











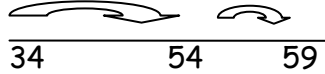
**IVY LANE SCHOOL**

**TEACHING WRITTEN CALCULATION**

**METHOD PROGRESSION**

## Ivy Lane Progression of calculation strategies - Addition


Key Learning	Level	Vocabulary	Games/activities	Teaching resources including websites
1) Find <b>one more than</b> a number (1-10) (1-20) → (1-30)	ELG 7 → N.C Level 1b	add sum and more altogether total	On the hop Ten pence pairs Build a wall Counting socks Feed the crocs Hungry snails Lines Addition slides Story numbers	Bead strings Magnetic numbers Foam numbers Threading beads Counting stick Number squares - missing numbers <a href="http://www.learnpremium">www.learnpremium</a> <a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> -Add 1 Machine
2) Combine two sets of objects practically, using cubes/counters etc.   Draw objects  +  =    Number sentence with objects drawn $3 + 2 = 5$   	ELG6 / 1C  Use number bonds - N.C. level 1a. Know facts to 20 - N.C. level 2b	One more Two more Plus How many?	Top hats Apple pips Ladybird spots Puddles Feed the crocs Add dice Find the pair Apple snap Number crunch Number slides Number lines Wheels on the bus Jack & the beanstalk Castles Trainspotters lotto Number spinners Snakes & ladders Spots Domino puzzles Fence posts Make a circle River adventure	Empty number lines Ace Monkey Mathsphere interactive Yr1 & Yr 2 calculations ITP Number facts ITP Numberline <a href="http://www.learnpremium">www.learnpremium</a> <a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> -Yr1 2 more than -pairs of numbers -passengers on the bus
3) Put larger number in your head and count on (know addition can be done in any order)	N.C. Level 2a	How many more is? Increase Single digit	Overtake Planet race Hot air balloons Stepping stones	Mathshere Up the garden path ITP Counting on and back ITP number facts <a href="http://www.learnpremium">www.learnpremium</a>


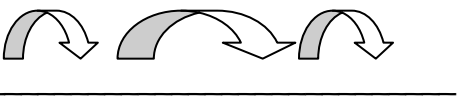
<p>4+7=11 7 goes in my head 8,9,10,11. 7+4=11 as above. To add 3 single digit numbers 4+6+5= To know number bonds to 20</p>		tens count on	<p>Underground game Add dice 10 pin bowling Totals Covers Making 10 Up the garden Dragon totals First to castle Clear the board On the hop Nasty twos</p>	<p><a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> - add 3 small numbers - simple addition - no. bonds to 20</p>
<p>4) Find 10 more than a number (0-30) up to (1-100)</p>	N.C. Level 2b (Place value objective)	double	<p>Honeybears Flowers</p>	<p>ITP Counting on and back in ones and tens <a href="http://www.learnpremium">www.learnpremium</a> <a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> - add 10 machine</p>
<p>5) Jump along empty number lines. 34+25=59</p> 	N.C. levels 1-3 (1-10=L1; 10-20=L2 20-100's=L3)	number line smallest largest	<p>River adventure Spin to win Number lines</p>	<p>ITP Counting on and back in ones and tens <a href="http://www.learnpremium">www.learnpremium</a></p>

<p>6) Partition a two digit number into tens and units to add.</p> <p>23+46= 23+46= 20+40=60 60+9= 3+6=9 69 60+9=69</p> <p>Extend to partitioning 2 and 3 digit numbers</p> <p>47 = 40 + 7 +76     <u>70 + 6</u> 110 + 13 = 123</p>	<p>N.C. level 2a (2 digit)</p> <p>N.C. level 3c (3 digit)</p>	<p>Partition Hundreds Tens Units</p> <p>Two digit Three digit</p>		<p>Digit cards <a href="http://www.learnpremium">www.learnpremium</a> <a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> - add 2 digits no. game</p>
<p><b>(mentally only)</b> Add the most significant digit first</p> <p>76 + 31 <u>100 + 7 = 107</u></p>	<p>N.C. level 3c</p>	<p>Mental method</p>		<p><a href="http://www.learnpremium">www.learnpremium</a> <a href="http://www.coxhoe.durham.sch">www.coxhoe.durham.sch</a> -addition pyramid <a href="http://www.woodlandsjunior.kent.sch.uk/maths/numberskills">www.woodlandsjunior.kent.sch.uk/maths/numberskills</a> number bonds to 1000</p>
<p>7) Expanded method in columns Add the <b>least</b> significant digit first</p> <p>347 +<u>215</u> 12 50 <u>500</u> <u>562</u></p>	<p>N.C. level 3b</p>	<p>written method</p>		<p><a href="http://www.learnpremium">www.learnpremium</a></p>

8) Standard column method $\begin{array}{r} 347 \\ +265 \\ \hline 612 \\ 11 \end{array}$ Initially, no carrying, then crossing to 10-100-1000 etc	N.C. level 3A          N.C. level 4C	Row Column Carrying		<a href="http://www.learnpremium">www.learnpremium</a>
9) Extend method to include decimal numbers (initially 1 decimal place then 2 in context of money	N.C. level 4A	Decimal point zero		ITP Decimal Number line <a href="http://www.learnpremium">www.learnpremium</a>

## Ivy Lane School Progression of calculation strategies - Subtraction

Key Learning	Level	Vocabulary	Games/activities	Teaching resources including websites
Counting backwards		Less Take away How many are left?		ITP Numberline
1) Practical taking away from a set of objects. Draw objects and cross out number taken away.	FS5 NC Level 1C	How many fewer is .... than..? Difference Subtract Minus How much less is?	On the hop Hungry snails Coin collector Hats away Win an egg	<a href="http://www.learnpremium.co.uk">www.learnpremium.co.uk</a> Numeracy box Ace Monkey Mathsphere calculations Yr 1 & 2
2) Find one less than a number (1-10)(1-20)(1-30)				<a href="http://www.coxhoe.urham.sch.uk">www.coxhoe.urham.sch.uk</a> subtract 1 machine
3) Number sentence with objects drawn.  $5 - 3 = 2$ 	FS7 1B		Top six Number spinners Snakes & ladders Story numbers Bicycle game	<a href="http://www.coxhoe.urham.sch.uk">www.coxhoe.urham.sch.uk</a> KS1 how many were taken away
4) Number sentence with no objects	1B			<a href="http://www.coxhoe.urham.sch.uk">www.coxhoe.urham.sch.uk</a> subtraction machine
5) Put larger number in your head and count on/back. 11-4=7      11 in my head, 10, 9, 8, 7,  Or begin at 7 and count on to reach 11.	1A/2C Use progression sheet for numbers (counting)		Difference Give the dog a bone Win an egg Go back Splash (6) Jack & the beanstalk(6) Cat & mouse (6) Capture & the satellites(6)	Mathsphere calculations Yr 1 & 2 ITP Counting on & back ITP Numberline

<p>6) Find 10 less than a number (0-30) (0 - 100)</p>	<p>2B (place value)</p>	<p>Place value Less than Tens Hundreds Count back Difference between</p>	<p>Lighthouse (6)</p>	<p><a href="http://www.coxhoe.urham.sch.uk">www.coxhoe.urham.sch.uk</a> subtracting 10 ITP number grid</p>
<p>7) Subtract multiples of 10 <math>80 - 30 = 50</math></p> <p>80 goes in my head, 70, 60, 50.</p>	<p>3C</p>			
<p>8) Count <b>back</b> <math>74 - 27 = 47</math></p> <p style="text-align: center;"> <math>\begin{array}{r} -3 \qquad -40 \qquad -4 \\ 27 \qquad 30 \qquad 70 \qquad 74 \end{array}</math> </p> 	<p>Numbers dictate level 1-10 NC1 10-20 NC2 20-100s NC3 100s &amp; 1000s NC4</p>	<p>Largest Smallest</p>	<p>Clear the board (6)</p>	<p><a href="http://www.coxhoe.urham.sch.uk">www.coxhoe.urham.sch.uk</a> subtract counting on(ppt) finding the difference by counting on Mathsphere calculations</p>
<p>9) Count <b>on</b> from the smallest number to the largest, (find the difference)</p> <p><math>52 - 38 = 14</math></p> <p style="text-align: center;"> <math>\begin{array}{r} +2 \qquad +10 \qquad +2 \\ 38 \qquad 40 \qquad 50 \qquad 52 \end{array}</math> </p> 				

<p>10) Subtract (using partitioning) with no exchanging</p> $\begin{array}{r} 70 + 4 \\ - 30 + 1 \\ \hline 40 + 3 = 43 \end{array}$	<p>NC3C</p> <p>Must be taught before decomposition &amp; then alongside</p>	<p>Partition Tens Units Hundreds</p>		
<p>11) Subtract (using partitioning) with exchanging</p> $\begin{array}{r} 74 \quad 70 + 4 \quad 60 + 14 + 4 \\ - 27 \quad 20 + 7 \quad \underline{20 + 7} \\ \quad \quad \quad 40 + 7 = 47 \end{array}$ <p>Always use alongside empty no. line Extend to 3 digit numbers</p>				
<p>12) Standard column method with exchanging</p> $\begin{array}{r} 17 \ 8 \ 3 \\ \quad 3 \ 7 \ - \\ \hline 1 \ 4 \ 6 \end{array}$ <p>Initially, only exchanging across 10's boundary then crossing over 100's boundary, then more than one boundary.</p>	<p>NC 3A</p> <p>More than one boundary NC 4C/4B</p>			
<p>13) Extend written method to include decimals with 1 &amp; then 2 decimal places (in context of money)</p>	<p>NC 4A</p>			



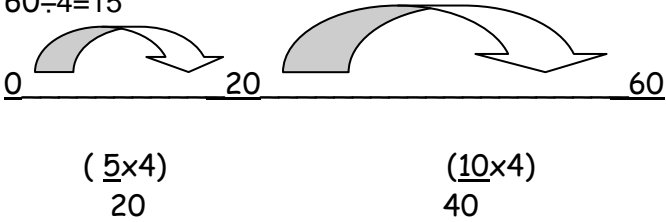
## Ivy Lane progression of calculation strategies - Multiplication

Key Learning	Level	Vocabulary	Games/activities	Teaching resources including websites
1) Counting in 2s, 5s, 10s Finding doubles of numbers from 1-10 Repeated addition of numbers	1c 1c 1a	Add Double Count Pattern	All in order Snake tables Sea horses Doubles game Set for take off	<a href="http://www.coxhoe.durham.sch.uk">www.coxhoe.durham.sch.uk</a> TRAIN table facts
2) Multiplication as groups of and sets of 4x3 4 groups of 3= OOO OOO OOO OOO	2c	Groups of Multiply Multiplied by Lots of Times	Number spinners Multiply horses	
3) Multiplication as an array 4x3= 4 rows of 3= X X X X X X X X X X X X MULTIPLICATION TABLES 2, 5 & 10 known by the end of Year 2	2b	Product array		<a href="http://www.coxhoe.durham.sch.uk">www.coxhoe.durham.sch.uk</a> TRAIN Introduce arrays

<p>4) Use knowledge of number facts e.g. times tables <math>\times 4</math> is the same as double and then double again</p>	<p>2b - 3c (depending on numbers)</p>	<p>Inverse</p>	<p>Back to back Bingo Perfect times CD</p>	<p><a href="http://www.whizz.com/kids/numeracy/rapidrecall/year3">www.whizz.com/kids/numeracy/rapidrecall/year3</a></p>
<p>5) Informal recording using partitioning <math>43 \times 6 = (40 \times 6) + (3 \times 6)</math> <math>= 240 + 18 = 258</math> MULTIPLICATION TABLES 2, 5 &amp; 10 known by the end of Year 2</p>				
<p>6) Grid method (2-digit number <math>\times</math> 1 digit number) <math>21 \times 3 =</math>   <math display="block">\begin{array}{r} X \quad 3 \\ 20 \ 60 \\ 1 \ 3 \\ \hline \end{array}</math> <math>\rightarrow 60 + 3 = 63</math>          MULTIPLICATION TABLES 2, 5 &amp; 10 known by the end of Year 2</p>	<p>3c</p>	<p>grid method tens units partition</p>		<p>ITP multigrid</p>
<p>7) Grid method (2-digit number <math>\times</math> 2 digit number) <math>21 \times 74 =</math>   <math display="block">\begin{array}{r} X \quad 20 \quad 1 \\ 70 \ 1400 \ 70 \\ 4 \quad 80 \ 4 \\ \hline \end{array}</math> <math>\rightarrow 1400 + 70 = 1470</math>  <math>\rightarrow 80 + 4 = 84</math>   <math>1470 + 84 = 1554</math></p>	<p>3c</p>			

8)Short multiplication (partition then add) 346 $\begin{array}{r} \text{X } 9 \\ \hline 54 \text{ (9X6)} \\ 360 \text{ (9x40)} \\ \hline 2700 \text{ (9x300)} \\ \hline 3114 \end{array}$	4 <b>For more able pupils only</b>			
9)Extend grid or short method to 3-digit numbers and then decimals	4/5			

## Ivy Lane progression of calculation strategies - Division

Key Learning	Level	Vocabulary	Games/activities	Teaching resources including websites
1) Practical sharing through play Halving	1	sharing grouping		Multilink counters
2) Division as sharing into equal groups $12 \div 4 = 3$ 12 shared into 4 equal groups gives 3 in each group □□□ □□□ □□□ □□□	2c	One each Two each Halve Divide Left over Equal groups of	Oranges and lemons Feeding time Division game Salad game Abacus 5 N10 Number spinners	<a href="http://www.coxhoe.durham.sch.uk">www.coxhoe.durham.sch.uk</a> ambleweb division machine I
3) Division as drouping (putting objects into equal groups) $12 \div 4 = 3$ If 12 is split into groups of 4, there are 3 groups.	2b			<a href="http://www.whizz.com/kids">www.whizz.com/kids</a> numeracy rapid recall Yr2 <a href="http://www.sums.so.uk/playground">www.sums.so.uk/playground</a>
4) Use knowledge of multiplication tables. $20 \div 5 = 4$ 5, 10, 15, 20, - there are 4 5's in 20.	3c	Inverse operation multiply		<a href="http://www.coxhoe.durham.sch.uk">www.coxhoe.durham.sch.uk</a> ambleweb division level 2 Mathsphere Yr 4 multiply & divide by 10/100/1000
5) Chunking on a vertical or horizontal number line. $60 \div 4 = 15$ 	3a	Chunking remainders		ITP grouping with remainders

6)Extend to include decimals and two-digit numbers numbers	4 For more able pupils only - as recommended by County			
7) Bus shelter method to top ability Year 6 pupils only	5 For more able pupils only - as recommended by County			