# Progression in Calculations

# <u>Addition</u>

Objective and Strategies	Concrete	Pictorial	Abstract
EYFS Count reliably with numbers from 1 to 20 - Place them in order and say which number is one more	Counting a range of familiar objects ensuring development of 1:1 correspondence.	Start by counting familiar things using blocks or cut- out pictures they can physically line up in a row. For instance counting pieces of fruit, or people in the room. With one block or cut-out picture for each orange or person. Using this add 1 more.	5 + 1 = 6 6 + 1 = 7 Use pictures of objects to add 1 more - finding how many altogether to use alongside the abstract.
EYFS Using quantities and objects, add two single- digit numbers and count on to find the answer.	$ \begin{array}{c} \bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\\bullet\\$	Add objects to the row to understand adding by counting on. $\int_{0}^{1} \int_{1}^{2} \int_{3}^{3} \int_{4}^{1} \int_{5}^{1} \int_{6}^{7} \int_{8}^{8} \int_{9}^{10} \int_{10}^{10}$ Counting on using a number track or number line.	6 + 3 = 9 7 + 4 = 11



Year 2 Adding three single digits	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.		4 + 7 + 6 = 10 + 7 $= 17$ Combine the two numbers that make 10 and then add on the remainder.
	Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	Add together three groups of objects. Draw a picture to recombine the groups to make 10.	
Year 2 Addition of 2 digit and 1digit Addition of 2 digit and 10s Addition of 2 two digit numbers	13 + 6 = 19       22 + 10 = 32         13 + 6 = 19       22 + 10 = 32         13 + 6 = 19       10 + 10 + 10 + 10 + 10 + 10 + 10 + 10 +	Using a calculations mat to ensure equipment is organised and placed in correct column. $\boxed{100 \times 10^{5} \times 10^{5} \times 10^{5} \times 10^{5}} \times 10^{5} \times 10$	Children's recording Identifying the tens and ones within the calculation. 35 + 33 = 68
Year 2 Commutative law Addition of 2 numbers can be done in any	Cuisennaire 7+3 =10 3+7 =10 Numicon + and + and	After practically using cuisennaire children can draw the Bar Model to demonstrate understanding. ? and ? 7 3 3 7	17 + 4 = 21 4 + 17 = 21 Children's recording noting there is no need to calculate the second calculation due to Commutative Law.

order			
Year 2 Addition facts to 20 Use related facts to 100	Numicon - addition facts to 20	Draw pictures or use of a number line or similar.	Children's Recordings drawing upon related facts 6+4=10 60+40=100 16 +4=20
Year 2/3 Column method- no regrouping Year 3 - 3 digit numbers	24 + 15= Add together the ones first then add the tens. Use the Base 10 blocks first before moving onto place value counters. TO TO TO TO TO TO TO TO TO TO	After practically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions.	<u>Calculations</u> 21 + 42 = 21 + <u>42</u>

Column methodregrouping Year 3 - 3 digit numbers

Column methodregrouping Year 4 - up to 4 digit numbers

Year 5 Add whole numbers with more than 4 digits and decimals up to 3 places –

Year 6 Solve addition and subtraction multi step problems in context deciding which operations and



Add up the units and exchange 10 ones for one 10.

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Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added.

This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100.

As children move on to decimals, money and decimal place value counters can be used to support learning. Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding.



### Partially numbered and blank numberlines.

Year 3 Start by numbers to clearl exchang addition 20 + <u>40 +</u> 60 +	y part befo y sho e belo 5 <u>8</u> 13 =	tition ore n ow th ow t	ning novi ne he	th ng	e on
As the children on, intro decimals the same decimal money) o Money c	move duce with e num place and d an be	e Iber s (ye iffer	53 + 30 $+ 30$ $-62$ $-72$	36 <u>85</u> 2 <u>1</u> 1 4	
72.8 +54.6 127.4 1 1		2 3 7 3 1 1 1		5 5 1 1	9 5 4
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$   \begin{array}{r}       3 \\       0 \\       7 \\       3 \\       5 \\       2   \end{array} $	6 8 7 <b>0</b> 1	1 0 0 1		

methods to use and why.		
	0.7 0.3	

# <u>Subtraction</u>

Objective and	Concrete	Pictorial	Abstract
EYFS Count reliably with numbers from 1 to 20, place them in order and say which number is one less than a given number.	How many teddies would there be if we had 1 less?	There are 9 children in a group. One child leaves. How many are in the group now?	5-1=4 7-1=6 Use pictures of objects to find 1 less - finding how many are left to use alongside the abstract.
EYFS Using quantities and objects subtract two single-digit numbers and count back to find the answer.	Can you take away 2 jewels? How many are left?	Can you find 7? Now take away 3. What number have you landed on?	6 - 3 = 3 9 - 4 = 5

Year 1	Use physical objects, counters, cubes etc to show how objects can be taken	Cross out drawn objects to show what has been taken away.	18 -3= 15
Taking away ones	away. 6-2=4	$ \begin{array}{c} \mathring{\bigtriangleup} & \mathring{\swarrow} & \mathring{\checkmark} \\ & \mathring{\bigtriangleup} & \mathring{\checkmark} \\ & \mathring{\bigtriangleup} & \mathring{\checkmark} \\ & \mathring{\bigtriangleup} & \mathring{\checkmark} \\ & 15 - 3 = 12 \end{array} $	13 - 8 = 5
Year 1	Make the larger number in your subtraction. Move the beads along	Count back on a number line or number track	Put 13 in your head, count back 4. What number are
Counting back	backwards in ones.	9 10 11 12 13 14 15	to help.
	13 – 4 000000000 0	Start at the bigger number and count back the smaller number showing the jumps on the number line.	
	counters and move them away from the group as you take them away counting backwards as you go.	$\begin{array}{c} -10 \\ -10 \\ 34 35 36 37 \\ Year1/2 \\ \hline This can progress all the way to counting back using two 2 diait numbers$	



Make 10	Make 14 on the ten frame. Take away the four first to make 10 and then takeaway one more so you have taken away 5. You are left with the answer of 9.	13 - 7 = 6 3 4 5 + 2 + 3 + 4 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5	How many do we take off to reach the next 10? How many do we have left to take off?
Year 250Sub 2 digit take50away ones502 digit take50away 10s502 digit take50away 2 digit50Subtraction50not in any order50E	56 - 3 = 53 56 - 20 = 36 56 - 20 = 36 56 - 23 = 33 56 - 32 = 33	Using a calculations mat to ensure equipment is organised and placed in correct column. Drawing blank number line.	Children's recording Identifying the tens and ones within the calculation. Crossing off the appropriate number.





method links to the written method	
alongside your working. Cross out the	
numbers when exchanging and show	
where we write our new amount.	

## **Multiplication**



Counting in multiples Year 1 2s 5s 10s Year 2 2s 3s 5s 10s	Count in multiples supported by concrete objects in equal groups.	Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30 Year 2
Year 1 Arrays with support	<ul> <li>Source and tens.</li> <li>Source and tens.</li> </ul>	Using concrete objects, pictorial representations and arrays with the support of an adult - take photographs/draw pictures 2 4 6 8 Cuisenaire 2 4 6 8 four lots of two makes eight two lots of four makes eight	Write number sentences (with support) to show what the array represents 2+2+2+2+2=10 5+5=10 5x2=10 2x5=10

Year 1/2 Repeated addition	Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2 add 2 add 2 equals 6 5 5 5 5 5 5 5 5	Write addition sentences to describe objects and pictures. 2+2+2+2=10
Year 2 Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.	Draw arrays in different rotations to find commutative multiplication sentences.	Use an array to write multiplication sentences and reinforce repeated addition.
Year 3 Grid Method Multiplication and division	Show the link with arrays to first introduce the grid method.	Children can represent the work they have done with place value counters in a way that they understand.	Start with multiplying by one digit numbers and showing the clear addition alongside the grid.



Year 4	Children can continue to be supported by place value counters at the stage of multiplication.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	Start with long multiplication, reminding the children about lining
multiplication	6r 3 6 6 7 7 7 7 7 7 7 7 7 7	51 59 59 59 59 59 59 59 59 59 59 59 59 59	up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer.
	It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below. Grid alongside the formal 2 digit by 1 digit -year 3/4	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 32 \\ \times \underline{24} \\ 8 \\ 120 \\ 40 \\ (20 \times 2) \\ \underline{600} \\ 768 \end{array}$
			This moves to the more compact method. Year 5/6
Vear 5/6			2 3 1 1 2 4 2
Multiplication -			1342 v 19
compact method			13420
			10736
			24156

				7	4
		×		6	3
				1	2
			2	1	0
			2	4	0
	+	4	2	0	0
		4	6	6	2

Division

Objective and Strategies	Concrete	Pictorial	Abstract
EYFS Solve problems including halving and sharing.		Image: Second system       Image: Second system       Image: Second system       Image: Second system         Image: Second system       Image: Second system       Image: Second system       Image: Second system       Image: Second system         Image: Second system       <	Can you share the 8 sweets so that we have half each?
Year 1 Sharing objects into groups	The second secon	Children use pictures or shapes to share quantities. Children use pictures or shapes to share quantities. 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 +	Share 9 buns between three people. $9 \div 3 = 3$ Year 2



Year 3 Division with a remainder	$14 \div 3 =$ Divide objects between groups and see how much is left over.	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.	Complete written divisions and show the remainder using r.	
		0 4 8 12 13 Draw dots and group them to divide an amount and clearly show a remainder. () () () () () () () () () () () () () (	$\begin{array}{c} 29 \div 8 = 3 \text{ REMAINDER 5} \\ \uparrow \uparrow \uparrow & \uparrow \\ \text{dividend divisor quotient} & \text{remainder} \end{array}$	
Year 3 and 4	Tens Units 3 2	Pupils can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.	Begin with divisions that divide equally with no remainder.	
Short division	3		2 1 8	
Year 5	Use place value counters to divide using the bus stop method alongside	Encourage them to move towards counting in multiples to divide more efficiently.	4 8 7 2	
	(1)     (1) <td></td> <td>Move onto divisions with a remainder.</td>		Move onto divisions with a remainder.	
	42 ÷ 3= Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.		8 6 r 2 3 5 4 3 2	

			Finally move into decimal places to divide the total accurately. 1 4 . 6 16 21
	We exchange this ten for ten ones and then share the ones equally among the groups.		35511.0
Year 6 Long division	$\frac{1}{2544 \div 12}$ How many groups of 12 thousands do we have? None Exchange 2 thousand for 20 hundreds. $\frac{1}{2544}$ How many groups of 12 are in 25 hundreds? 2 groups. Circle them. We have grouped 24 hundreds so can take them off and we are left with	Instead of using physical counters, students can draw the counters and circle the groups on a whiteboard or in their books. Use this method to explain what is happening and as soon as they have understood what move on to the abstract method as this can be a time consuming process.	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$

