

Howley Grange Primary School



Calculation Policy 2016



Progression in Addition:

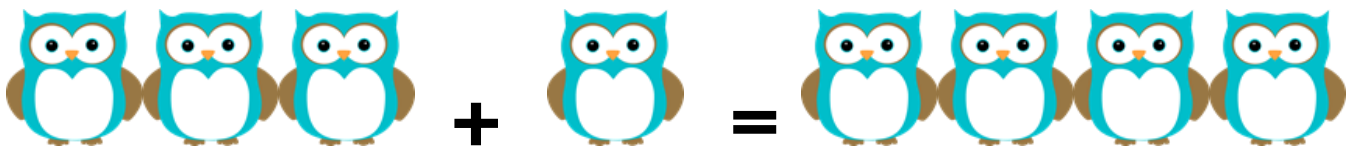
Pictorial representation:

Step 1: Identify the first number in the sum e.g. 3 and count out this many objects.

Step 2: Identify the second number in the sum e.g. 1 and count out this many objects.

Step 3: Add the sets of objects together to get your answer.

e.g. $3 + 1 = 4$



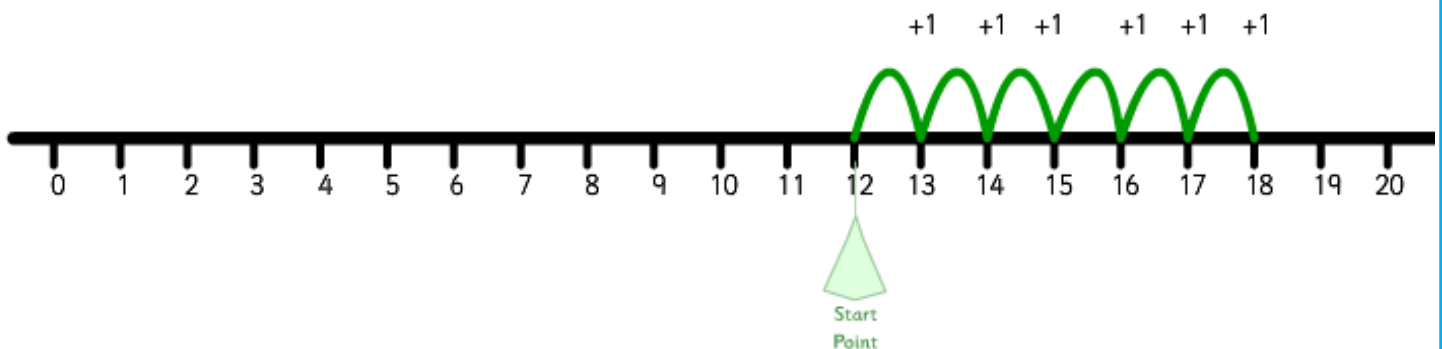
Adding a one digit number on a number line:

Step 1: Identify the first number in the sum and find/mark this on your number line.

Step 2: Identify the second number in the sum and make this many jumps forwards, being careful to jump one number at a time.

Step 3: Record the last number you land on as your answer.

e.g. $12 + 6 = 18$



Progression in Addition:

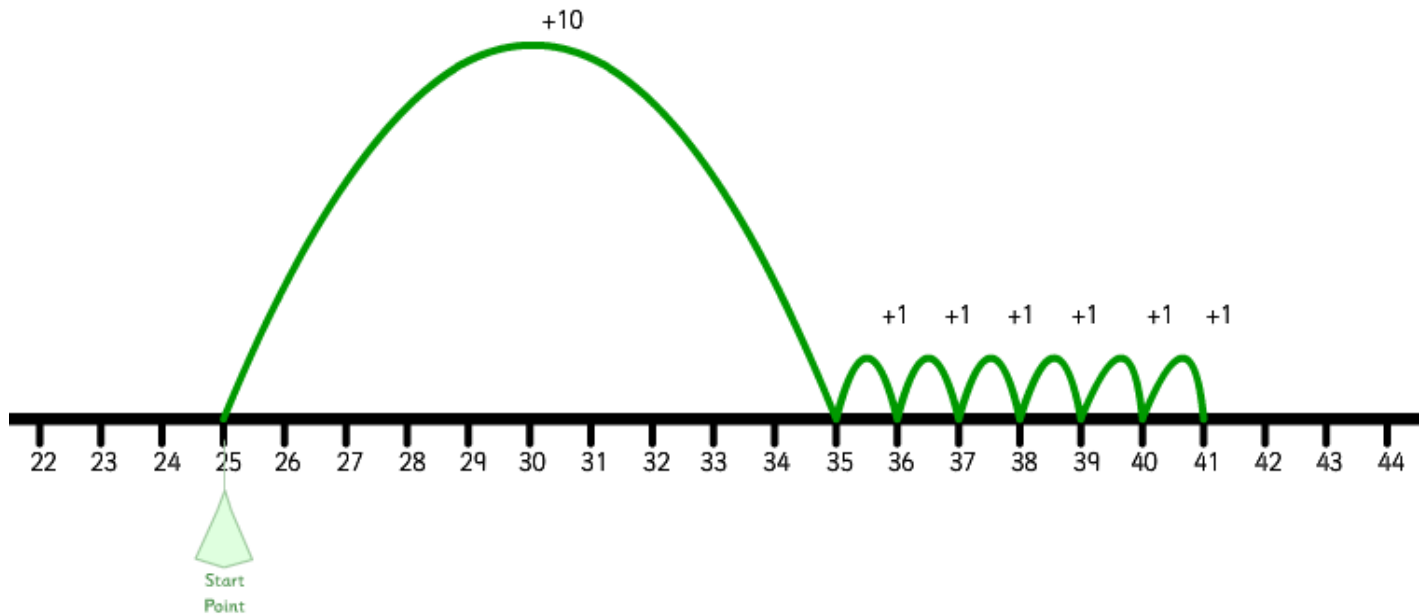
Adding a two digit number on a number line:

Step 1: Identify the first number in the sum and find/mark this on your number line.

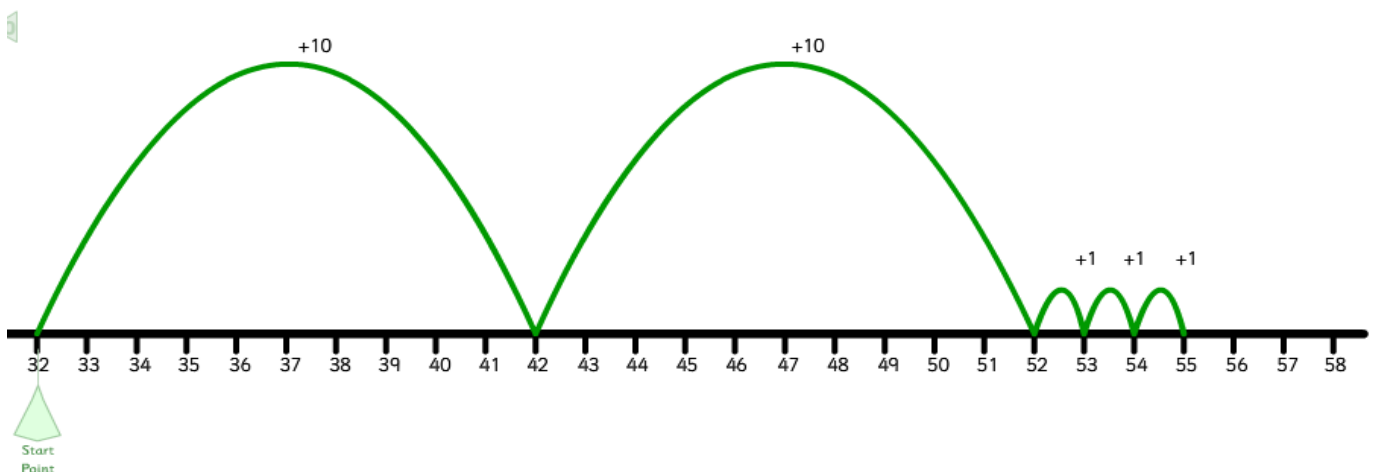
Step 2: Identify the second number in the sum, using place value knowledge work out how many jumps of 10 you need to make, followed by how many jumps of one you need to make.

Step 3: Record the last number you land on as your answer.

e.g. $25 + 16 = 41$



e.g. $32 + 23 = 55$



Progression in Addition:

Pictorial column addition:

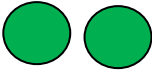
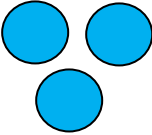

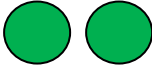
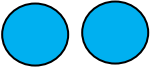
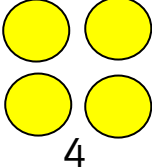
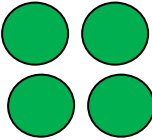
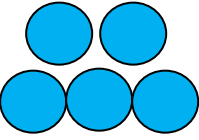
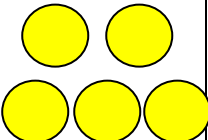
Step 1: Lay out the counters for the given sum, being careful to use the correct counters (hundreds, tens or ones) in the correct column.

Step 2: Begin in the ones column, add the counters together, moving them to the bottom equals square.

Step 3: Repeat with the tens column followed by the hundreds column.

Step 4: Count the counters in each column and write the total underneath.

e.g. $231 + 224 = 455$

<u>H</u>	<u>T</u>	<u>O</u>	
 2	 3	 1	
 2	 2	 4	+
 4	 5	 5	=

Use this method without carrying to begin, followed by carrying 10, then carrying 100, followed by carrying both.

Progression in Addition:

Formal column addition (with and without carrying):

Step 1: Add the numbers in the ones column and if a 2 digit number put the ones digit underneath the ones column and the tens digit underneath the equals line of the tens column.

Step 2: Add the numbers in the tens column and also add the digit that is underneath the equal's line in the same column. If a 2 digit number, put the ones digit underneath the tens column and the tens digit underneath the equals line of the hundreds column.

Step 3: Repeat the same process for the hundreds and thousands columns.

Without carrying e.g. $216 + 143 = 259$

	<u>H</u>	<u>I</u>	<u>O</u>
	2	1	6
+	1	4	3
	3	5	9

With carrying e.g. $546 + 176 = 722$

	<u>H</u>	<u>I</u>	<u>O</u>
	5	4	6
+	1	7	6
	7	2	2
	1	1	

Progression in Subtraction:

Pictorial representation:

Step 1: Identify the first number in the sum e.g. 5 and count out this many objects.

Step 2: Identify the second number in the sum e.g. 2 and take this many objects away/cross them off.

Step 3: Count how many objects you have left, record this answer.

e.g. $5 - 2 = 3$



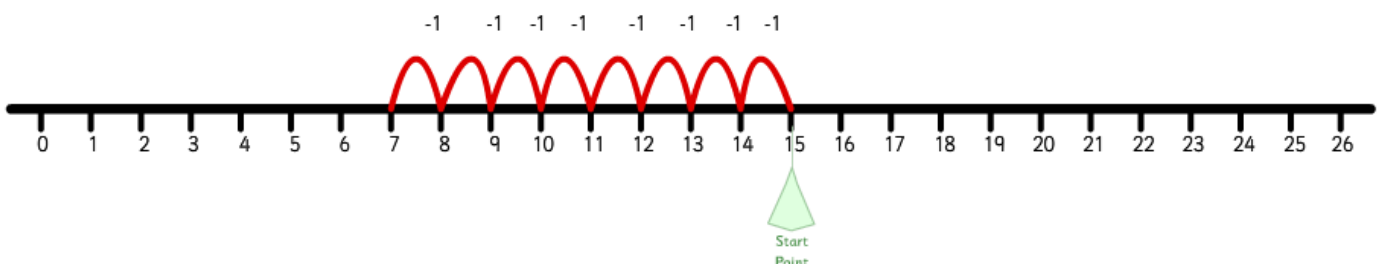
Subtracting a one digit number on a number line:

Step 1: Identify the first number in the sum and find/mark this on your number line.

Step 2: Identify the second number in the sum and make this many jumps backwards, being careful to jump one number at a time.

Step 3: Record the last number you land on as your answer.

e.g. $15 - 8 = 7$



Progression in Subtraction:

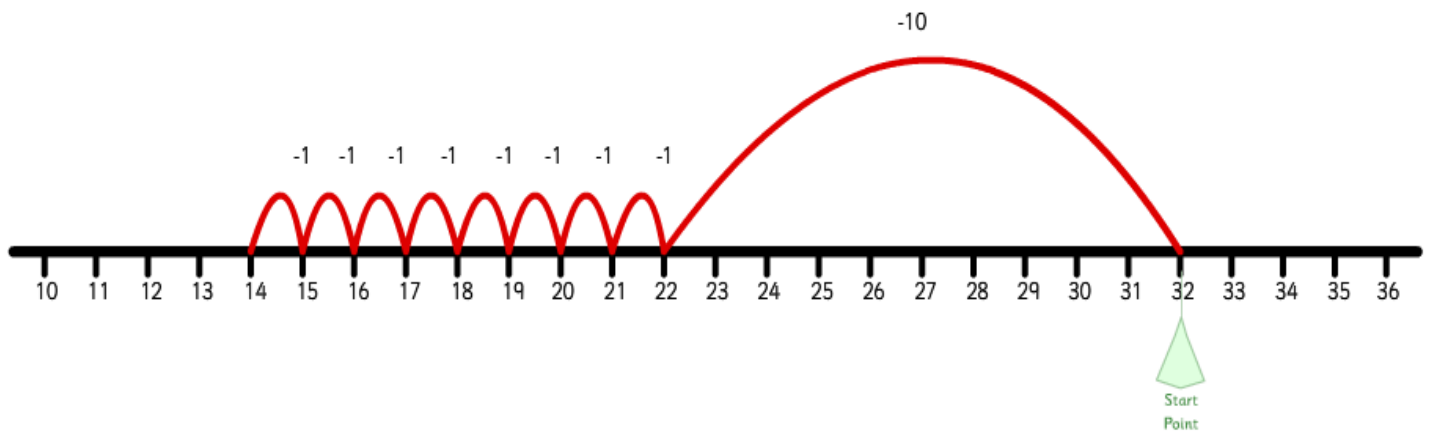
Subtracting a two digit number on a number line:

Step 1: Identify the first number in the sum and find/mark this on your number line.

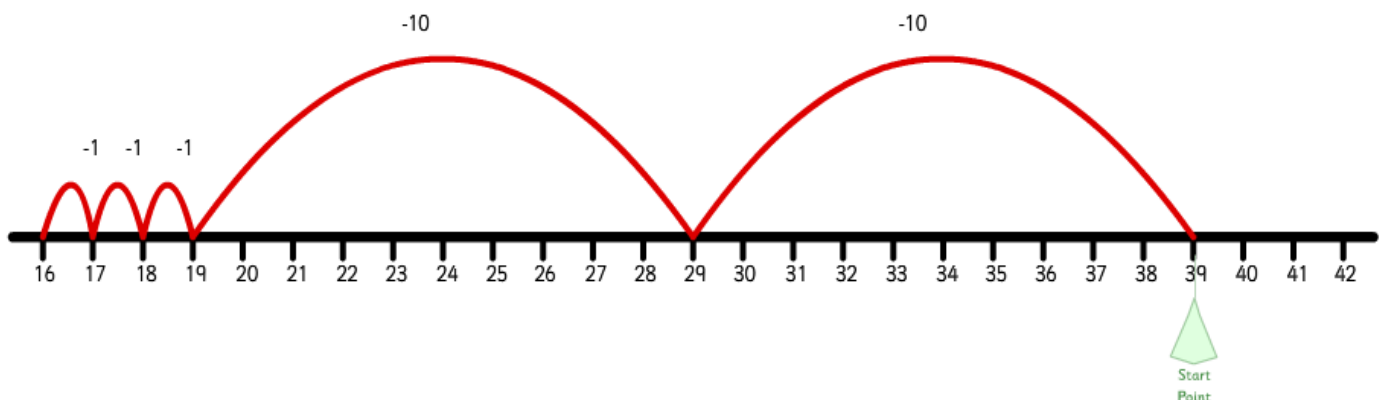
Step 2: Identify the second number in the sum, using place value knowledge work out how many jumps of 10 you need to make followed by how many jumps of one you need to make, remembering to go backwards.

Step 3: Record the last number you land on as your answer.

e.g. $32 - 18 = 14$



e.g. $39 - 23 = 16$



Progression in Subtraction:

Pictorial column subtraction:

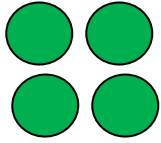
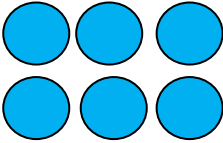
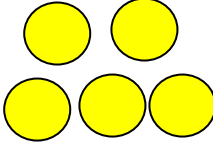
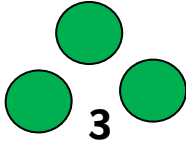
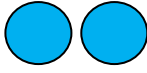
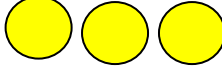
Step 1: Lay out the counters for the given sum, being careful to use the correct counters (hundreds, tens or ones) in the correct column.

Step 2: Begin in the ones column, take the bottom number away from the top number, leave the remaining counters in the bottom equals square.

Step 3: Repeat with the tens column followed by the hundreds column.

Step 4: Look at the equals squares and count the tokens in each column and write the total underneath.

e.g. 465- 142 = 323

<u>H</u>	<u>T</u>	<u>O</u>	
 4	 6	 5	
1	4	2	-
 3	 2	 3	=

Progression in Subtraction:

Formal column subtraction:

Step 1: Subtract the bottom number from the top number in the ones column, if the top number is smaller then you will need to exchange from the tens column. Do this by crossing through the number that is there and replacing with it the number that is 1 less.

Step 2: Put the exchanged 1, that has been taken from the tens column, next to the number that is in the ones column. Now the top number is big enough to subtract the bottom number.

Step 3: Repeat the same process for the tens, hundreds and thousands columns.

Without exchanging e.g. $368 - 246 = 122$

	<u>H</u>	<u>T</u>	<u>O</u>
	3	6	8
-	2	4	6
	1	2	2

With exchanging e.g. $432 - 127 = 305$

	<u>H</u>	<u>T</u>	<u>O</u>
	4	3 ²	2 ¹
-	1	2	7
	3	0	5

Progression in Multiplication:

Pictorial representation:

Step 1: Identify how many in each set e.g. 2.

Step 2: Count in sets of e.g. 2.

Step 3: Check by counting each individual object if needed.

e.g. 3 sets of 2 is 6.



2



4



6

Multiplication by sets:

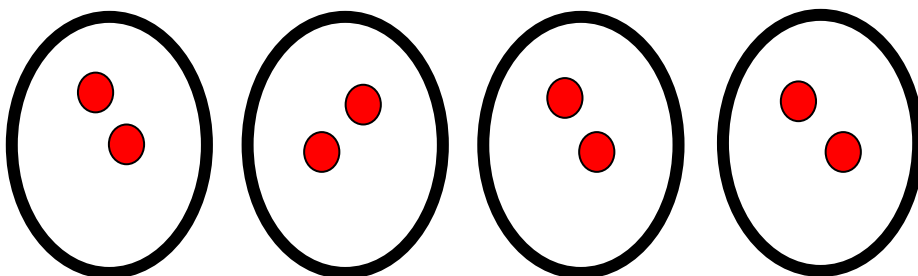
Step 1: Identify the first number in the sum and draw this many sets.

Step 2: Identify the second number in the sum and draw this many dots in each set.

Step 3: Use your knowledge of counting in sets of e.g. 2's to total the amount.

Step 4: Count each dot individually to check your total is correct or if you are unable to count in sets of.

e.g. $4 \times 2 = 8$



Progression in Multiplication:

Multiplication by arrays:

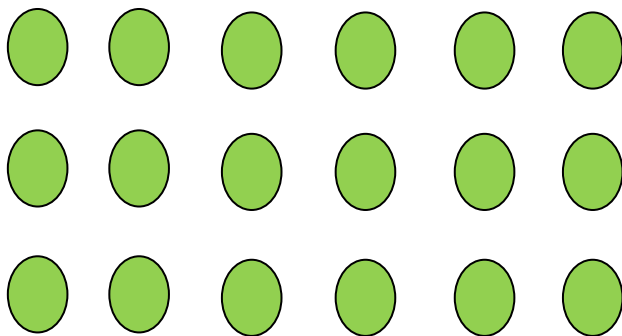
Step 1: Identify the first number in the sum and draw this many dots across the top.

Step 2: Identify the second number in the sum and draw this many dots down from the top, remembering to count the one already in place.

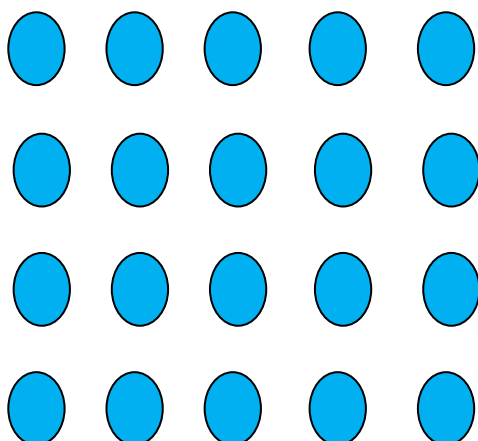
Step 3: Fill in the missing dots in the array, being careful to place a dot in each appropriate square.

Step 4: Count in sets of e.g. 2's, 3's 5's or 10's or individually to identify the total. Cross of each dot as you count it, if it helps.

e.g. $6 \times 3 = 18$



e.g. $5 \times 4 = 20$



Progression in Multiplication:

Multiplication on a number line

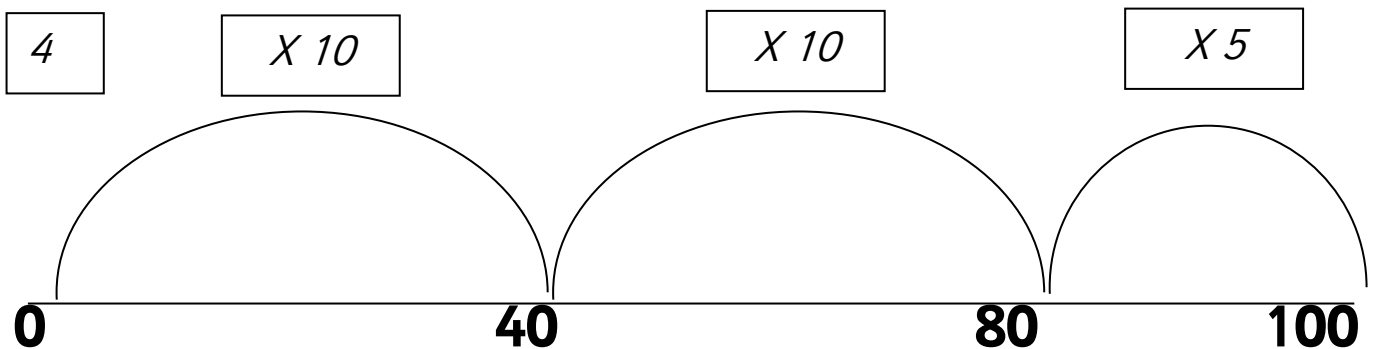
Step 1: Flexibly partition the number.

Step 2: Use partitioning to make your jumps, using your knowledge of times tables.

Step 3: Record your answer (the number you land on).

e.g. $25 \times 4 = 100$

$25 \times 4 =$
$10 \times 4 =$
$10 \times 4 =$
$5 \times 4 =$



Progression in Multiplication:

Grid method

Step 1: Partition the number.

Step 2: Multiply the ones column.

Step 3: Multiply the tens column.

Step 4: Add together to complete the answer.

e.g. $27 \times 5 = 135$

	<u>I</u>	<u>O</u>	
<u>x</u>	20	7	
5	100	+ 35	= 135

Column method (with and without carrying)

Step 1: Multiply the ones and write the answer in the equals lines of the ones column, if answer is a 2 digit number, put the tens digit underneath the equals line of the tens column.

Step 2: Multiply the tens column, if there is a digit underneath the equal's line of this column, add that to the answer and write in the equals line of the tens column.

Step 3: Repeat this process for the hundreds and thousands columns.

Without carrying

	<u>I</u>	<u>O</u>	
	4	2	
x		2	
	8	4	

With carrying

	<u>H</u>	<u>I</u>	<u>O</u>	
		4	6	
			4	
	1	8	4	

Progression in Multiplication:

Long Multiplication

e.g. $53 \times 26 = 1378$

	<u>Th</u>	<u>H</u>	<u>I</u>	<u>O</u>	
			5	3	
x			2	6	
		3	1	8	Answer line 1
+	1	0	6	0	Answer line 2
	1	3	7	8	Answer line 3

Step 1: Multiply the ones by the ones- 3×6 .

Step 2: Multiply the tens by the ones- 5×6 . Put the answer in line 1.

Step 3: As we are now multiplying by tens, put a 0 in the ones column.

Step 4: Multiply the ones by the tens- $3 \times 2 = 6$.

Step 5: Multiply the tens by the tens- $5 \times 2 = 10$. Put the answer in line 2.

Step 6: Add answer line 1 and 2 together and put the final answer in line 3.

Progression in Division

Pictorial representation:

Step 1: Count out a set of objects.

Step 2: Share the objects between 2 people (one for you, one for me).

Step 3: Count how many each person has.



3 for me



3 for you

Progression in Division

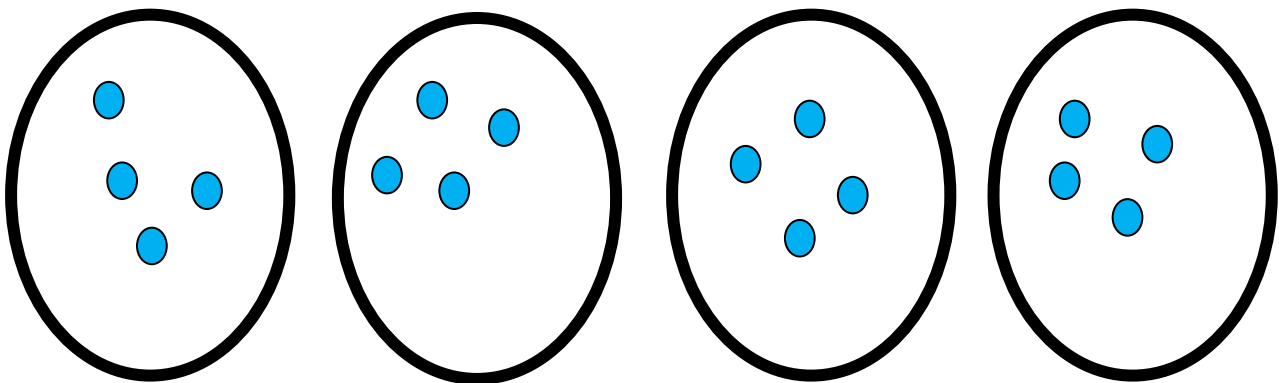
Division by sets:

Step 1: Identify the second number in the sum, draw this many sets.

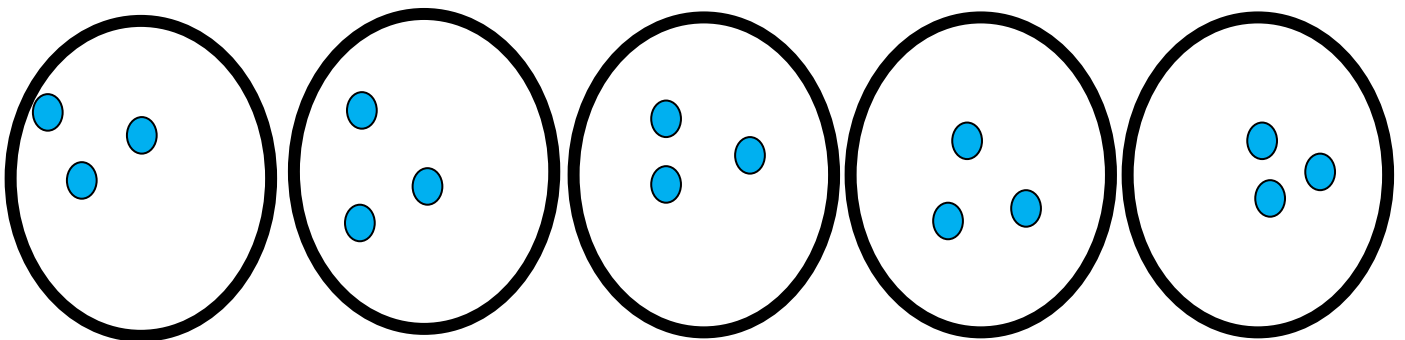
Step 2: Look at the first number in the sum and share this across the set, putting 1 dot at a time in each circle until you reach the given number.

Step 3: Count how many are in 1 of your sets and record this as your answer.

e.g. $16 \div 4 = 4$



e.g. $15 \div 5 = 3$



Progression in Division

Division by counting in sets on a number line:

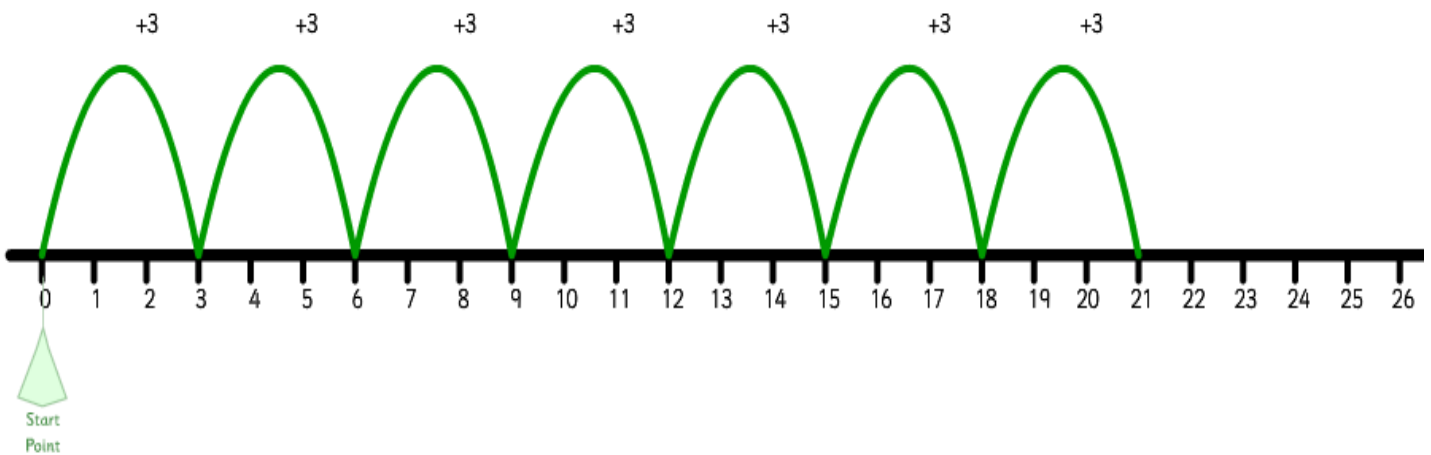
Step 1: Identify the smallest number in the sum, count up in this number.

Step 2: Stop when you get to the biggest number in the sum.

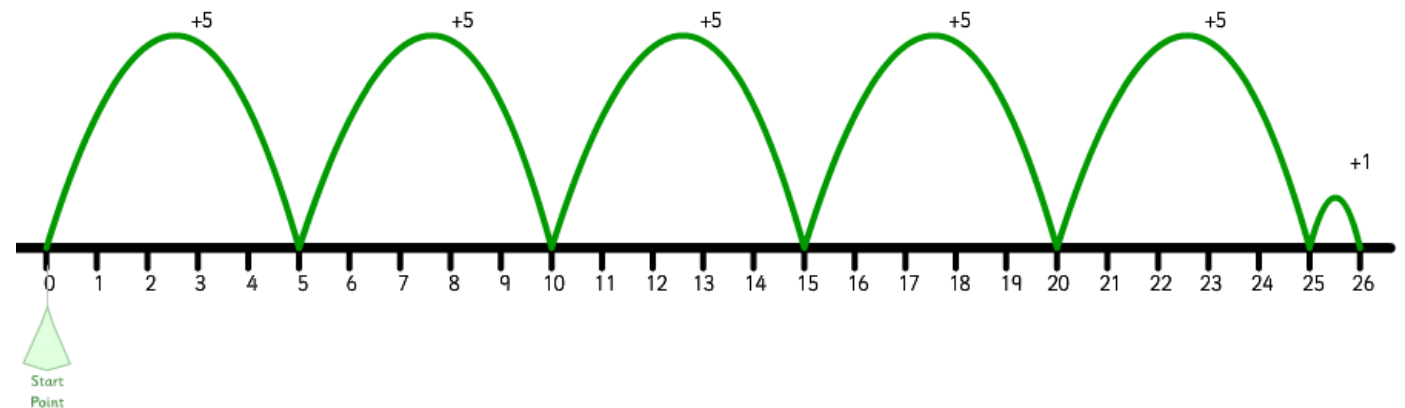
Step 3: Count how many jumps you have made and record this as your answer.

Step 4: Remember to include the remainder in your answer if there is one.

e.g. $21 \div 3 = 7$



e.g. $26 \div 5 = 5$ remainder 1 (r1).



Progression in Division

Division by known table facts:

Step 1: Identify the 2 numbers in the division sum.

Step 2: Using your knowledge of inverse relationships, identify what number you would need to multiply the smallest given number with in order to get the biggest number.

e.g. $30 \div 6 = 5$

$$6 \times ? = 30$$

$$6 \times 5 = 30$$

e.g. $42 \div 7 = 6$

$$7 \times ? = 42$$

$$7 \times 6 = 42$$

Progression in Division

Division using the bus stop method (with and without carrying)

Step 1: Put the biggest number inside the bus stop.

Step 2: Put the smallest number on the left, outside the bus stop.

Step 3: Start at the left, work out how many times the number on the outside goes into the first number. If the number on the outside of the bus stop goes into the number inside the bus stop but has a remainder, put the remainder next to the digit to the right.

Step 4: Repeat the process until all numbers have been divided.

Without carrying e.g. $396 \div 3 = 132$

$$\begin{array}{r} 132 \\ 3 \overline{) 396} \end{array}$$

With carrying e.g. $6532 \div 4 = 1633$

$$\begin{array}{r} 1633 \\ 4 \overline{) 6532} \end{array}$$

Progression in Division:

Long Division (Chunking method using common multiples and subtraction)

e.g. $839 \div 27 = 31r2$

	<u>H</u>	<u>I</u>	<u>O</u>	
	8	3	9	
-	2	7	0	(27x10=270)
	<hr/>			
	5	6	9	
-	2	7	0	(27x10=270)
	<hr/>			
	2	9	9	
-	2	7	0	(27x10=270)
	<hr/>			
		2	9	
		2	7	(27x1=27)
	<hr/>			
			2	10+10+10+1=31r2

Steps: Follow steps as shown above.

Progression in Division:

Short compact division method

Step 1: $8 \div 27 =$ unable to do, so put a 0 on top of the bus stop above the 8.

Step 2: Now do $83 \div 27$ (use subtraction to help)

$$3 \times 27 = 81 \text{ remainder } 2.$$

Step 3: Remainder 2 goes next to the next digit along (to the right).

Step 4: $29 \div 27 = 1$ remainder 2. Put the 1 on top of the bus stop, put the 2 outside of the bus stop as the remainder.

e.g. $839 \div 27 = 31r2$

$$\begin{array}{r} 031r2 \\ \hline 27 \overline{)839} \end{array}$$