












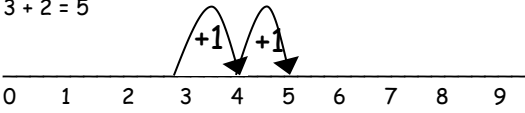
Calculation Methods

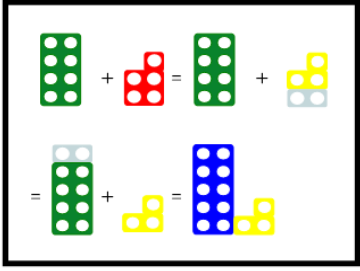

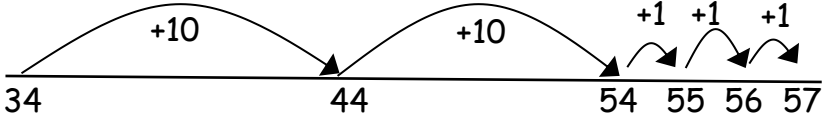
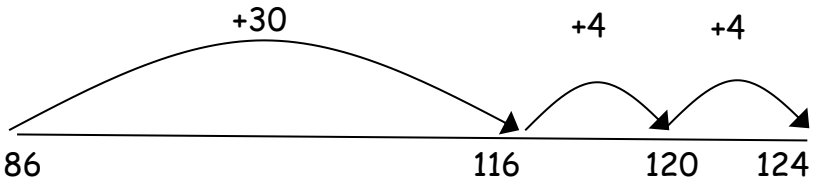





PROGRESSION THROUGH CALCULATIONS FOR ADDITION

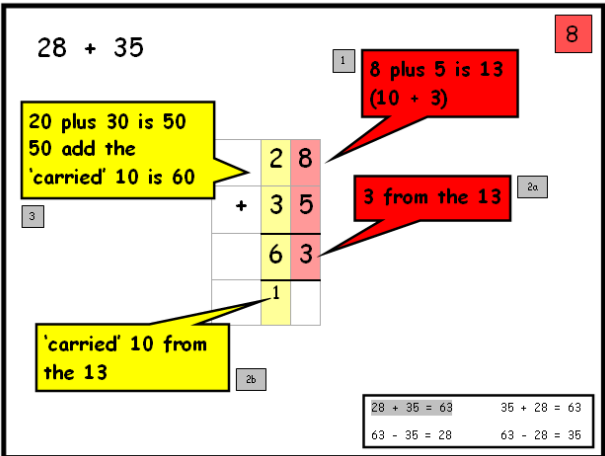
- Progression Step 1 - 3-5 years*
- Progression Step 2 - 6-8 years*
- Progression Step 3 - 9-11 years*
- Progression Step 4 - 11+ years*

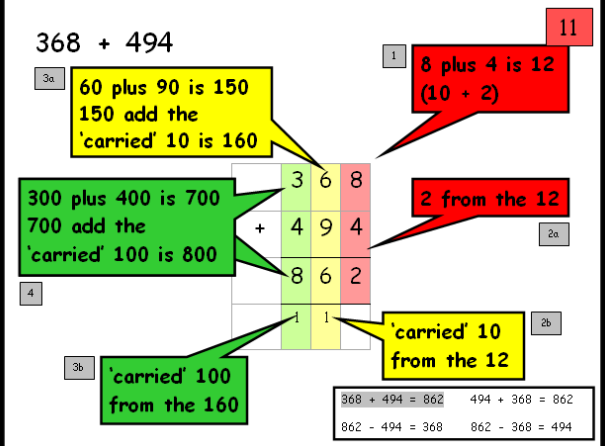
Addition Steps					
<p>Progression Step 1</p>	<p>Pupils are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, Numicon etc.</p> <div style="text-align: center; margin: 20px 0;">  </div> <p>(Scan the QR code to see a pupil demonstrating)</p>				
	<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: center;"><u>Make 6</u></p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  2 and 4 </div> <div style="text-align: center;">  3 and 3 </div> <div style="text-align: center;">  4 and 2 </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 10px;"> <div style="text-align: center;">  0 and 6 </div> <div style="text-align: center;">  1 and 5 </div> <div style="text-align: center;">  5 and 1 </div> </div> </div> <div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p style="text-align: right; color: red; font-weight: bold; font-size: small;">1</p> <p>5 + 3 =</p> <div style="display: flex; align-items: center; justify-content: center; gap: 10px;"> <div style="text-align: center;">  5 </div> <div>+</div> <div style="text-align: center;">  3 </div> <div>=</div> <div style="text-align: center;">  8 </div> <div>=</div> <div style="text-align: center;">  8 </div> </div> <p style="text-align: center; margin-top: 5px;">5 + 3 = (5 + 3) = 8</p> <table border="1" style="margin-left: auto; margin-right: auto; font-size: x-small;"> <tr> <td>5 + 3 = 8</td> <td>3 + 5 = 8</td> </tr> <tr> <td>8 - 3 = 5</td> <td>8 - 5 = 3</td> </tr> </table> </div>	5 + 3 = 8	3 + 5 = 8	8 - 3 = 5	8 - 5 = 3
5 + 3 = 8	3 + 5 = 8				
8 - 3 = 5	8 - 5 = 3				
	<p>3 + 2 = 5</p> <div style="text-align: center; margin: 10px 0;">  </div>				

	<p>8+5=13 First, add 2 to make 10 and then add 3 to make 13.</p>	
<p>Use a number line or a hundred square to count onwards in tens and units.</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	<p>34+23=57</p> 	
	<p>When adding 9 to a number, add 10 and take 1 away.</p>	<p>5+9= 5+10=15 -1 =14</p>
	<p>Recall number bonds to 20 in your head.</p>	<p>8+2=10 18+2=20</p>
<p>Progression Step 2</p>	<p>Partition tens and units</p>	<p>56= 50+6</p>
	<p>Count on from the largest number irrespective of the order of the calculation.</p>	<p>38 + 86 = 124</p> 

	<p>Partition tens and units</p>	<p>37+15</p> <p>Add the tens 30+10=40 Add the units 7+5=12 Add the tens and units 40+12=52</p>
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	<p><u>Column Addition</u></p> <p>Ensure understanding of place value. Start with adding the units.</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	$\begin{array}{r} 46 \\ +23 \\ \hline 89 \end{array}$
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	<p>Once the previous method is understood, start adding from the units column and carry over if needed.</p>	 <p>28 + 35</p> <p>8 plus 5 is 13 (10 + 3)</p> <p>3 from the 13</p> <p>20 plus 30 is 50 50 add the 'carried' 10 is 60</p> <p>'carried' 10 from the 13</p> <p>28 + 35 = 63 35 + 28 = 63 63 - 35 = 28 63 - 28 = 35</p>
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	<p>Extend the 'carrying' method to numbers with more digits.</p>	 <p>368 + 494</p> <p>8 plus 4 is 12 (10 + 2)</p> <p>2 from the 12</p> <p>60 plus 90 is 150 150 add the 'carried' 10 is 160</p> <p>300 plus 400 is 700 700 add the 'carried' 100 is 800</p> <p>'carried' 100 from the 160</p> <p>'carried' 10 from the 12</p> <p>368 + 494 = 862 494 + 368 = 862 862 - 494 = 368 862 - 368 = 494</p>
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<p>Pupils should extend the 'carrying' method to number with any number of digits.</p>	$\begin{array}{r} 7648 \\ +1486 \\ \hline 9134 \\ 111 \end{array}$ $\begin{array}{r} 6584 \\ +5848 \\ \hline 12432 \\ 111 \end{array}$ $\begin{array}{r} 42 \\ 6432 \\ 786 \\ 3 \\ + 4681 \\ \hline 11944 \\ 121 \end{array}$
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Progression Step 3

Decimal addition
Always line up the decimal point when setting out the sum.



(Scan the QR code to see a pupil demonstrating)

5.6 + 2.8

14

1	0.6 plus 0.8 is 1.4
3	5 plus 2 is 7. 7 plus the 'carried' 1 is 8
2a	0.4 from the 1.4
2b	'carried' 1 from the 1.4

$5.6 + 2.8 = 8.4$	$2.8 + 5.6 = 8.4$
$8.4 - 2.8 = 5.6$	$8.4 - 5.6 = 2.8$




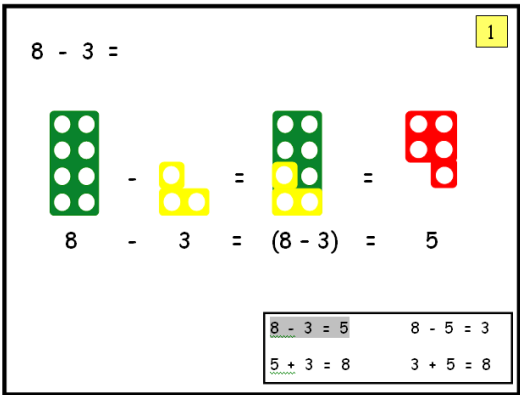
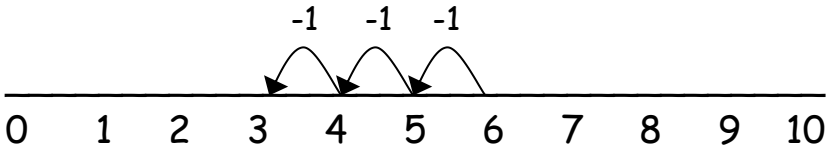
PROGRESSION THROUGH CALCULATIONS FOR SUBTRATION

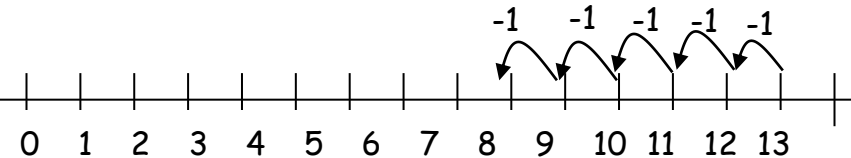
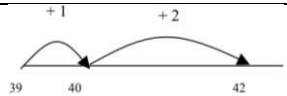
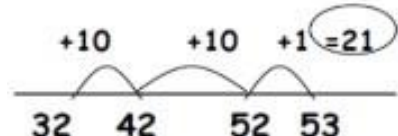

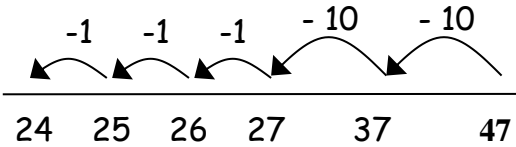
Progression Step 1 - 3-5 years

Progression Step 2 - 6-8 years

Progression Step 3 - 9-11 years

Progression Step 4 - 11+ years

Subtraction Steps	
<p>Progression Step 1</p> <p>Pupils are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures, Numicon etc.</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	
<p>Use a numberline to 10 to count back one by one.</p>	<p>$6 - 3 = 3$</p> 

	<p>Count back on a number line or hundred square to count back over 10 13-5</p>	<p>$13 - 5 = 8$</p> 
	<p>When subtracting 9 from a number, subtract 10 then add 1.</p>	<p>$23 - 9 =$</p> <p>$23 - 10 = 13$</p> <p>$+ 1$</p> <p>$= 14$</p>
	<p>Use a number line or 100 square to count forwards to discover the difference.</p>	 <p>$42 - 39 = 3$</p>
	<p>Count forwards in jumps of 10 and jumps of 1.</p>	<p>$53 - 32 =$</p> 
<p>Progression Step 2</p>	<p>Discover the difference by subtracting and counting backwards in steps.</p> <p>$47 - 23 = 24$</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	

Column Subtraction

Traditional method, ensure largest number on top, line up the units. Begin with subtracting the units.



(Scan the QR code to see a pupil demonstrating)

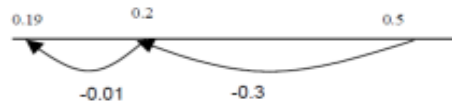
$$\begin{array}{r} 89 \\ -57 \\ \hline 32 \end{array}$$

Move onto calculations that you will need to borrow from next door as the number on top is smaller than the number on the bottom.

Progression Step 3

Decimal Subtraction
Use knowledge of number bonds and place value to subtract.

$$0.5 - 0.31 = 0.19$$



Subtract decimals using column subtraction. The decimal point remains in the same place. Always start from the units.

$$\begin{array}{r} 0.151 \\ \cancel{1}76.48 \\ \hline 93.72 \\ \hline 82.76 \end{array}$$

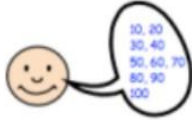


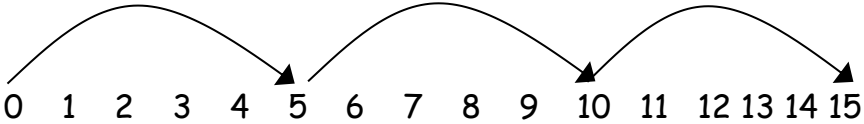
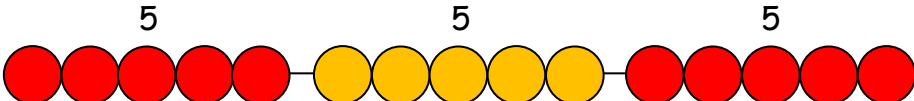


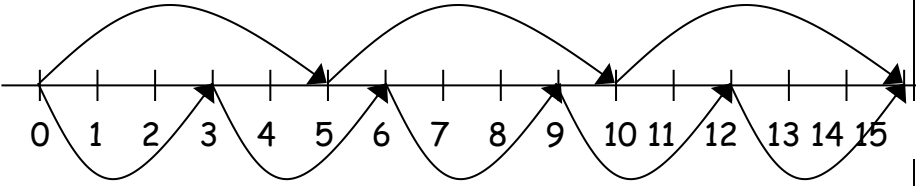


(Scan the QR code to see a
pupil demonstrating)



PROGRESSION THROUGH CALCULATIONS FOR MULTIPLICATION

Progression Step 1 - 3-5 years
Progression Step 2 - 6-8 years
Progression Step 3 - 9-11 years
Progression Step 4 - 11+ years

		Multiplication Steps
Progression Step 1	Pupils will count in twos, fives and tens. They will recognise doubles to 5, then 10.	
	Count sets of objects	Count every 2 e.g., count legs, socks, eyes Count every 5 e.g., fingers Count every 10 e.g., count hands
	Draw pictures/markings	There are 3 sweets in one bag. How many sweets are there in 5 bags? 
	Recognise doubles to 20.	$5 \times 2 = 10$ $10 \times 2 = 20$
Progression Step 2	Introduce multiplication as repeated addition.  (Scan the QR code to see a pupil demonstrating)	$5 \times 3 = 5 + 5 + 5$  and on a bead bar: $5 \times 3 = 5 + 5 + 5$ 

	<p>Pupils should know that 3×5 has the same answer as 5×3.</p>	<p>This can also be shown on the number line.</p> 																				
	<p>Use multiplication 2,3,4,5, and 10.</p>																					
	<p>Use symbols = and x to complete number sentences.</p>	$10 \times 4 = \underline{\quad}$ $5 \times \underline{\quad} = 10$																				
	<p>Using symbols to stand for unknown numbers to complete equations using inverse operations</p>	$\square \times 5 = 20$ $3 \times \triangle = 18$ $\square \times \bigcirc = 32$																				
	<p>Grid method to partition tens and units.</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	<table style="border-collapse: collapse; margin-left: auto; margin-right: auto;"> <tr> <td style="border-right: 1px solid black; padding: 5px;">\times</td> <td style="border-right: 1px solid black; padding: 5px; text-align: center;">10</td> <td style="padding: 5px; text-align: center;">6</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">4</td> <td style="border-right: 1px solid black; padding: 5px; text-align: center;">40</td> <td style="padding: 5px; text-align: center;">24</td> <td style="padding: 5px;"></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: right;">40</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: right;">+ 24</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px; text-align: right; border-top: 1px solid black;">64</td> </tr> </table>	\times	10	6		4	40	24					40				+ 24				64
\times	10	6																				
4	40	24																				
			40																			
			+ 24																			
			64																			

Progression Step 3

Recall all times tables 1-12

1x table	2x table	3x table	4x table	5x table	6x table
1 × 1 = 1	1 × 2 = 2	1 × 3 = 3	1 × 4 = 4	1 × 5 = 5	1 × 6 = 6
2 × 1 = 2	2 × 2 = 4	2 × 3 = 6	2 × 4 = 8	2 × 5 = 10	2 × 6 = 12
3 × 1 = 3	3 × 2 = 6	3 × 3 = 9	3 × 4 = 12	3 × 5 = 15	3 × 6 = 18
4 × 1 = 4	4 × 2 = 8	4 × 3 = 12	4 × 4 = 16	4 × 5 = 20	4 × 6 = 24
5 × 1 = 5	5 × 2 = 10	5 × 3 = 15	5 × 4 = 20	5 × 5 = 25	5 × 6 = 30
6 × 1 = 6	6 × 2 = 12	6 × 3 = 18	6 × 4 = 24	6 × 5 = 30	6 × 6 = 36
7 × 1 = 7	7 × 2 = 14	7 × 3 = 21	7 × 4 = 28	7 × 5 = 35	7 × 6 = 42
8 × 1 = 8	8 × 2 = 16	8 × 3 = 24	8 × 4 = 32	8 × 5 = 40	8 × 6 = 48
9 × 1 = 9	9 × 2 = 18	9 × 3 = 27	9 × 4 = 36	9 × 5 = 45	9 × 6 = 54
10 × 1 = 10	10 × 2 = 20	10 × 3 = 30	10 × 4 = 40	10 × 5 = 50	10 × 6 = 60
11 × 1 = 11	11 × 2 = 22	11 × 3 = 33	11 × 4 = 44	11 × 5 = 55	11 × 6 = 66
12 × 1 = 12	12 × 2 = 24	12 × 3 = 36	12 × 4 = 48	12 × 5 = 60	12 × 6 = 72
7x table	8x table	9x table	10x table	11x table	12x table
1 × 7 = 7	1 × 8 = 8	1 × 9 = 9	1 × 10 = 10	1 × 11 = 11	1 × 12 = 12
2 × 7 = 14	2 × 8 = 16	2 × 9 = 18	2 × 10 = 20	2 × 11 = 22	2 × 12 = 24
3 × 7 = 21	3 × 8 = 24	3 × 9 = 27	3 × 10 = 30	3 × 11 = 33	3 × 12 = 36
4 × 7 = 28	4 × 8 = 32	4 × 9 = 36	4 × 10 = 40	4 × 11 = 44	4 × 12 = 48
5 × 7 = 35	5 × 8 = 40	5 × 9 = 45	5 × 10 = 50	5 × 11 = 55	5 × 12 = 60
6 × 7 = 42	6 × 8 = 48	6 × 9 = 54	6 × 10 = 60	6 × 11 = 66	6 × 12 = 72
7 × 7 = 49	7 × 8 = 56	7 × 9 = 63	7 × 10 = 70	7 × 11 = 77	7 × 12 = 84
8 × 7 = 56	8 × 8 = 64	8 × 9 = 72	8 × 10 = 80	8 × 11 = 88	8 × 12 = 96
9 × 7 = 63	9 × 8 = 72	9 × 9 = 81	9 × 10 = 90	9 × 11 = 99	9 × 12 = 108
10 × 7 = 70	10 × 8 = 80	10 × 9 = 90	10 × 10 = 100	10 × 11 = 110	10 × 12 = 120
11 × 7 = 77	11 × 8 = 88	11 × 9 = 99	11 × 10 = 110	11 × 11 = 121	11 × 12 = 132
12 × 7 = 84	12 × 8 = 96	12 × 9 = 108	12 × 10 = 120	12 × 11 = 132	12 × 12 = 144

Progression Step 3

Grid method
TU X TU



(Scan the QR code to see a pupil demonstrating)

Children will approximate first
56 × 27 is approximately 60 × 30 = 1800

x	20	7	
50	1000	350	
6	120	42	

1000
+ 350
+ 120
+ 42
1512

Progression Step 3

HTU X TU

235 × 24 is approximately 240 × 20 = 4800

x	200	30	5	
20	4000	600	100	
4	800	120	20	

4000
+ 600
+ 100
+ 800
+ 120
+ 20
5740

Multiplying decimals

$$\begin{array}{r} \times \quad 4 \quad 0.9 \\ 3 \quad \boxed{12} \quad \boxed{2.7} \end{array}$$

$$12 + 2.7 = 14.7$$

Column Method

TU × U



(Scan the QR code to see a pupil demonstrating)

23 × 8

1 2 times 8 is 24 (2a)

3a 20 times 8 is 160, add the 'carried' 20 is 180

3b 60 from the 260

4 100 from the 180

2b 'carried' 20 from the 24

2a 4 from the 24

Column Method

HTU × U

346 × 9

5 346 × 9

1 6 times 9 is 54

3a 40 times 9 is 360 plus the 'carried' 50 is 410

4 300 times 9 is 2700, plus the 'carried' 400 is 3100

2a 4 from the 54

5 3000 from the 3100

3b 'carried' 400 from the 410

2b 'carried' 50 from the 54

Multiplying Decimals



(Scan the QR code to see a pupil demonstrating)

12

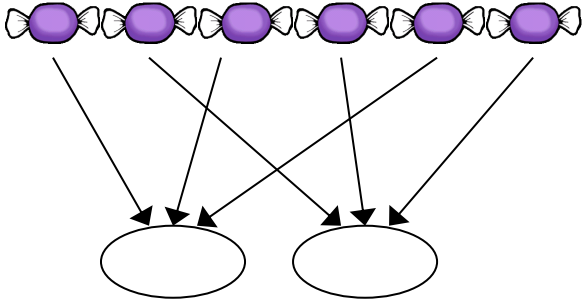
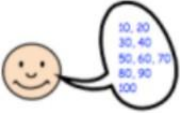

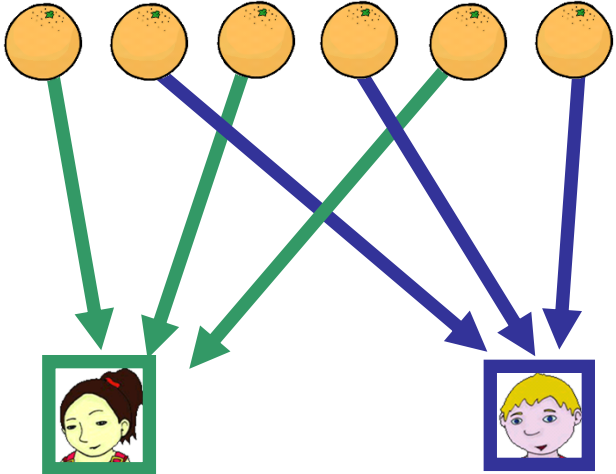
4.9×3

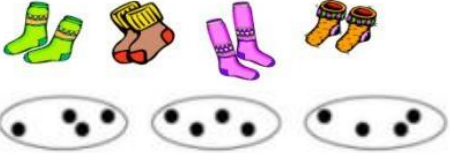




3a	4 times 3 is 12, plus the 'carried' 2 is 14	4	.	9	1	0.9 times 3 is 2.7
3b	4 from the 14	×				3
3c	10 from the 14	1	4	.	7	0.7 from the 2.7
2b	'carried' 2 from the 2.7		2			2a



PROGRESSION THROUGH CALCULATIONS FOR DIVISION

Progression Step 1 - 3-5 years
Progression Step 2 - 6-8 years
Progression Step 3 - 9-11 years
Progression Step 4 - 11+ years

		Division Steps
Progression Step 1	Divide objects equally	
	Count every 2,5 and 10.	
	Count confidently to share objects correctly.  (Scan the QR code to see a pupil demonstrating)	6 oranges shared between 2 people, how many do they each get? 6 oranges shared between 2 people, how many do they each get? 

	Group objects into sets of 2,5 or 10	
Progression Step 2	Use 2,3,4,5 and 10 times tables.	
	Group numbers using a number line.	<p>How many groups of 3 in 18?</p> 
	Use the symbols = and ÷ to complete number sentences.	$10 \div 5 = \underline{\quad}$ $8 \div \underline{\quad} = 2$
Progression step 3	<p>Short Division Method</p> <p>Use multiplication knowledge to divide numbers into specific numbers.</p>  <p>(Scan the QR code to see a pupil demonstrating)</p>	<p>$TU \div U$</p> $72 \div 3$ $\begin{array}{r} 24 \\ 3 \overline{) 72} \end{array}$ <p>Answer = 24</p>
	 <p>(Scan the QR code to see a pupil demonstrating)</p>	<p>$HTU \div U$</p> $196 \div 6$ $\begin{array}{r} 032 \text{ r } 4 \\ 6 \overline{) 196} \end{array}$ <p>Answer = 32 remainder 4</p>

Pupils will have a range of calculation methods, mental and written. Selection will depend on numbers involved.

Pupils should not be made to go onto the next stage if:

1. They are not ready
2. They are not confident

Pupils should be encouraged to approximate their answers before calculating.

Pupils should be encouraged to check their answers after calculating using an appropriate strategy.

Pupils should be encouraged to consider if a mental calculation would be appropriate before using written methods.

Additional Online Resources



<https://www.rmeasimaths.com>



<https://ttrockstars.com>



[j2blast \(j2e.com\)](https://www.j2e.com)



<https://www.topmarks.co.uk>



<https://www.teachyourmonster.org>



<https://www.ictgames.com>