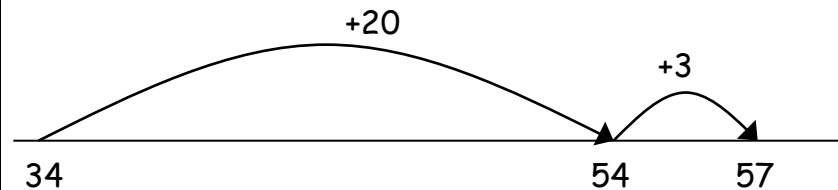


$$34 + 23 = 57$$



Grouping tens


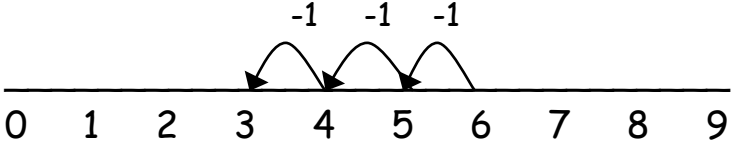
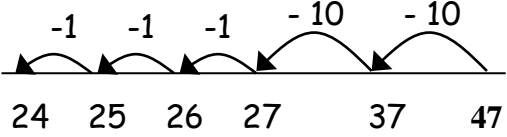
$$34 + 23 = 57$$

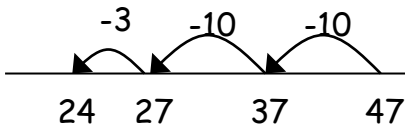
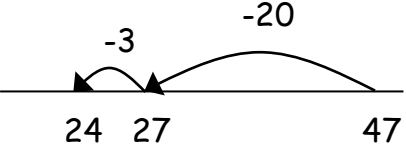


<p>Stage 6: Partitioning tens and units horizontally (KS2 or when appropriate)</p>	<p>Move on to vertical partitioning Tens and units and hundreds and tens and units.</p>	$47 + 76 = (40 + 70) + (7 + 6)$ $= 110 + 13$ $= \mathbf{123}$ <p>leading to</p>
<p>Stage 7: Partition numbers vertically in a column</p>		$47 = 40 + 7$ $+ \underline{76} = \underline{70} + 6$ $110 + 13 = 123$
<p>Stage 8: The numbers in columns adding the units first</p>		$67 + 24$ $\begin{array}{r} 67 \\ + 24 \\ \hline 11 \\ \underline{80} \\ 91 \end{array}$ $131 + 209$ $\begin{array}{r} 131 \\ + 209 \\ \hline 10 \\ 30 \\ \underline{300} \\ 340 \end{array}$

<p>Stage 9: Compact method - where numbers get carried into the next column</p>	<p>Move on to adding with decimals up to three decimal places</p>	<p>587 + 475</p> $  \begin{array}{r}  587 \\  + 475 \\  \hline  1062 \\  11  \end{array}  $ <p>3587 + 675</p> $  \begin{array}{r}  3587 \\  + 675 \\  \hline  4262 \\  111  \end{array}  $
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## Subtraction

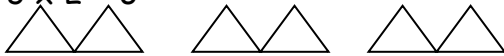
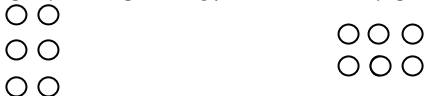

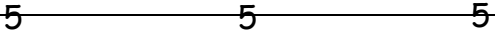
The Different Stages	Number Development	Strategy - What it Looks Like
Stage 1: Practical -	Practically get a group of objects and take some away	
Stage 2: Jottings: drawing a set of objects and then crossing some out.		$11 - 4 = 7$ 
Stage 3: count back on a number line with numbers on		$6 - 3 = 3$ 
Stage 4: Learning to count forward and back on an empty line		$47 - 23 = 24$ 

		$47 - 23 = 24$	 $47 - 23 = 24$ 
<p><b>Stage 5: Partitioned numbers are then written under one another - this is how we start to introduce the column subtraction method (KS2 or when appropriate)</b></p>		$  \begin{array}{r}  74 - 23 \\  70 + 4 \\  -20 + 3 \\  \hline  50 + 1 = 51  \end{array}  $	
<p><b>Stage 6: Expanded decomposition (2 digit numbers)</b> Leads to the shorter version of the column subtraction method. We always start with the units number</p>		$  \begin{array}{r}  74 - 27 \\  70 + 4 \\  -20 + 7 \\  \hline  \end{array}  $	$  \begin{array}{r}  60 \quad 14 \\  -70 + 4 \\  -20 + 7 \\  \hline  40 + 7 = 47  \end{array}  $

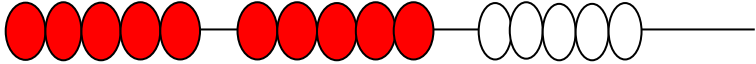
<p><b>Stage 6: Expanded decomposition (3 digit numbers)</b></p>		<p><b>741-367</b>  <math display="block">\begin{array}{r} 700 + 40 + 1 \\ - 300 + 60 + 7 \\ \hline \end{array}</math></p>	$\begin{array}{r} 600 \quad 130 \quad 11 \\ - 700 + 40 + 1 \\ - 300 + 60 + 7 \\ \hline 300 + 70 + 4 = 374 \end{array}$
<p><b>Stage 7: Compact Decomposition</b></p>		<p><b>74- 27</b></p> $\begin{array}{r} 6 \quad 14 \\ - 7 \quad 4 \\ - 2 \quad 7 \\ \hline 4 \quad 7 \end{array}$ $\begin{array}{r} 6 \quad 13 \quad 11 \\ - 7 \quad 4 \quad 1 \\ - 3 \quad 6 \quad 7 \\ \hline 3 \quad 7 \quad 4 \end{array}$ <p><b>5008-1257</b></p> $\begin{array}{r} 9 \\ 4 \quad 10 \quad 10 \\ - 5 \quad 0 \quad 0 \quad 8 \\ - 1 \quad 2 \quad 5 \quad 7 \\ \hline 3 \quad 7 \quad 5 \quad 1 \end{array}$	



## Multiplication

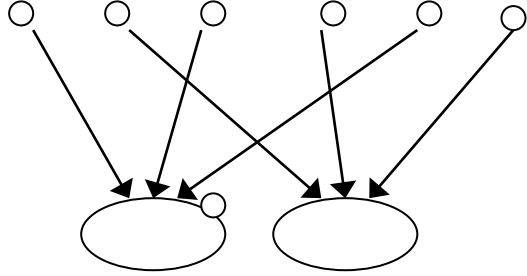
The Different Stages	Number Development	Strategy - What it Looks Like
See Mental Calculation policy section to review gaps and progression in mental times table and division facts knowledge.		
Stage 1: Counting practically in repeated groups/patterns.	Numbers up to 30	
Stage 2: Grouping using pictorial representations	2,5 10 times tables	$3 \times 2 = 6$ 
Stage 3: Arrays	2,5 10 times tables	$3 \times 2 = 6$ or $2 \times 3 = 6$ 
Stage 4: Repeated Addition 5 times 3 is $5+5+5=15$ or 3 lots of 5 or $5 \times 3$ Repeated addition can be shown easily on a number line.	All times tables $TU \times U$	$5 \times 3 = 5 + 5 + 5$  0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 and on a bead bar: $5 \times 3 = 5 + 5 + 5$ 

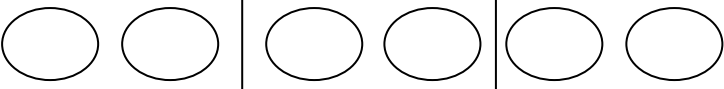
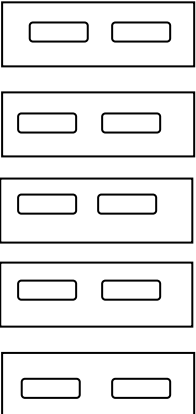
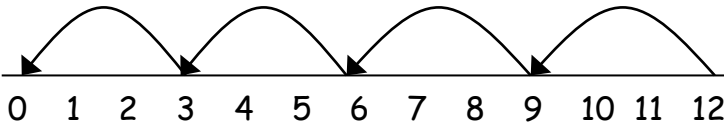


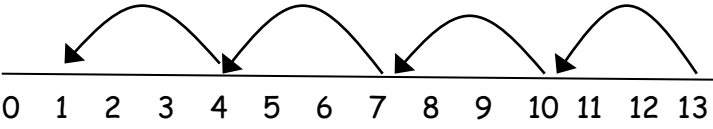
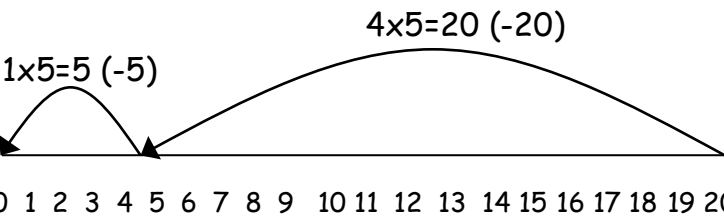
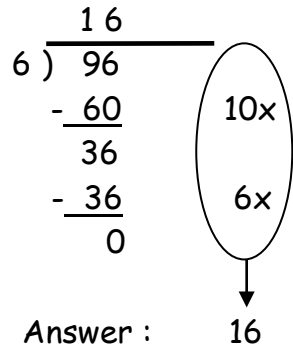
		
<p>Stage 5: Partitioning (KS2 or when appropriate)</p>	<p>TU x U HTU x U</p>	<p> <math>13 \times 5 =</math>  <math>10 \times 5 = 50</math>    <math>3 \times 5 = 15</math>  <math>50 + 15 = 65</math> </p>
<p>Stage 6: Long Multiplication. The next step is to show the method of recording in a column format but showing the working. This links to the grid method above.</p> <p>Children should describe what they do by saying the actual values of digits in the columns for example the first step in <math>38 \times 7</math> is 30 multiplied by 7 not <math>3 \times 7</math>.</p>	<p>TU x U TU x TU HTU x TU ThHTU x U</p>	<p> <math>38 \times 7 = 266</math>  <math>30 + 8</math>  <math>\begin{array}{r} X \quad 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}</math> </p> <p> <math>8 \times 7 = 56</math>  <math>30 \times 7 = 210</math> </p> <p>Leading to condensed version of long multiplication</p> <p> <math>\begin{array}{r} 38 \\ x \quad 7 \\ \hline 56 \\ 210 \\ \hline 266 \end{array}</math> </p>

		<p>56x27 is approximately 60 x 30= 1800</p> $\begin{array}{r} 56 \\ \times 27 \\ \hline 1000 \\ 120 \\ 350 \\ \hline 42 \\ \hline 1512 \\ 1 \end{array}$
<p>Stage 7: Short multiplication The step here involves adding 210 and 50 mentally with only the 5 in the tens column being recorded.</p> <p>2 digit x 2 digit and beyond. Using rounding to make an estimation prior to the calculation.</p>	<p>TU x U TU x TU HTU x TU ThHTU x U</p>	$\begin{array}{r} 38 \\ \times 7 \\ \hline 266 \\ \hline 5 \end{array}$ <p>38 x 56 is approximately 30 x 60 = 1800</p> $\begin{array}{r} 38 \\ \times 56 \\ \hline 48 \\ 180 \\ 40 \\ \hline 1500 \\ \hline 1768 \\ 1 \end{array}$

## Division

The Different Stages	Number Development	Strategy - What it Looks Like
See Mental Calculation policy section to review gaps and progression in mental times table and division facts knowledge.		
Stage 1: Children physically sharing objects	Numbers up to 30	6 sweets shared between 2 children.
Stage 2: Children will develop their understanding of division and use jottings to support calculations. (Pictorial and arrays)	2,5 10 times tables	Sharing equally 6 sweets shared between 2 people. How many do they get each 1. Pictorial division 

		<p>6 divided by 3 - 6 sweets divided between 3 people</p>  <p><math>10 \div 2 = 5</math></p> 
Stage 3: Repeated Subtraction	All times tables	<p><math>12 \div 3 = 4</math></p> 

<p>Including repeated subtraction leading to a remainder.</p>		<p><math>13 \div 3 = 4r1</math></p> 
<p>Stage 4: Repeated Subtraction, subtracting multiples of the divisor. (KS2 or when appropriate)</p>	<p>All times tables <math>TU \div U</math></p>	
<p>Stage 5: Chunking method</p>	<p><math>TU \div U</math> <math>HTU \div U</math> <math>TU \div TU</math></p>	<p><math>96 \div 6</math></p>  <p>Answer : 16</p>

		$256 \div 7 =$  $\begin{array}{r} 7 \overline{) 256} \\ \underline{70} \phantom{0} \\ 186 \\ - 140 \\ \underline{46} \\ 42 \\ \underline{4} \\ 4 \end{array}$ $10 \times 7$ $20 \times 7$ $6 \times 7$  So $10 + 20 + 6 = 36 \text{ r } 4$
Stage 5: Short Division	$TU \div U$ $HTU \div U$ $TU \div TU$ $HTU \div TU$	$560 \div 4$  $\begin{array}{r} 140 \\ 4 \overline{) 560} \end{array}$
Stage 6: Long Division	$TU \div U$ $HTU \div U$ $TU \div TU$ $HTU \div TU$	$560 \div 24$  $\begin{array}{r} 23 \\ 24 \overline{) 560} \\ \underline{480} \\ 80 \\ \underline{72} \\ 8 \end{array}$  Answer $23 \text{ r } 8$