



Geoffrey Field Junior School Progression in Calculation Policy – Overview

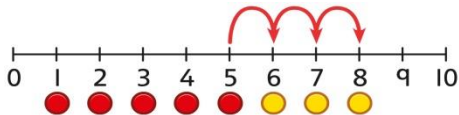
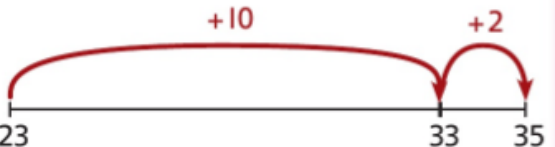
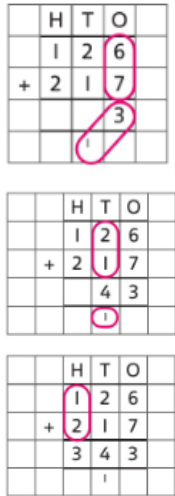
Addition, Subtraction, Multiplication and Division

Date: May 2023

- 1) Progression for addition Years 1 to 6
- 2) Progression for subtraction Years 1 to 6
- 3) Progression for multiplication Years 1 to 6
- 4) Progression for division Years 1 to 6
- 5) National Curriculum Objectives Addition and Subtraction calculations
- 6) National Curriculum Objectives Addition and Subtraction calculations

Progression for Addition Year 1 to 6

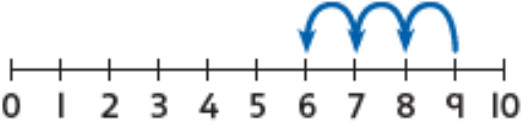
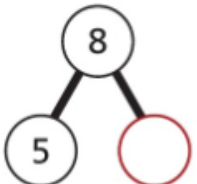
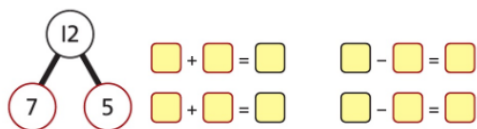
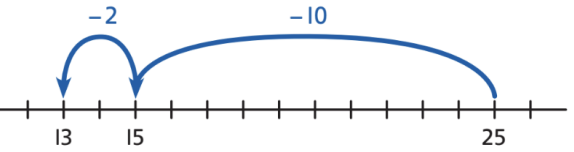
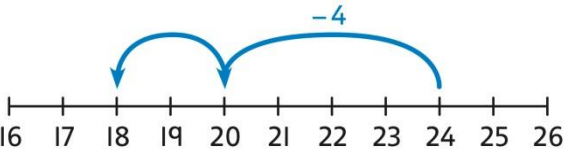
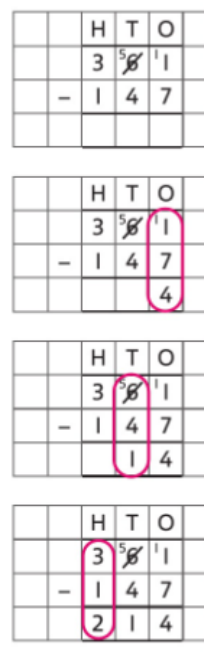
- PLEASE NOTE THIS PROGRESSION DOCUMENT SHOWS THE END POINT FOR EACH YEAR GROUP ONLY. The smaller steps, prior to this end point, must be taught and are found in the detailed progression document behind with CPA progressions for each step.

Year 1 end point	Year 2 end point	Year 3 end point
Add numbers by counting on (including crossing 10) using a number line or number tracks to support  $5 + 3 = 8$	Add on from a 2-digit number by adding 10s then 1s (counting on).  $23 + 12 = 23 + 10 + 2$ Add two 2 digit numbers by adding the 10s and 1s separately (partitioning). $32 + 11$ $30 + 10 = 40$ $2 + 1 = 3$ $40 + 3 = 43$	Use column addition with exchange for two 3 digit numbers, ensuring understanding of place value at every stage of the calculation.  $126 + 217 = 343$ <i>Note: Children should also study examples where exchange is required in more than one column, for example $185 + 318 = ?$</i>

Year 4 end point	Year 5 end point	Year 6 end point																																																																																																																																																						
Use a column method to add two 4 digit numbers, including exchanges. <table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>5</td><td>5</td><td>4</td></tr><tr><td>+</td><td>4</td><td>2</td><td>3</td><td>7</td></tr><tr><td></td><td></td><td></td><td></td><td>1</td></tr></table><table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>5</td><td>5</td><td>4</td></tr><tr><td>+</td><td>4</td><td>2</td><td>3</td><td>7</td></tr><tr><td></td><td></td><td></td><td>9</td><td>1</td></tr></table><table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>5</td><td>5</td><td>4</td></tr><tr><td>+</td><td>4</td><td>2</td><td>3</td><td>7</td></tr><tr><td></td><td></td><td>7</td><td>9</td><td>1</td></tr></table><table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>5</td><td>5</td><td>4</td></tr><tr><td>+</td><td>4</td><td>2</td><td>3</td><td>7</td></tr><tr><td></td><td>5</td><td>7</td><td>9</td><td>1</td></tr></table> Note: children should be able to calculate sums where there is exchange in more than one column. They should also be able to add 4 digit and 3 or 2 digits ensuring calculations are lined up correctly.		Th	H	T	O		1	5	5	4	+	4	2	3	7					1		Th	H	T	O		1	5	5	4	+	4	2	3	7				9	1		Th	H	T	O		1	5	5	4	+	4	2	3	7			7	9	1		Th	H	T	O		1	5	5	4	+	4	2	3	7		5	7	9	1	Use column addition for larger numbers, including exchanges and including sums where numbers need to be lined up accurately e.g. 5 digit + 3 digit. <table><tr><td></td><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>9</td><td>1</td><td>7</td><td>5</td></tr><tr><td>+</td><td>1</td><td>8</td><td>4</td><td>1</td><td>7</td></tr><tr><td></td><td>3</td><td>7</td><td>5</td><td>9</td><td>2</td></tr></table> Add using a column method for adding decimals, ensuring that children understand the link with place value. <table><tr><td>O · Tth Hth</td></tr><tr><td>0 · 2 3</td></tr><tr><td>+</td></tr><tr><td>0 · 4 5</td></tr><tr><td>0 · 6 8</td></tr></table> Include exchange where required, alongside an understanding of place value. <table><tr><td>O · Tth Hth</td></tr><tr><td>0 · 9 2</td></tr><tr><td>+</td></tr><tr><td>0 · 3 3</td></tr><tr><td>1 · 2 5</td></tr></table> Include additions where the numbers of decimal places are different. 3.4 + 0.65 = ? <table><tr><td>O · Tth Hth</td></tr><tr><td>3 · 4 0</td></tr><tr><td>+</td></tr><tr><td>0 · 6 5</td></tr></table>		TTh	Th	H	T	O		1	9	1	7	5	+	1	8	4	1	7		3	7	5	9	2	O · Tth Hth	0 · 2 3	+	0 · 4 5	0 · 6 8	O · Tth Hth	0 · 9 2	+	0 · 3 3	1 · 2 5	O · Tth Hth	3 · 4 0	+	0 · 6 5	Use column addition where mental methods are not efficient for increasingly larger numbers. Recognise common errors with column addition. 32,145 + 4,302 = ? <table><tr><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td>3</td><td>2</td><td>1</td><td>4</td><td>5</td></tr><tr><td>+</td><td>4</td><td>3</td><td>0</td><td>2</td></tr><tr><td>3</td><td>6</td><td>4</td><td>4</td><td>7</td></tr></table> Column methods are also used for decimal additions where mental methods are not efficient. <table><tr><td>H</td><td>T</td><td>O · Tth Hth</td></tr><tr><td>1</td><td>4</td><td>0 · 0 9</td></tr><tr><td>+</td><td>4</td><td>9 · 8 9</td></tr><tr><td>1</td><td>8</td><td>9 · 9 8</td></tr></table>	TTh	Th	H	T	O	3	2	1	4	5	+	4	3	0	2	3	6	4	4	7	H	T	O · Tth Hth	1	4	0 · 0 9	+	4	9 · 8 9	1	8	9 · 9 8
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Progression for Subtraction Year 1 to 6

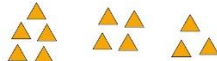
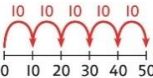
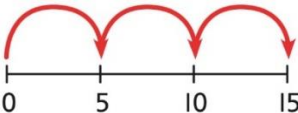
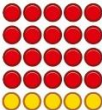
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Counting Back Children count back to take away and use a number line or number track to support the method.  $9 - 3 = 6$ Part Whole Model Children use a part-whole model to support the subtraction to find a missing part.  $8 - 5 = ?$ Children develop an understanding of the relationship between addition and subtraction facts in a part-whole model. 	Counting Back Subtract 10s then 1s with a number line for visual support.  $25 - 10 - 2 = 13$ $25 - 12 = 13$ Bridging Bridge 10 by using known bonds.  $24 - 6 = ?$ $24 - 4 - 2 = ?$	Use column subtraction with exchange for three digit numbers, ensuring understanding of place value at every stage of the calculation.  If the subtraction is a 3-digit number subtract a 2-digit number, children should understand how the recording relates to the place value, and so how to line up the digits correctly. Children should also understand how to exchange in calculations where there is a zero in the 10s column.

Year 4 end point	Year 5 end point	Year 6 end point																																																																																																																																																																		
Use a column method to subtract two 4 digit numbers, including exchanges. 31 4357 − 2735 1622 Make exchanges across more than one column where there is a zero as a place holder. 2,502 − 243 = ? <table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>2</td><td>5</td><td>0</td><td>2</td></tr><tr><td>−</td><td></td><td>2</td><td>4</td><td>3</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> <table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>2</td><td>5</td><td>0</td><td>2</td></tr><tr><td>−</td><td></td><td>2</td><td>4</td><td>3</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table> <table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>2</td><td>5</td><td>0</td><td>2</td></tr><tr><td>−</td><td></td><td>2</td><td>4</td><td>3</td></tr><tr><td></td><td>2</td><td>2</td><td>5</td><td>9</td></tr></table>		Th	H	T	O		2	5	0	2	−		2	4	3							Th	H	T	O		2	5	0	2	−		2	4	3							Th	H	T	O		2	5	0	2	−		2	4	3		2	2	5	9	Use column subtraction for larger numbers, including exchanges and including sums where numbers need to be lined up accurately e.g. 5 digit - 3 digit. <table><tr><td></td><td>TTh</td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>5</td><td>2</td><td>5</td><td>9</td><td>7</td></tr><tr><td>−</td><td>1</td><td>8</td><td>0</td><td>3</td><td>4</td></tr><tr><td></td><td>4</td><td>4</td><td>5</td><td>6</td><td>3</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table> 62,597 − 18,034 = 44,563 Use column subtraction, with an understanding of place value, including subtracting numbers with up to 3 decimal places. 3.921 − 3.75 = ? <table><tr><td></td><td>O</td><td>·</td><td>Tth</td><td>Hth</td><td>Thth</td></tr><tr><td></td><td>3</td><td>·</td><td>9</td><td>2</td><td>1</td></tr><tr><td>−</td><td>3</td><td>·</td><td>7</td><td>5</td><td>0</td></tr><tr><td></td><td></td><td></td><td></td><td></td><td></td></tr></table>		TTh	Th	H	T	O		5	2	5	9	7	−	1	8	0	3	4		4	4	5	6	3								O	·	Tth	Hth	Thth		3	·	9	2	1	−	3	·	7	5	0							Compare and select methods. Use column subtraction when mental methods are not efficient. Use two different methods for one calculation as a checking strategy. <table><tr><td></td><td>Th</td><td>H</td><td>T</td><td>O</td></tr><tr><td></td><td>1</td><td>8</td><td>14</td><td>2</td></tr><tr><td>−</td><td>1</td><td>5</td><td>5</td><td>8</td></tr><tr><td></td><td>3</td><td>9</td><td>4</td><td></td></tr></table> + 6 − 400 Use column subtraction for decimal problems, which needs an understanding of place value to align the columns correctly. 309.6 − 206.40 <table><tr><td></td><td>H</td><td>T</td><td>O</td><td>·</td><td>Tth</td><td>Hth</td></tr><tr><td></td><td>3</td><td>0</td><td>9</td><td>·</td><td>6</td><td>0</td></tr><tr><td>−</td><td>2</td><td>0</td><td>6</td><td>·</td><td>4</td><td>0</td></tr><tr><td></td><td>1</td><td>0</td><td>3</td><td>·</td><td>2</td><td>0</td></tr></table>		Th	H	T	O		1	8	14	2	−	1	5	5	8		3	9	4			H	T	O	·	Tth	Hth		3	0	9	·	6	0	−	2	0	6	·	4	0		1	0	3	·	2	0
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Progression for multiplication Year 1 to 6

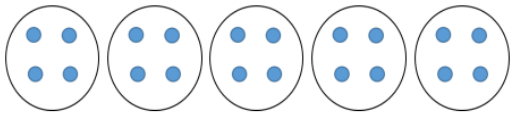
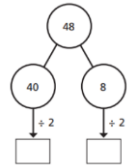
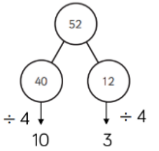
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Recognising and making equal groups Children draw and represent equal and unequal groups. A  B  Describe equal groups using words Three equal groups of 4. Four equal groups of 3. Finding the total of equal groups by counting in 2s, 5s and 10s  	Learning $\times 2$, $\times 5$ and $\times 10$ table facts Equal groups and repeated addition   $5 + 5 + 5 = 15$ $3 \times 5 = 15$ Using arrays to represent multiplication and support understanding  4 groups of 5 ... 5 groups of 5 Understanding commutativity  $4 + 4 + 4 + 4 + 4 = 20$ $5 + 5 + 5 + 5 = 20$ $4 \times 5 = 20$ and $5 \times 4 = 20$	Multiplying a 2-digit number by a 1-digit number, expanded column method Children may write calculations in expanded column form, but must understand the link with place value and exchange. Children are encouraged to write the expanded parts of the calculation separately. <table><tr><th>T</th><th>O</th></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr><tr><td></td><td></td></tr></table><table><tr><td>$\times$</td><td>6</td><td></td></tr><tr><td>15</td><td></td><td></td></tr><tr><td colspan="3"> </td></tr><tr><td>$+$</td><td></td><td></td></tr><tr><td colspan="3"> </td></tr></table> 6×5 6×10 $5 \times 28 = ?$ <table><tr><th>T</th><th>O</th></tr><tr><td>28</td><td></td></tr><tr><td>$\times 5$</td><td></td></tr><tr><td colspan="2"> </td></tr><tr><td>40</td><td>5×8</td></tr><tr><td>100</td><td>5×20</td></tr><tr><td colspan="2"> </td></tr><tr><td>140</td><td></td></tr></table>	T	O													$\times$	6		15						$+$						T	O	28		$\times 5$				40	5×8	100	5×20			140	
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Year 4 end point	Year 5 end point	Year 6 end point																																								
Use the formal column method for up to 3-digit numbers multiplied by a single digit. 312 × 3 936 23 × 5 115 23 × 5 115 Understand how the expanded column method is related to the formal column method and understand how any exchanges are related to place value at each stage of the calculation.	Multiplying 2-digit numbers by 2-digit numbers Use an area model and add the parts. $28 \times 15 = ?$ 20 m 8 m 10 m 5 m $20 \times 10 = 200 \text{ m}^2$ $8 \times 10 = 80 \text{ m}^2$ $20 \times 5 = 100 \text{ m}^2$ $8 \times 5 = 40 \text{ m}^2$ H T O 2 0 0 1 0 0 8 0 4 0 4 2 0 $28 \times 15 = 420$ Use column multiplication, ensuring understanding of place value at each stage. 34 × 27 238 680 918 34 × 7 34 × 20 34 × 27 Multiplying up to 4-digits by 2-digits 1274 × 32 2548 38212 40768 1,274 × 2 1,274 × 30 1,274 × 32	Use compact column multiplication with understanding of place value at all stages. <table><thead><tr><th>TTh</th><th>Th</th><th>H</th><th>T</th><th>O</th></tr></thead><tbody><tr><td></td><td>2</td><td>7</td><td>3</td><td>9</td></tr><tr><td>×</td><td></td><td></td><td>2</td><td>8</td></tr><tr><td>2</td><td>1</td><td>9</td><td>1</td><td>2</td></tr><tr><td>2</td><td>5</td><td>3</td><td>7</td><td></td></tr><tr><td>1</td><td>5</td><td>4</td><td>7</td><td>8</td></tr><tr><td></td><td>1</td><td>6</td><td>6</td><td>9</td></tr><tr><td></td><td></td><td></td><td></td><td>2</td></tr></tbody></table>	TTh	Th	H	T	O		2	7	3	9	×			2	8	2	1	9	1	2	2	5	3	7		1	5	4	7	8		1	6	6	9					2
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Progression for Division Year 1 to 6

- PLEASE NOTE THIS PROGRESSION DOCUMENT SHOWS THE END POINT FOR EACH YEAR GROUP ONLY. The smaller steps, prior to this end point, must be taught and are found in the detailed progression document behind with CPA progressions for each step.

Year 1 end point	Year 2 end point	Year 3 end point
Children solve problems by sharing amounts into equal groups (sharing). NB. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. 	Calculate divisions within the multiplication tables and write them using the division ($\div$) and equals ($=$) signs (sharing and grouping) $20 \div 5 = 4$	Calculate divisions within the multiplication tables and write them using the division ($\div$) and equals ($=$) signs (sharing and grouping) $24 \div 4 = 6$ 2-digit number divided by 1-digit number, no remainders (using times tables they know) (sharing) Children partition a number into 10s and 1s to divide (sharing no exchange) $48 \div 2 =$  $40 \div 2 = 20$ $8 \div 2 = 4$ $68 \div 2 = 24$ Children partition a number into 10s and 1s to divide (sharing with exchange) $52 \div 4 =$  $40 \div 4 = 10$ $12 \div 4 = 3$ $52 \div 4 = 13$

Addition & subtraction: Calculations

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
add and subtract one-digit and two-digit numbers to 20, including zero	- add and subtract numbers using concrete objects, pictorial representations, and mentally, including: - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers	- add and subtract numbers mentally, including: - a three-digit number and ones - a three-digit number and tens - a three-digit number and hundreds - add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate	- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) - add and subtract numbers mentally with increasingly large numbers	- perform mental calculations, including with mixed operations and large numbers - use their knowledge of the order of operations to carry out calculations involving the four operations

Multiplication & division: Calculations

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication ($\times$), division ($\div$) and equals (=) signs	write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	multiply two-digit and three-digit numbers by a one-digit number using formal written layout	- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers - multiply and divide numbers mentally drawing upon known facts - divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context - multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication - divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context - divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context - perform mental calculations, including with mixed operations and large numbers