Progression in Teaching Addition

Mental Skills

Recognise the size and position of numbers
Count on in ones and tens
Know number bonds to 10 and 20
Add multiples of 10 to any number
Partition and recombine numbers
Bridge through 10

Models and Images

Counting apparatus
Place value apparatus
Place value cards
Number tracks
Numbered number lines
Marked but unnumbered number lines
Empty number lines
Hundred square
Counting stick
Bead string
Models and Images charts
Numicon
Base 10
Calculation Mats

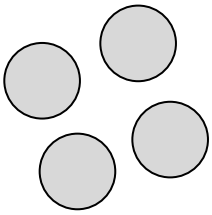
Foundation Stage

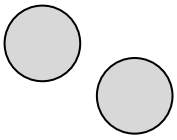
Early Learning Goal:

Using quantities and objects, children add two single-digit numbers and count on to find the answer.

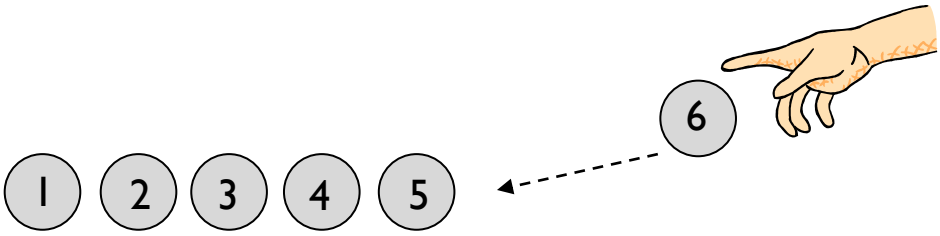
Counting all method

Children will begin to develop their ability to add by using practical equipment to count out the correct amount for each number in the calculation and then combine them to find the total. For example, when calculating 4 + 2, they are encouraged to count out four counters and count out two counters.





To find how many altogether, touch and drag them into a line one at a time whilst counting.

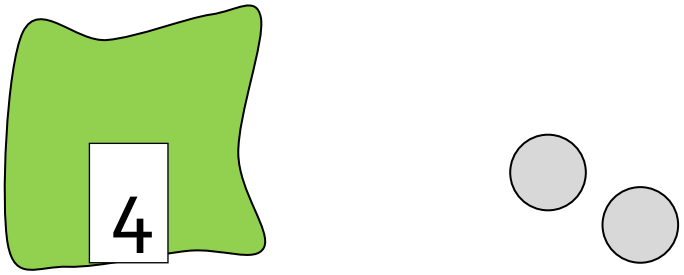


By touch counting and dragging in this way, it allows children to keep track of what they have already counted to ensure they don't count the same item twice.

Counting on method

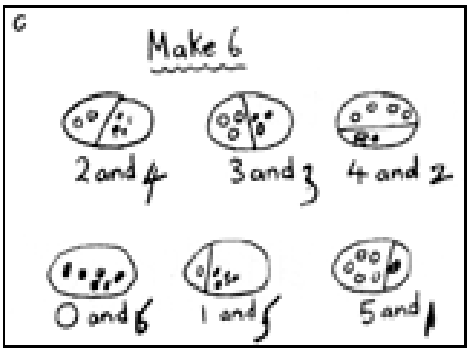
To support children in moving from a counting all strategy to one involving counting on, children should still have two groups of objects but one should be covered so that it cannot be counted. For example, when calculating 4 + 2, count out the two groups of counters as before.

Then cover up the larger group with a cloth.



For most children, it is beneficial to place the digit card on top of the cloth to remind them of the number of counters underneath. They can then start their count at 4, and touch count 5 and 6 in the same way as before, rather than having to count all of the counters separately as before.

Those who are ready may record their own calculations.



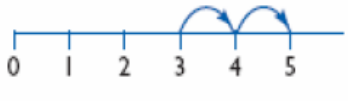
Stage 1

Children are taught that addition is the combining of two or more amounts. They begin by counting all of the items in the groups, then move on to counting on from the largest amount. Children are encouraged to develop a mental image of the size of numbers. They learn to think about addition as combining amounts in practical, real life situations.

They begin to record addition number sentences such as 2 + 4 = 6 and 8 = 3 + 5 and 3 + 2 + 4 = 9

Begin to relate addition to combining two groups of objects

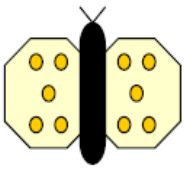
3 + 2 = 5



Count along a number line to add numbers together

Begin to use the + and = signs to record mental calculations in a number sentence

6 + 4=10



5 + 5 = 10

Know doubles of numbers

Children may also use their fingers to support addition.

Y1

Stage 2

End of Year Objective:

Add one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

the total by counting all or counting on. Using their developing understanding of place value, they will move on to be able to use Base 10 equipment to make teens numbers using separate tens and units.

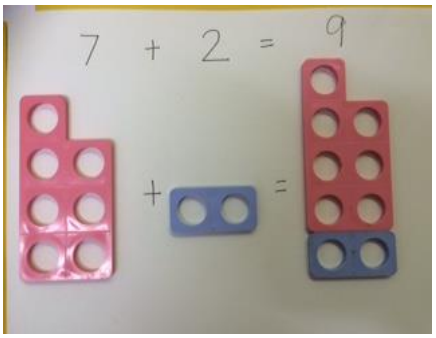
For example, when adding 11 and 5, they can make the 11 using a ten rod and a unit.

The units can then be combined to aid with seeing the final total, e.g.

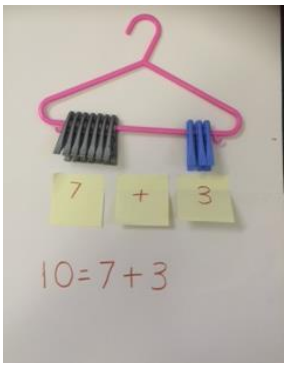
so 11 + 5 = 16. If possible, they should use two different colours of base 10 equipment so that the initial amounts can still be seen.

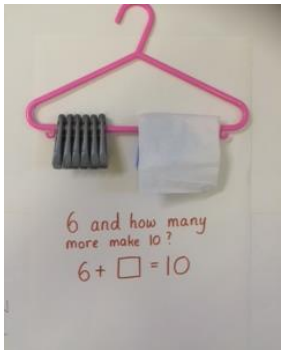
Children should also be encouraged to use a variety of practical equipment and visual representations.

Begin to use the + and = signs to record mental calculations in a number sentence.



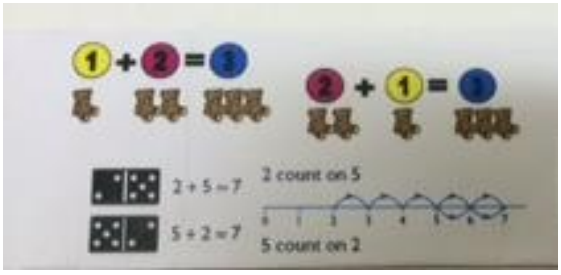
Know by heart all the pairs of numbers with a total of 10 and 20





Know doubles of numbers

Know that addition can be done in any order

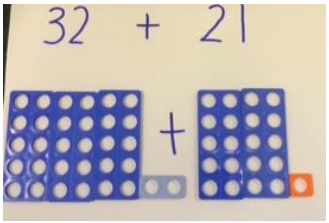


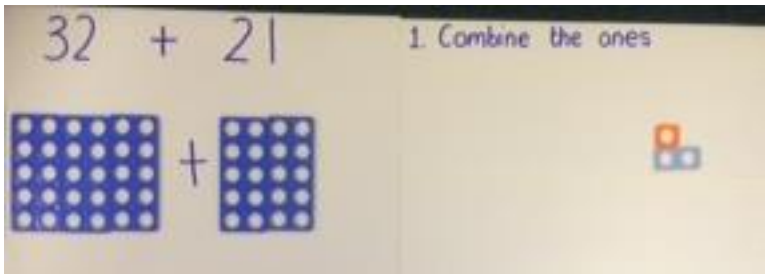
Y2

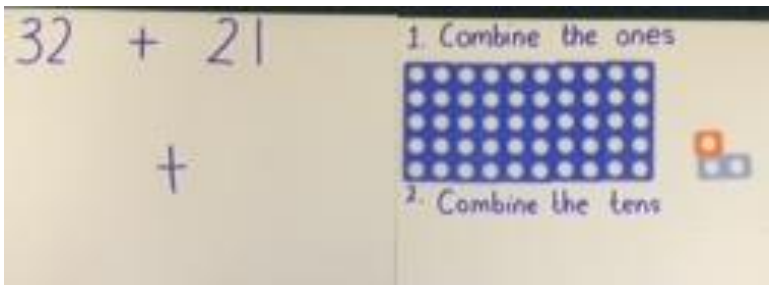
End of Year Objective:

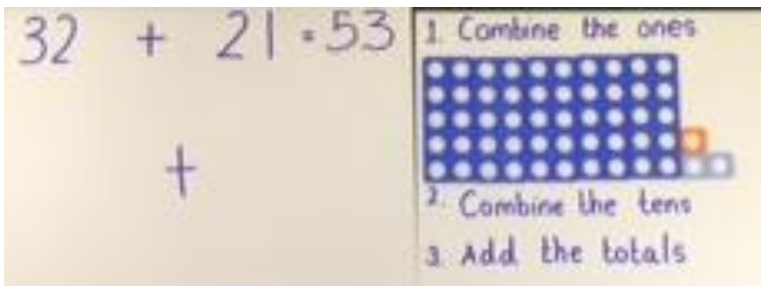
Add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; three one-digit numbers.

Children will continue to use the Numicon to support their calculations. For example, to calculate 32 + 21, they can make the individual amounts, counting the ones first and then count on the tens.

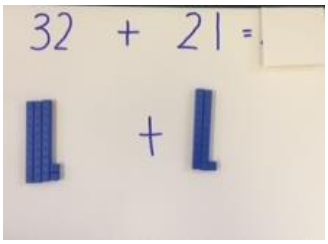


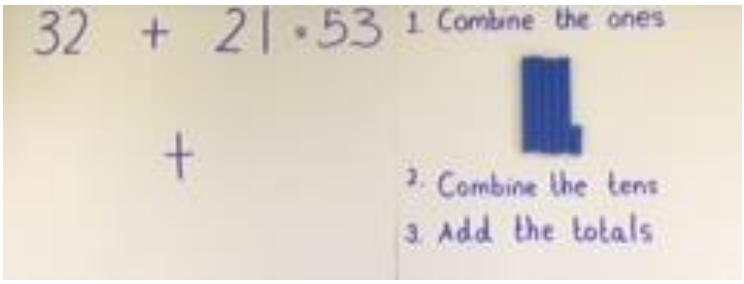




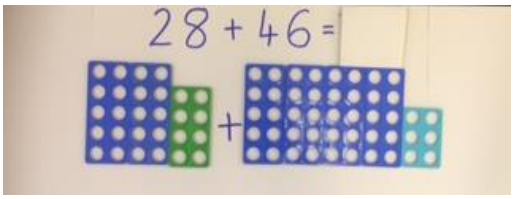


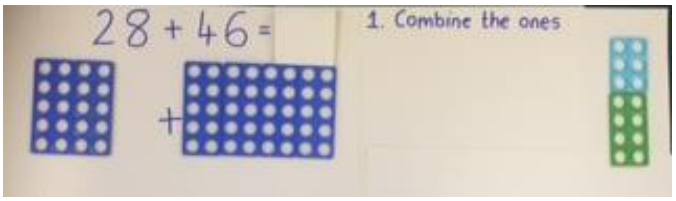
Once the children are secure, they can use the base 10 equipment.

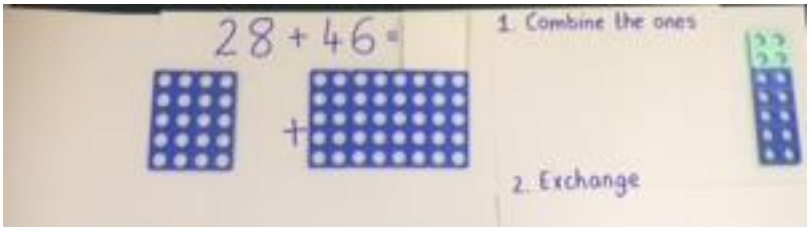


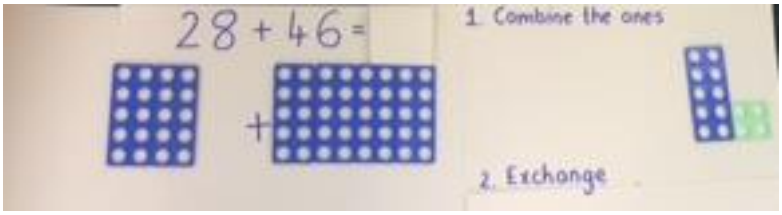


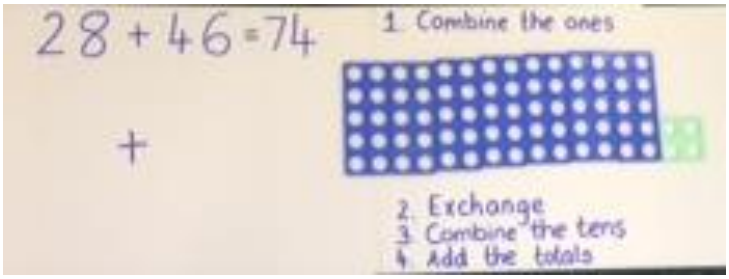
When the ones total more than 10, children should be encouraged to exchange 10 ones for 1 ten. This is the start of understanding `carrying` in vertical addition.



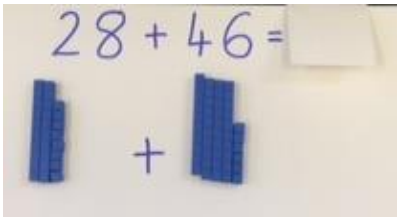


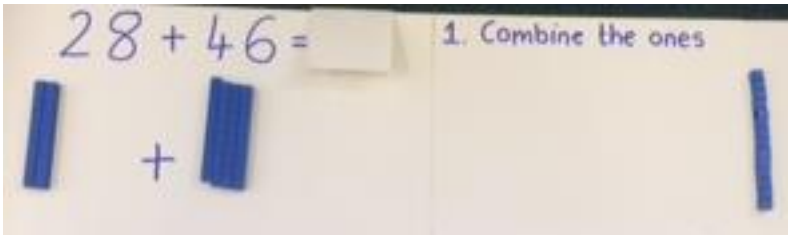


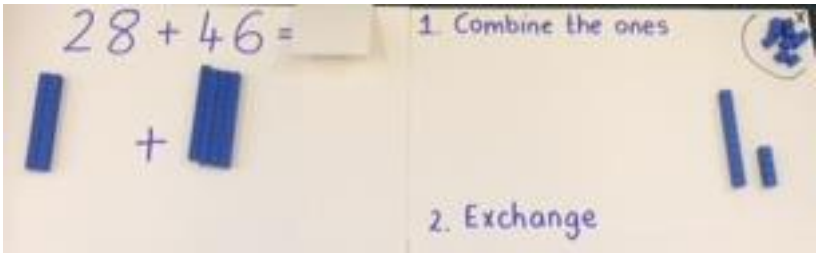


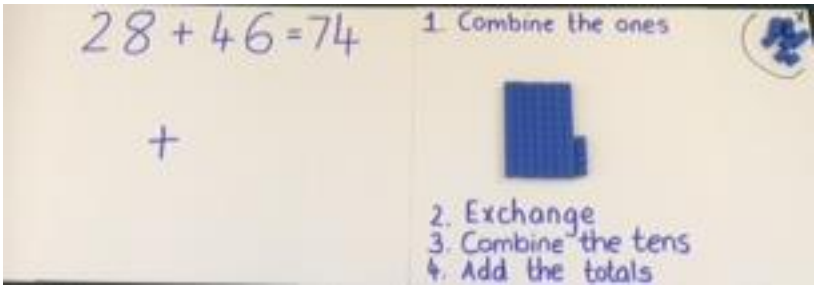


When the children are ready they can move on to using base 10.

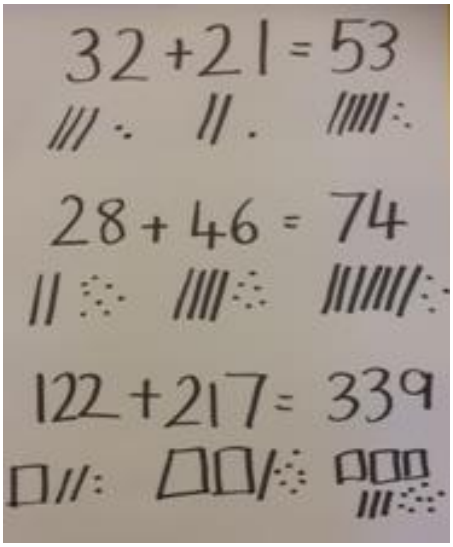






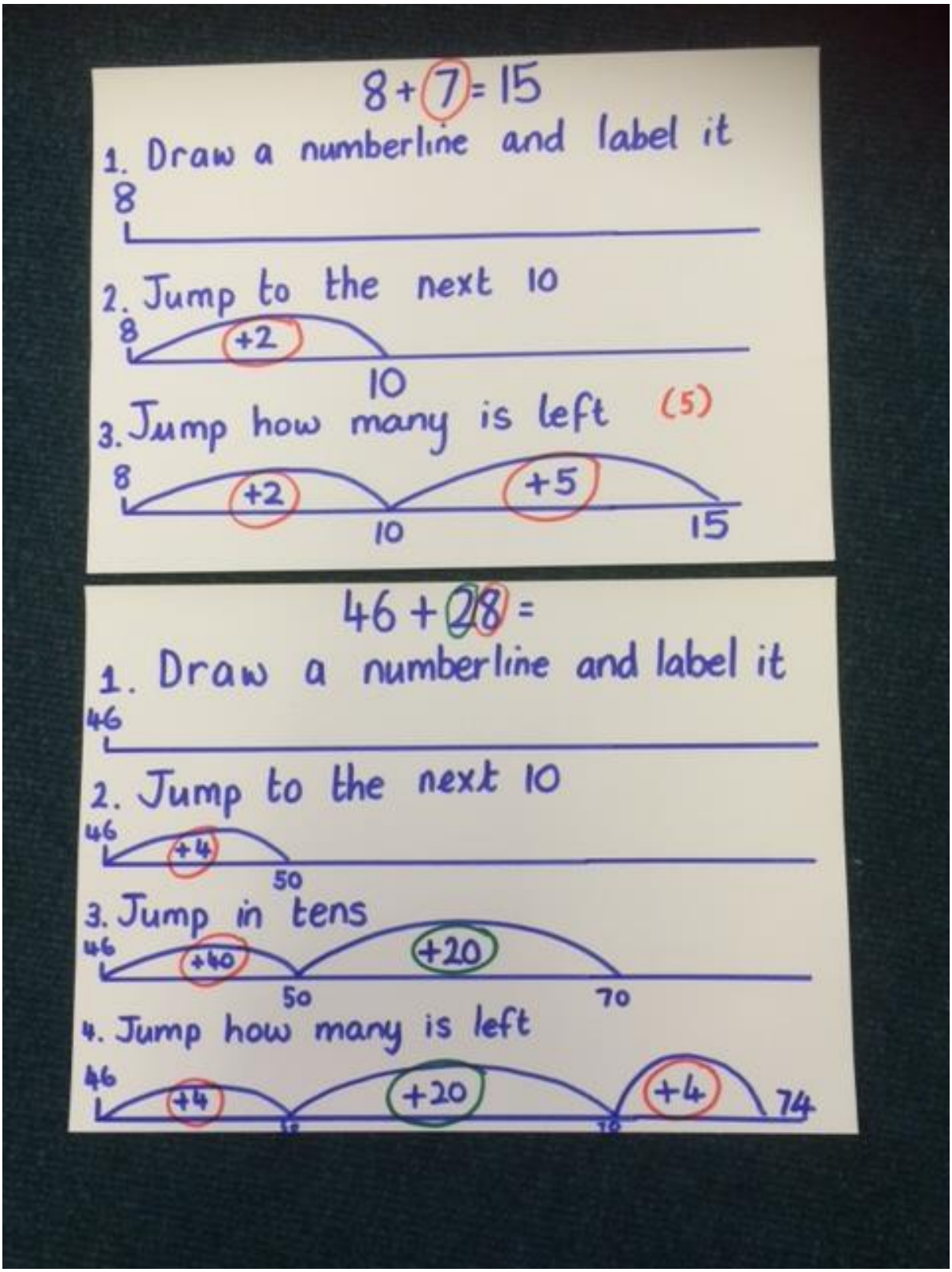


This can be formally recorded:



This can then be extended to adding three digit numbers e.g. 122+217 using a square as the representation of 100.

Challenge: By bridging through ten



Y3

End of Year Objective:

Add numbers with up to three digits, using formal written method of columnar addition.*

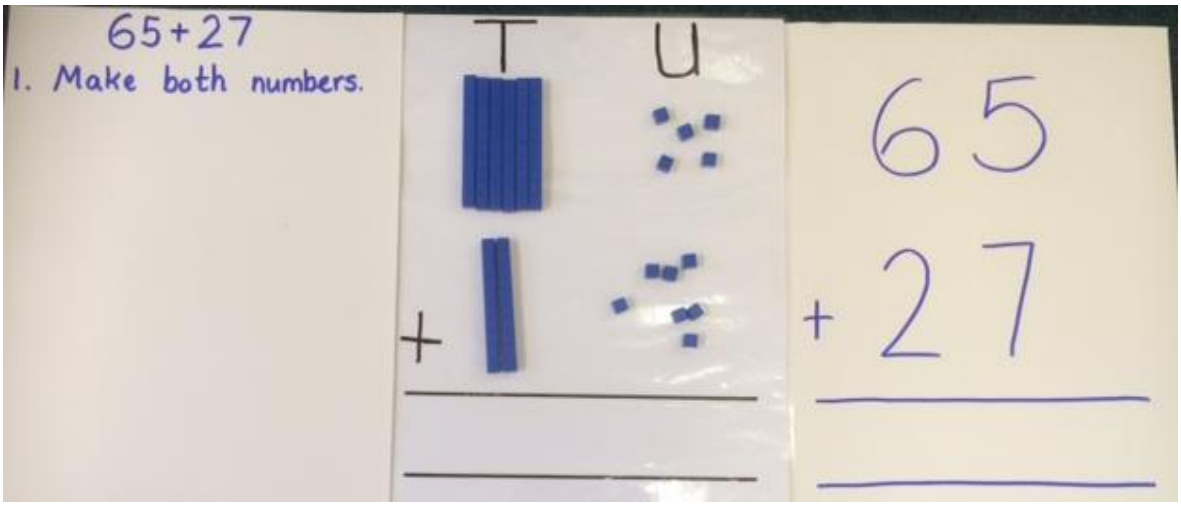
**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the end of the key stage. Within each key stage, schools therefore have the flexibility to introduce content earlier or later than set out in the programme of study." p4*

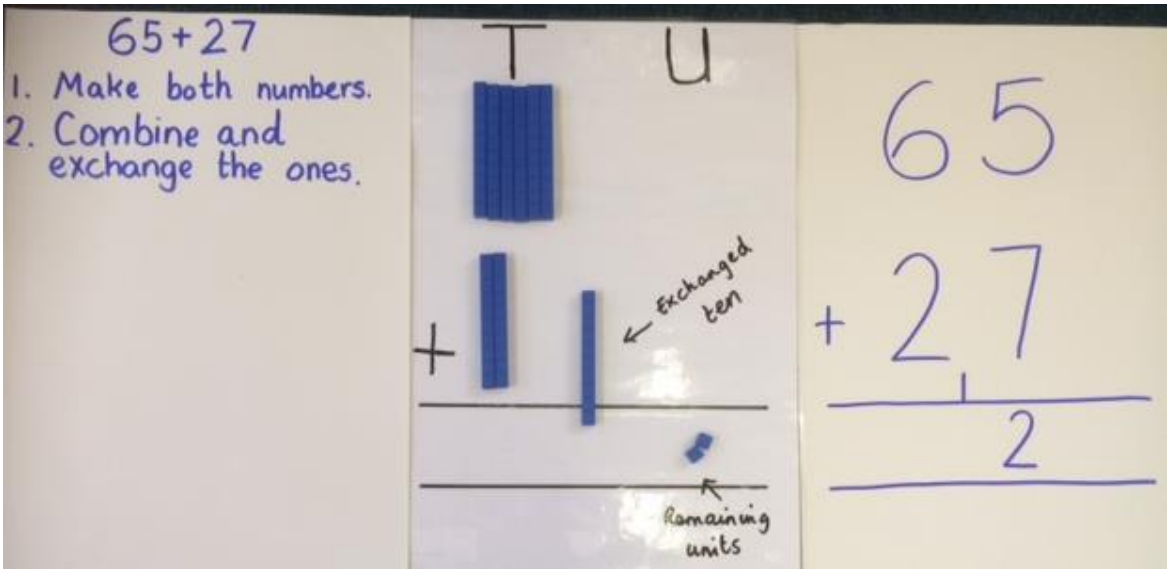
It is more beneficial for children's understanding to go through the expanded methods of calculation as steps of development towards a formal written method.

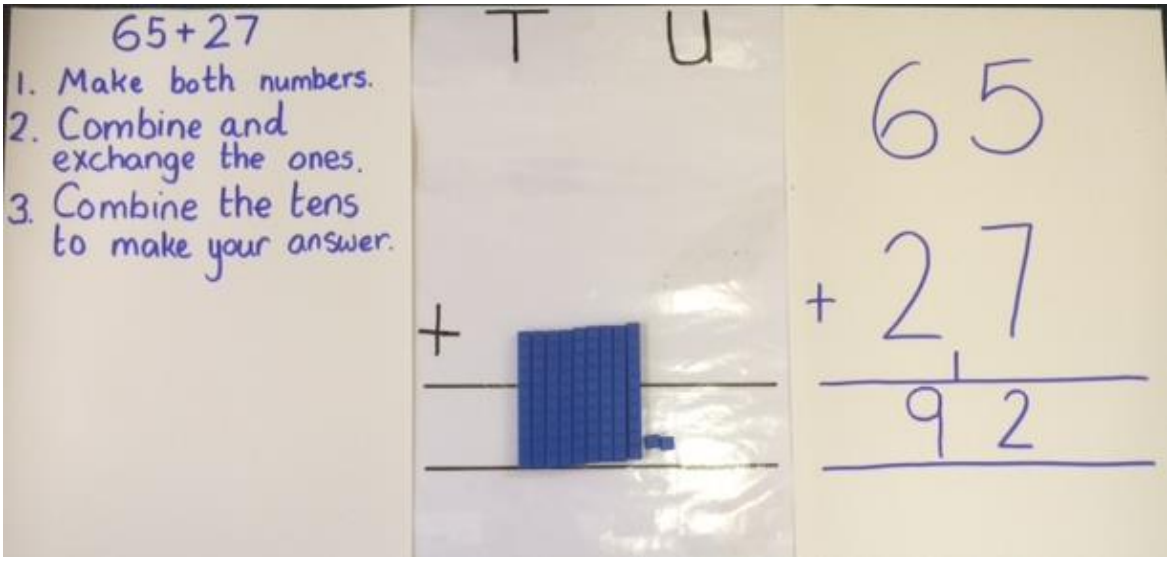
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange.

Children should add the **least significant digits** first (i.e. start with the units/ones), and in an identical method to that from year 2, should identify whether there are greater than ten units which can be exchanged for one ten.

They can use a place value grid to begin to set the calculation out vertically and to support their knowledge of exchange between columns (as in Step 1 in the diagram below). e.g. 65 + 27







Children should utilise this practical method to link their understanding of exchange to how the column method is set out. Teachers should model the written method alongside this practical method initially and the children should record visually only.

This should progress to children utilising the written, practical and visual methods alongside each other and finally, when they are ready, to children utilising just the written method.

By the end of year 3, children should also extend this method for three digit numbers.

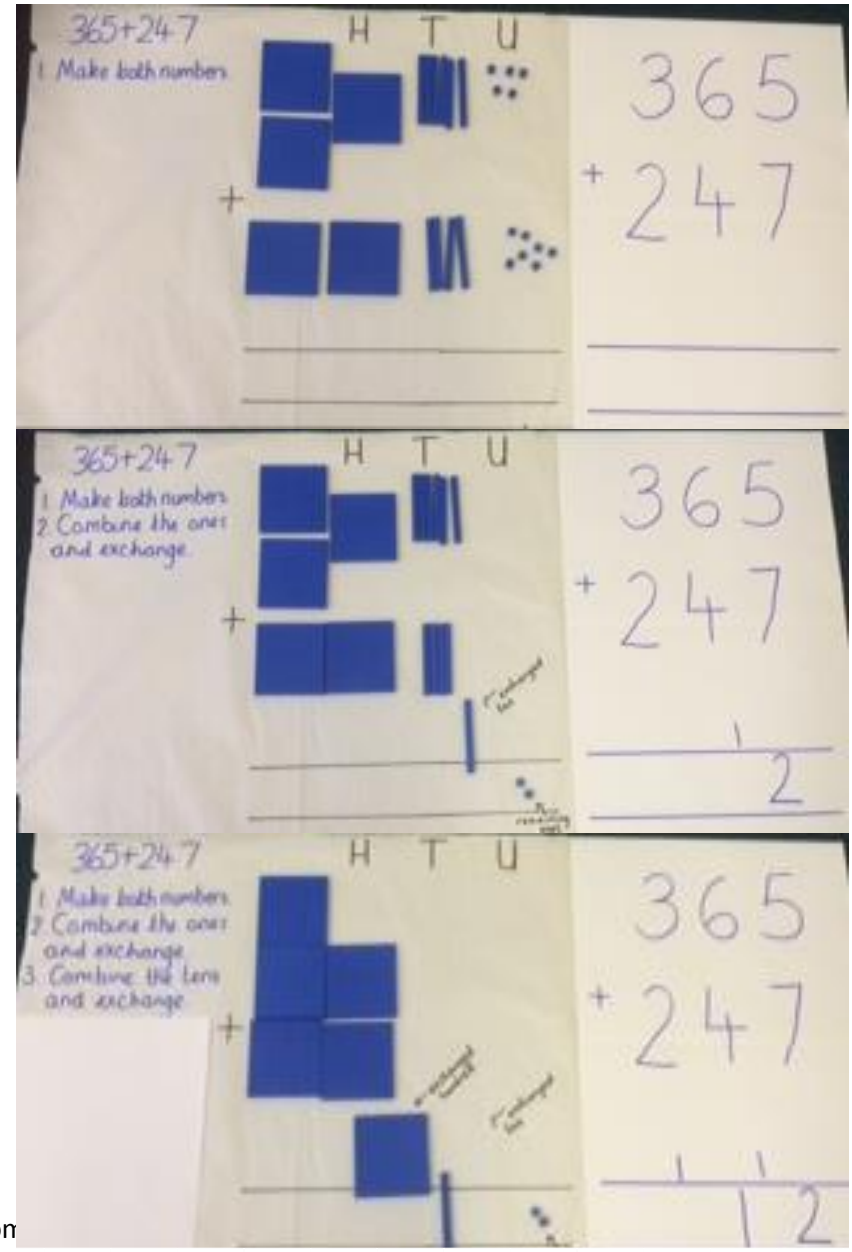
Y4

End of Year Objective:

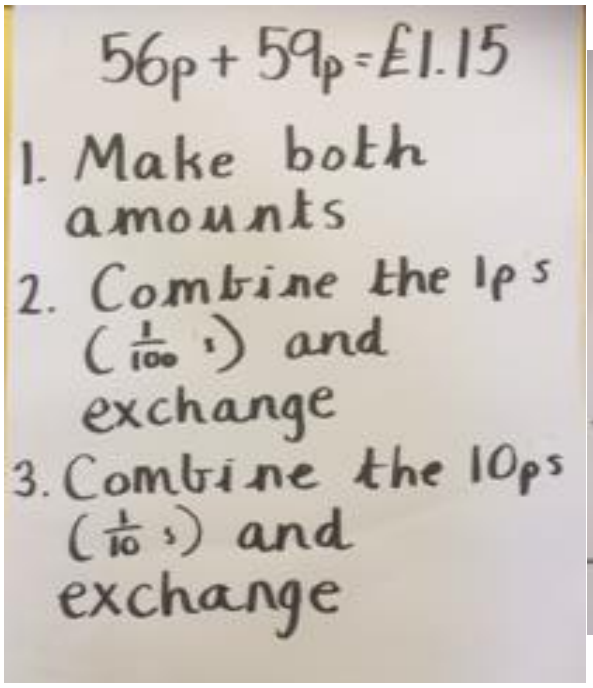
Add numbers with up to 4 digits *and decimals with one decimal place in the context of length and two decimal places in the context of money or length* using the formal written method of columnar addition where appropriate.

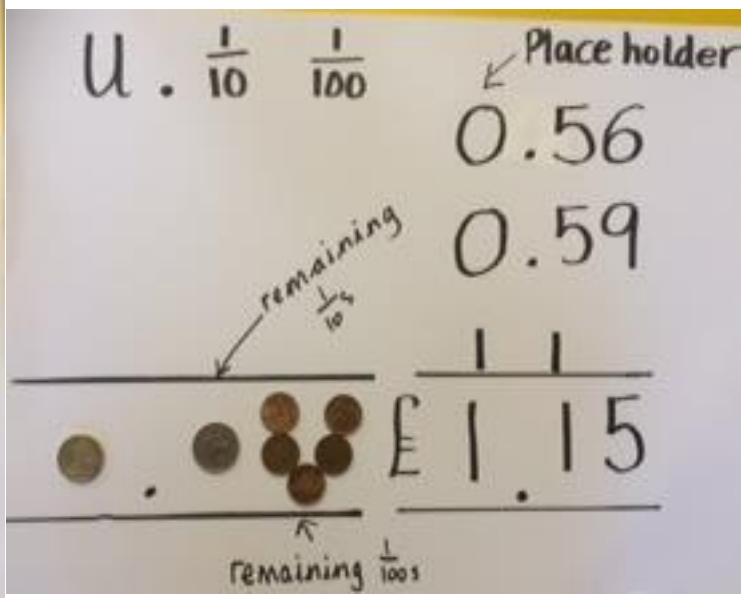
Children will move to year 4 using whichever method they were using as they transitioned from year 3. By the end of year 4, children should be using the written method confidently and with understanding. They will also be adding:

- several numbers with different numbers of digits, understanding the place value
- *decimals with one decimal place, knowing that the decimal points line up under one another.*




365+247
H T U
1. Make both numbers
2. Combine the ones and exchange
3. Combine the tens and exchange
4. Combine the hundreds
365
+247
612


56p + 59p = £1.15
1. Make both amounts
2. Combine the 1ps (1/100s) and exchange
3. Combine the 10ps (1/10s) and exchange


U . 1/10 1/100
Place holder
0.56
0.59
remaining 1/10s
£1.15
remaining 1/100s

Y5

End of Year Objective:

Add whole numbers with more than 4 digits *and decimals with two decimal places*, including formal written methods (columnar addition). This can be taught in the context of money or length

Children should continue to use the carrying method to solve calculations. They will also be adding:

- several numbers with different numbers of digits, understanding the place value
- *decimals with up to two decimal places (with each number having the same number of decimal places), knowing that the decimal points line up under one another.*
- amounts of money and measures, including those where they have to initially convert from one unit to another.

Y6

End of Year Objective:

Add whole numbers and decimals using formal written methods (columnar addition).

Children should extend the carrying method and use it to add whole numbers and decimals with any number of digits. When adding decimals with different numbers of decimal places, children should be taught and encouraged to make them the same through identification that 2 tenths is the same as 20 hundredths, therefore, 0.2 is the same value as 0.20.