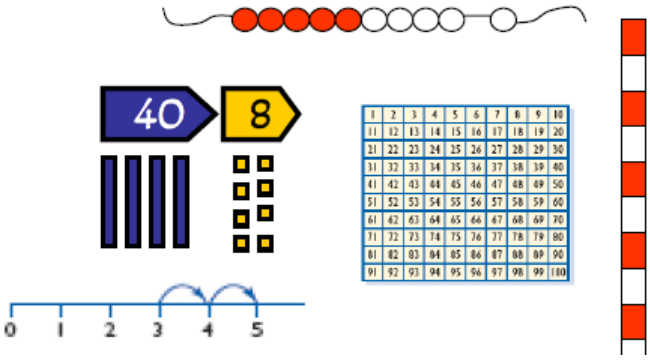
Progression in Teaching Subtraction

Mental Skills

Recognise the size and position of numbers
Count back in ones and tens
Know number facts for all numbers to 20
Subtract multiples of 10 from any number
Bridge through 10

Models and Images

Counting apparatus
Place value apparatus
Place value cards
Number tracks
Numbered number lines
Marked but unnumbered lines
Hundred square
Empty number lines.
Counting stick
Bead strings
Models and Images Charts
ITPs-Number Facts,
Counting on and back in ones and tens,
Difference
Numicon



In developing a written method for subtraction, it is important that children understand the concept of subtraction, in that it is:

- Removal of an amount from a larger group (take away)
- Comparison of two amounts (difference)

They also need to understand and work with certain principles, i.e. that it is:

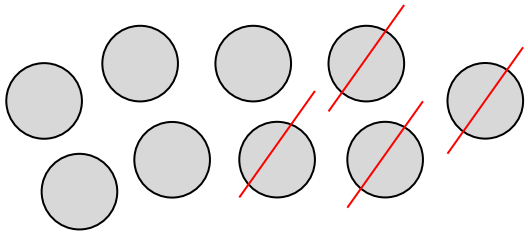
- the inverse of addition
- not commutative i.e. 5 - 3 is not the same as 3 - 5
- not associative i.e. 10 - 3 - 2 is not the same as 10 - (3 - 2)

Early Learning Goal:
Using quantities and objects, children subtract two single-digit numbers and count on or back to find the answer.

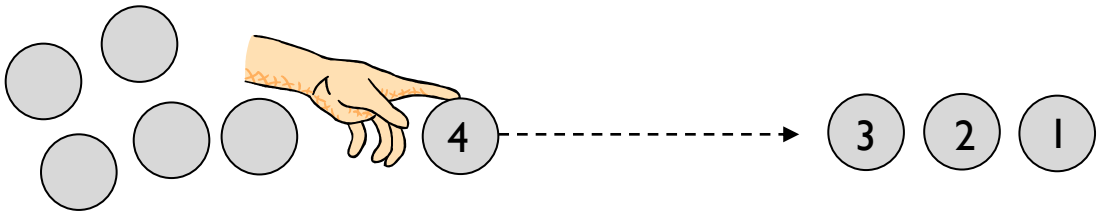
Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of practical equipment, including small world play, role play, counters, cubes etc.

Taking away

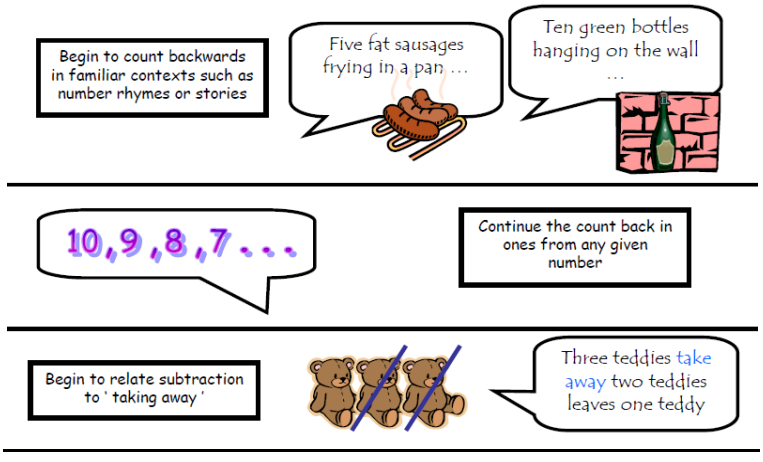
Children will begin to develop their ability to subtract by using practical equipment to count out the first number and then remove or take away the second number to find the solution by counting how many are left e.g. 9 – 4.



For illustration purposes, the amount being taken away are show crossed out. Children would be encouraged to physically remove these using touch counting.



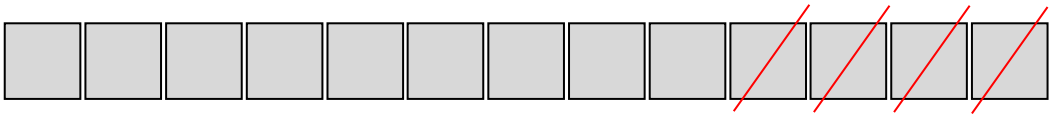
By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep re-counting. They will then touch count the amount that are left to find the answer.



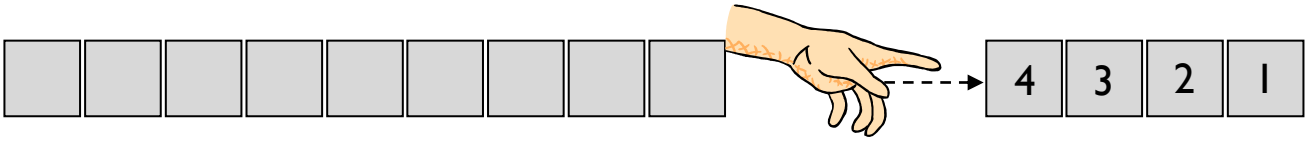
Y1

End of Year Objective:
Subtract one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).

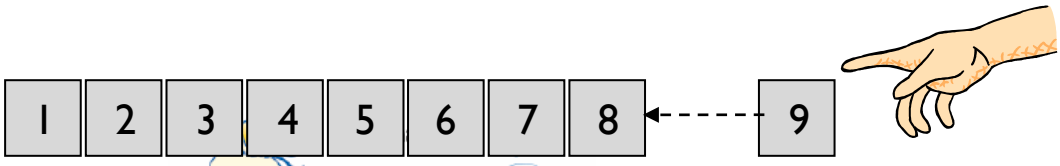
Children will continue to use practical equipment and taking away strategies. **To avoid the need to exchange for subtraction at this stage, it is advisable to continue to use equipment such as counters, cubes and the units from the Base 10 equipment, but not the tens, e.g. 13 - 4**

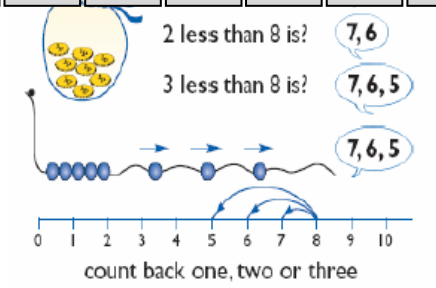


Touch count and remove the number to be taken away, in this case 4.

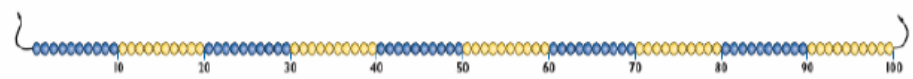


Touch count to find the number that remains.

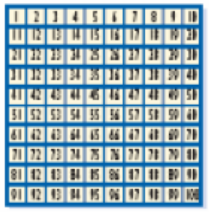


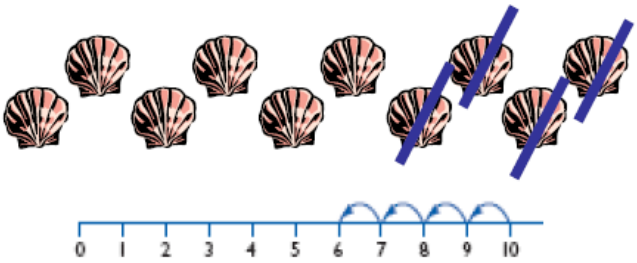


Find one less than a number



Count back in tens





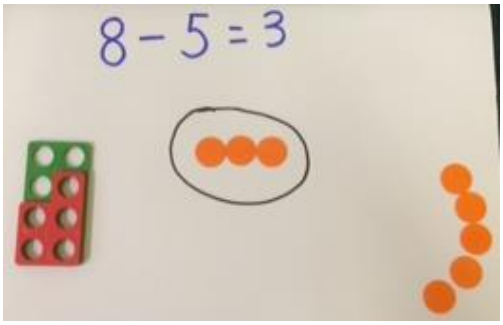
If I take away four shells there are six left

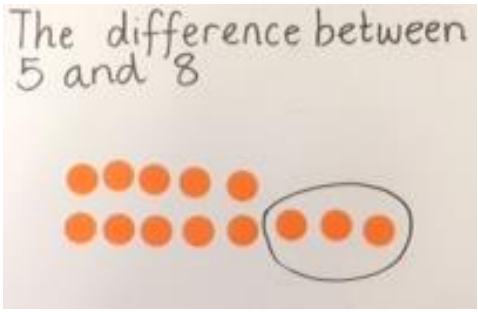
Count backwards along a number line to ' take away

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

Maria had six sweets and she ate four. How many did she have left?

6 – 4 = 2

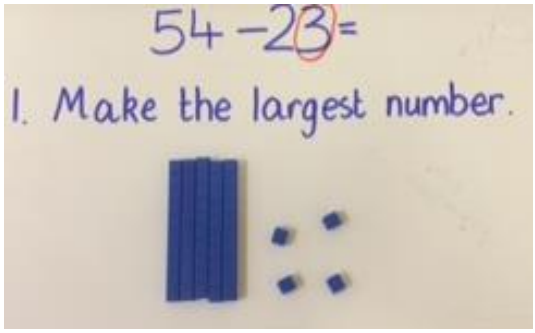


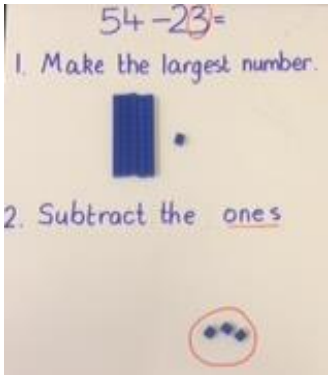


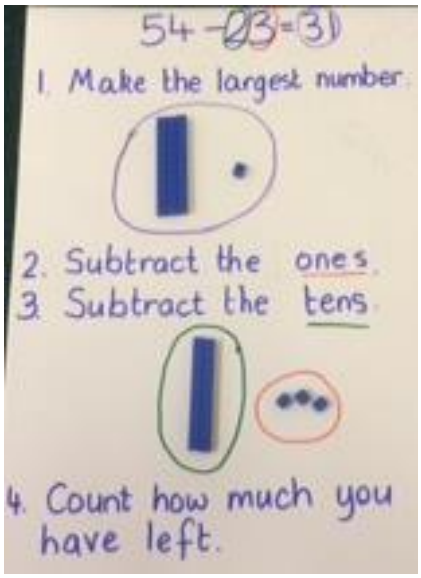
Y2

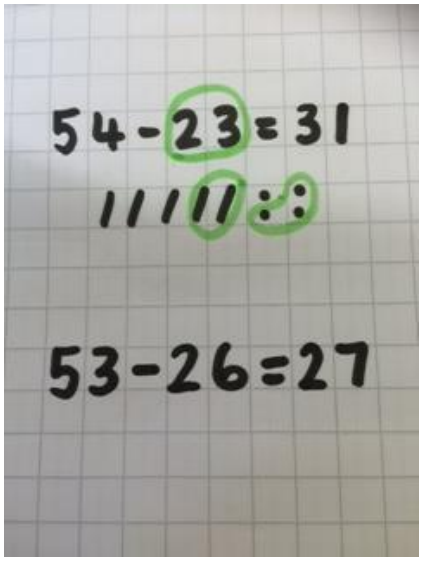
End of Year Objective:
Subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers.

Children will begin to use the Base 10 equipment to support their calculations, still using a take away, or removal, method. They need to understand that the number being subtracted does not appear as an amount on its own, but rather as part of the larger amount.

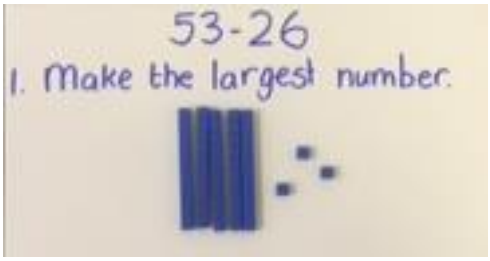


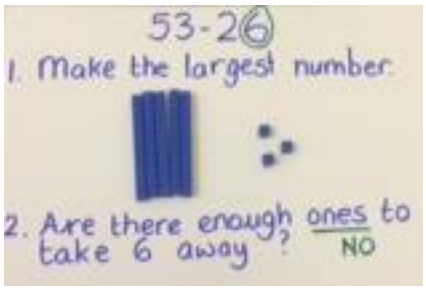


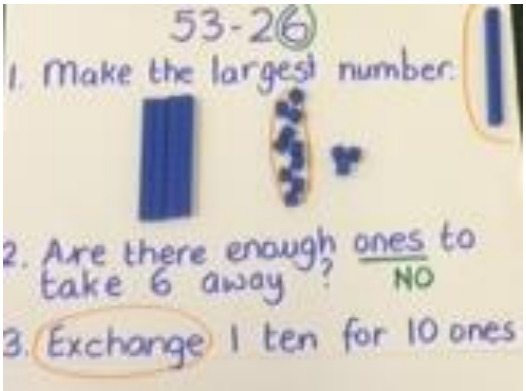


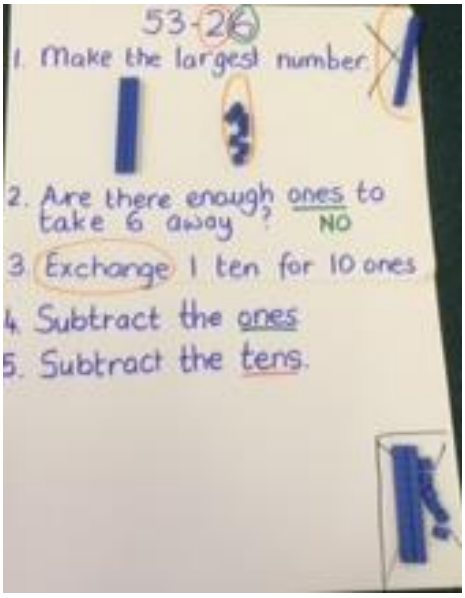


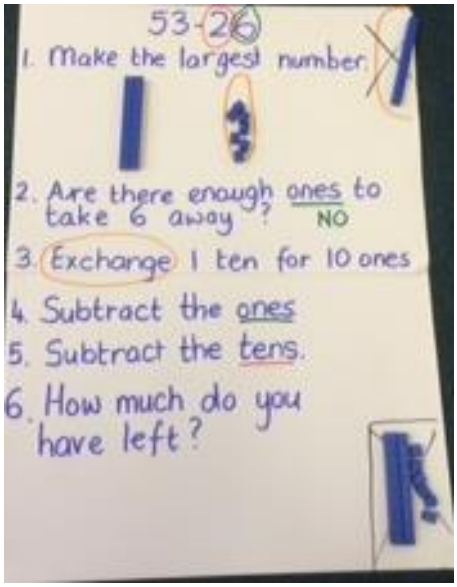
When the amount of units to be subtracted is greater than the units in the original number an exchange method is required. **This relies on children's understanding of ten ones being an equivalent amount to one ten.**



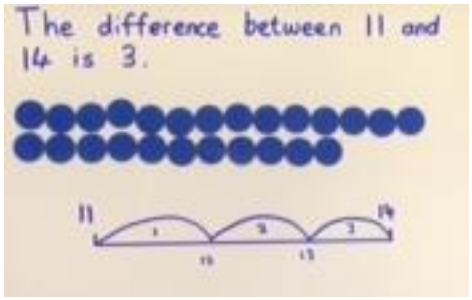


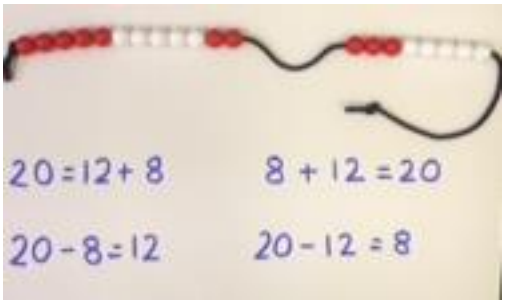






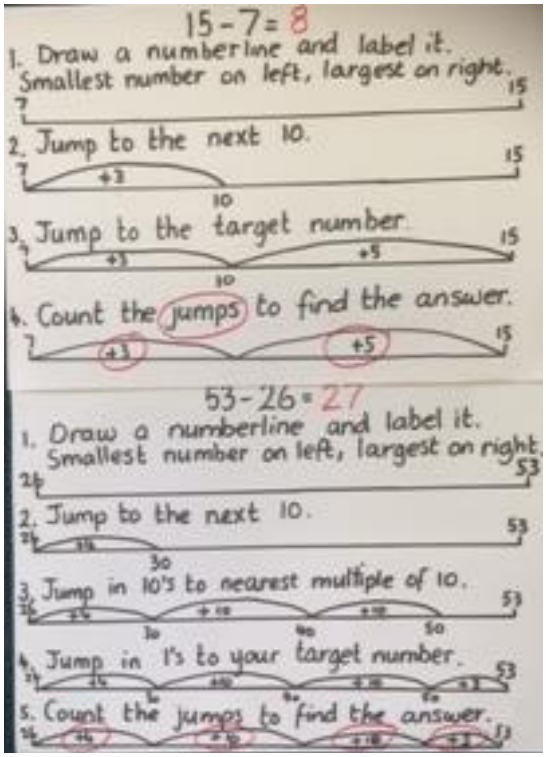
Children must also represent subtraction as difference.





Know by heart subtraction facts for numbers up to 10 and 20

Challenge:

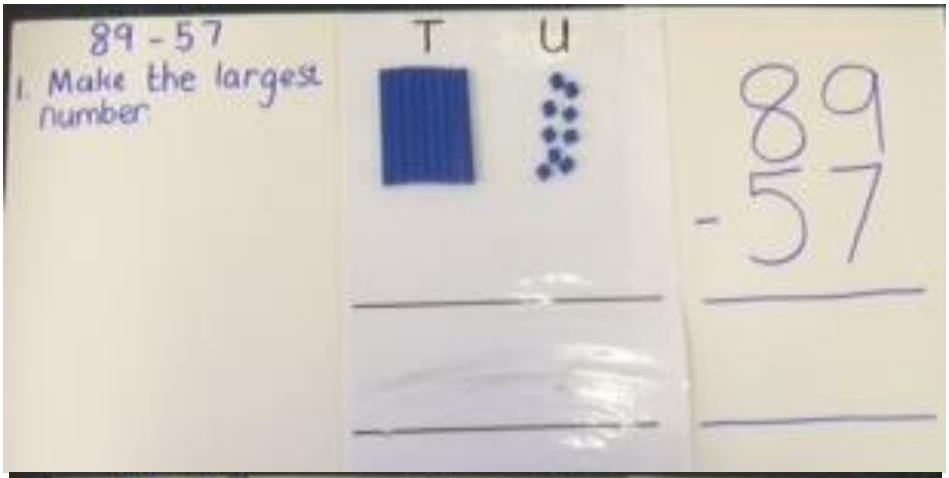


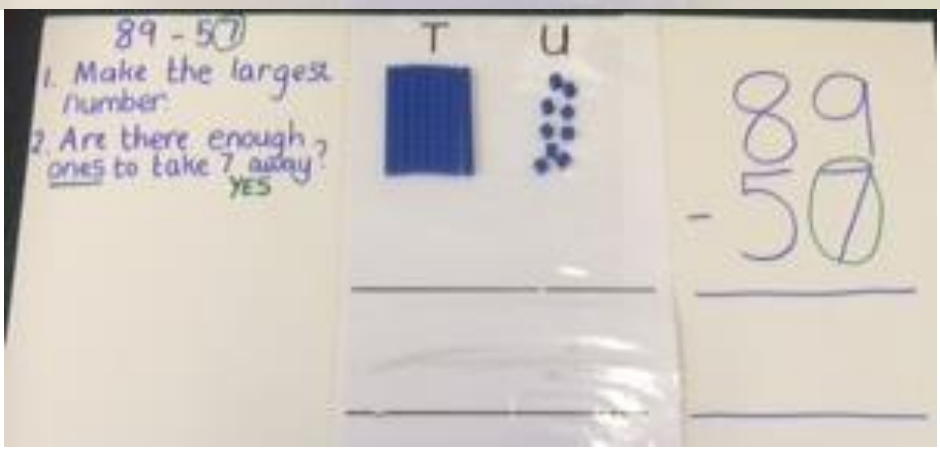
Y3

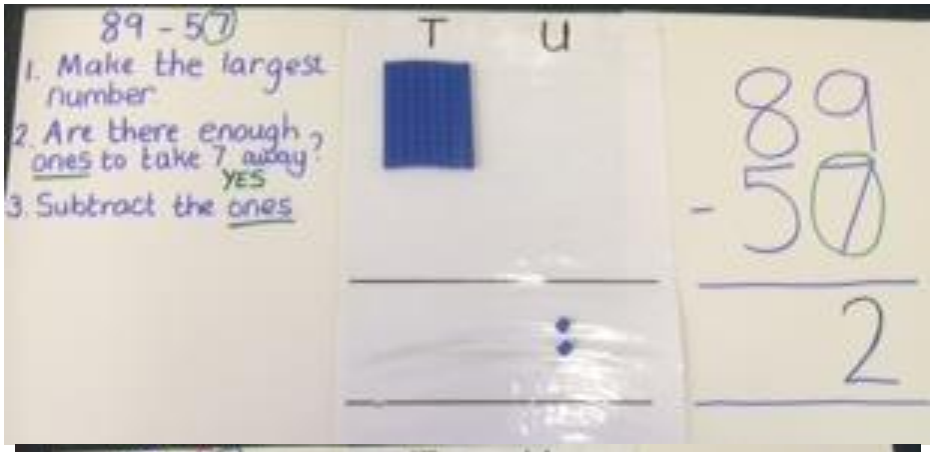
End of Year Objective:
Subtract numbers with up to three digits, using formal written method of column subtraction.*

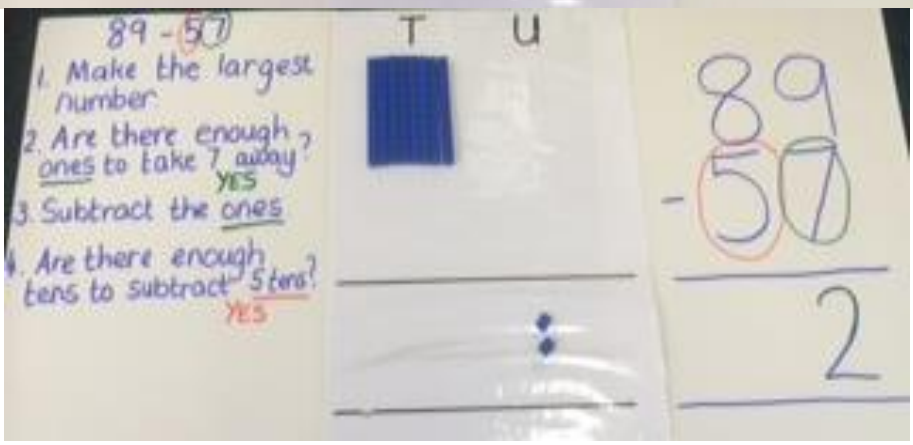
**Although the objective suggests that children should be using formal written methods, the National Curriculum document states "The programmes of study for mathematics are set out year-by-year for key stages 1 and 2. Schools are, however, only required to teach the relevant programme of study by the 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*

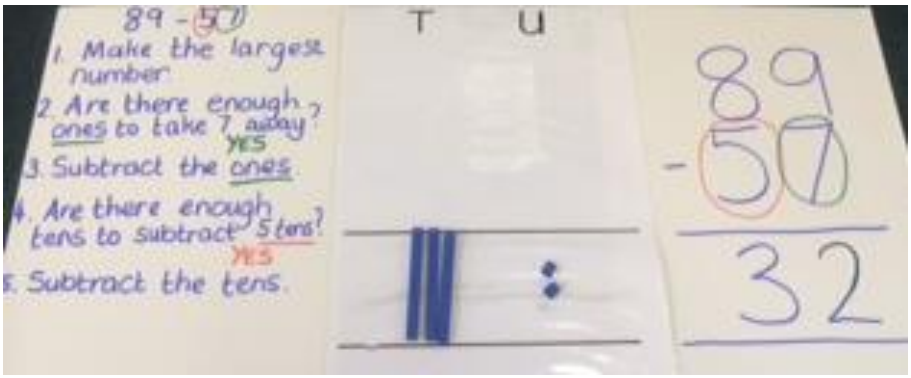
Children will build on their knowledge of using Base 10 equipment from Y2 and continue to use the idea of exchange. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to represent the first number, removing the units and tens as appropriate (as with the more informal method in Y2).



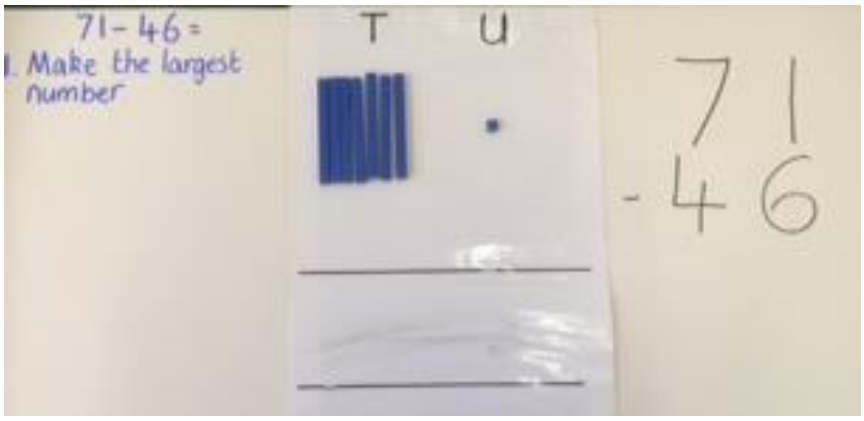




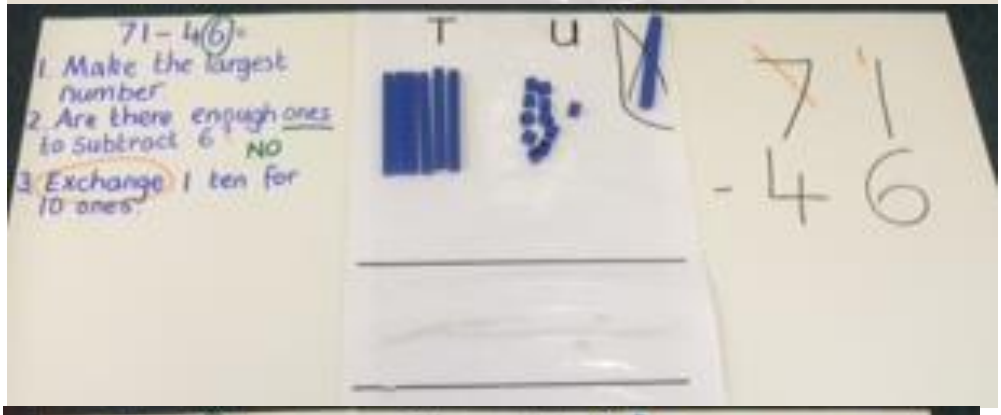


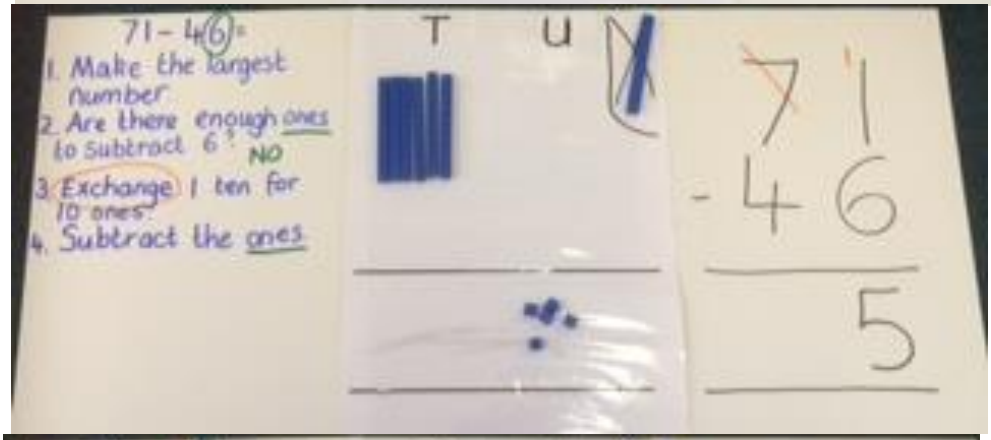


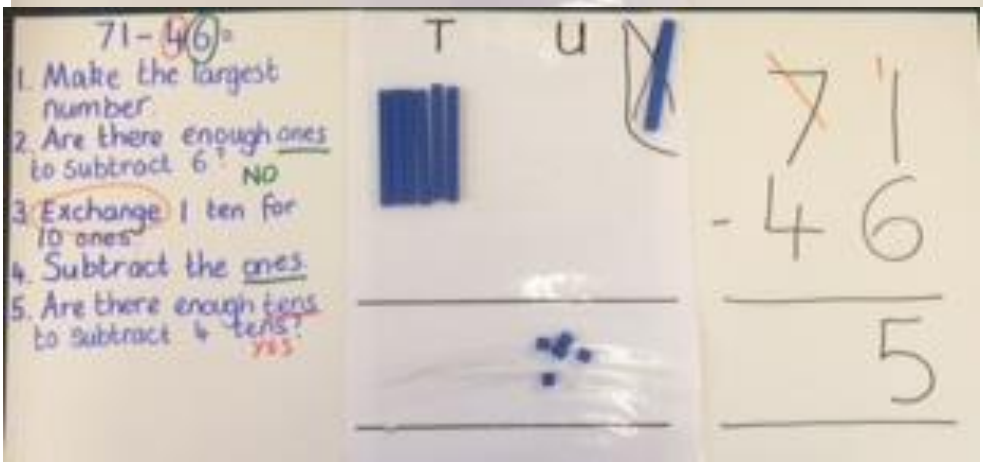
Once children are secure they should be introduced to crossing the tens.

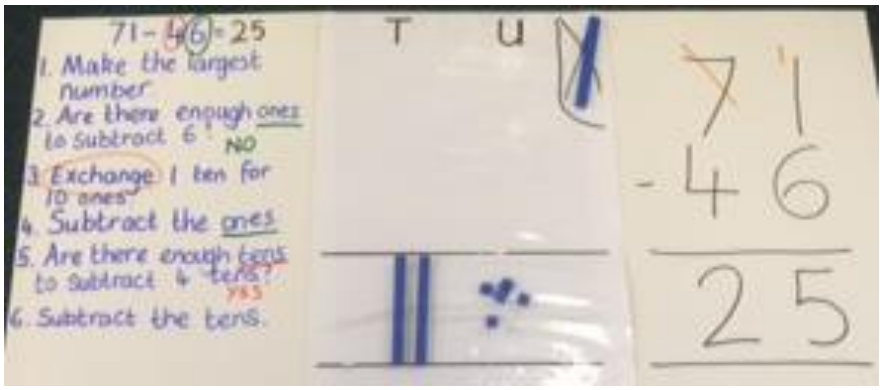



71 - 46 =
1. Make the largest number
2. Are there enough ones to subtract 6? NO
T U
7 1
- 4 6


71 - 46 =
1. Make the largest number
2. Are there enough ones to subtract 6? NO
3. Exchange 1 ten for 10 ones
T U
7 1
- 4 6


71 - 46 =
1. Make the largest number
2. Are there enough ones to subtract 6? NO
3. Exchange 1 ten for 10 ones
4. Subtract the ones
T U
7 1
- 4 6
5


71 - 46 =
1. Make the largest number
2. Are there enough ones to subtract 6? NO
3. Exchange 1 ten for 10 ones
4. Subtract the ones
5. Are there enough tens to subtract 4 tens? yes
T U
7 1
- 4 6
5



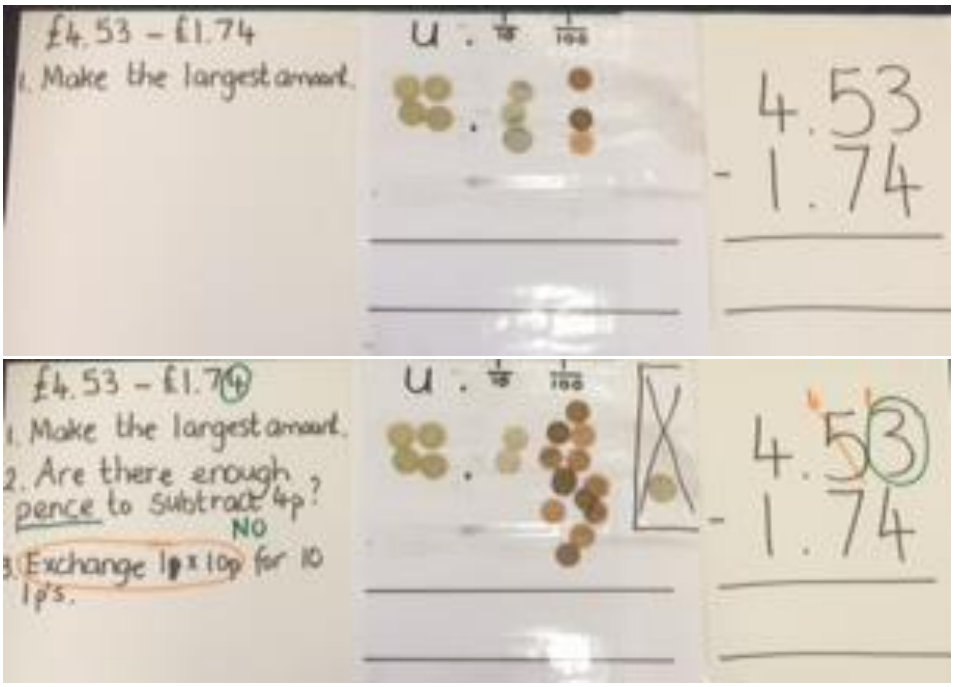
From this the children will begin to solve problems which involve exchange.
By the end of year 3, children should also extend this method for three digit numbers.

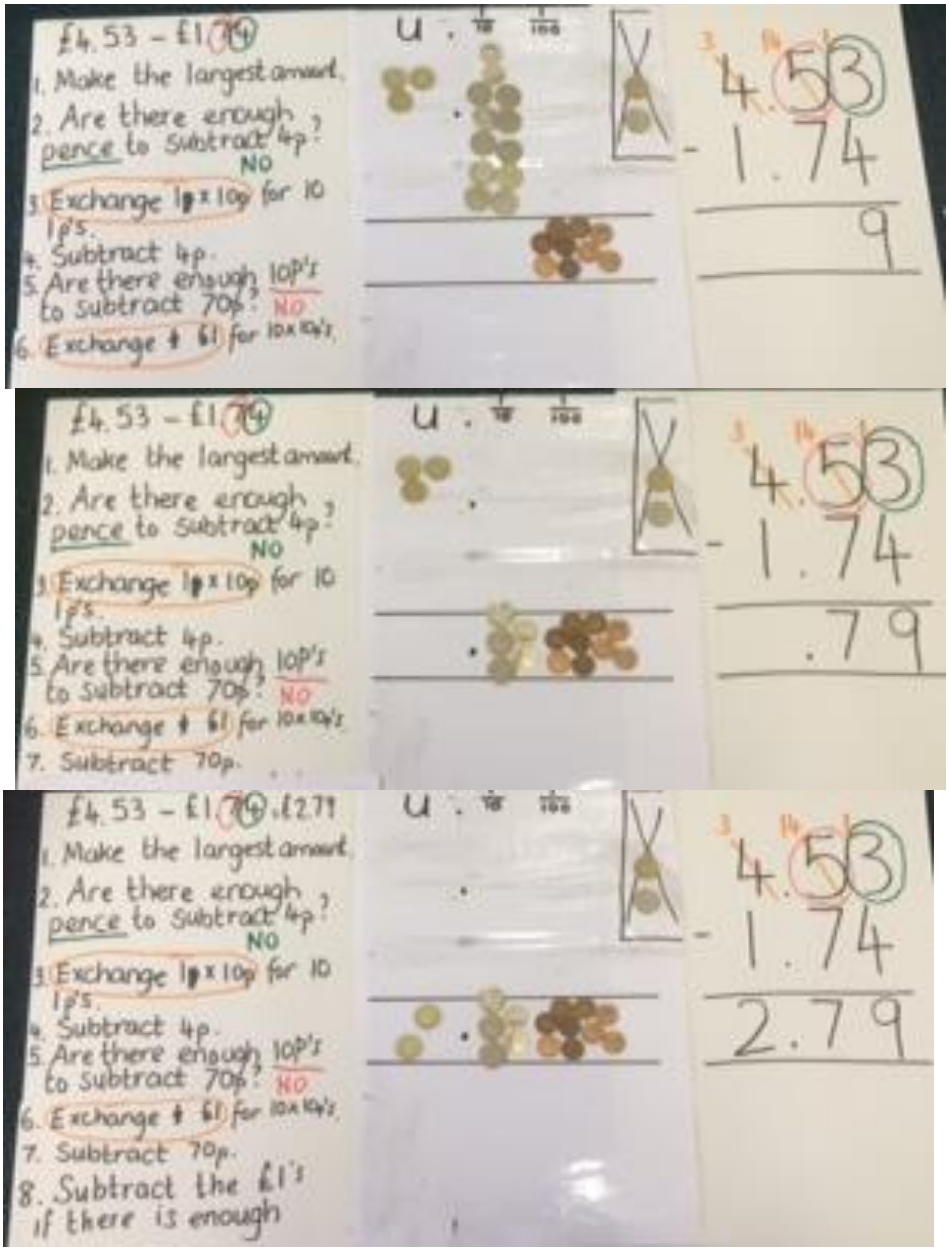
Y4

End of Year Objective:
Subtract numbers with up to 4 digits *and decimals with one decimal place in the context of length and two decimal places within the context of money* using the formal written method of column subtraction where appropriate.

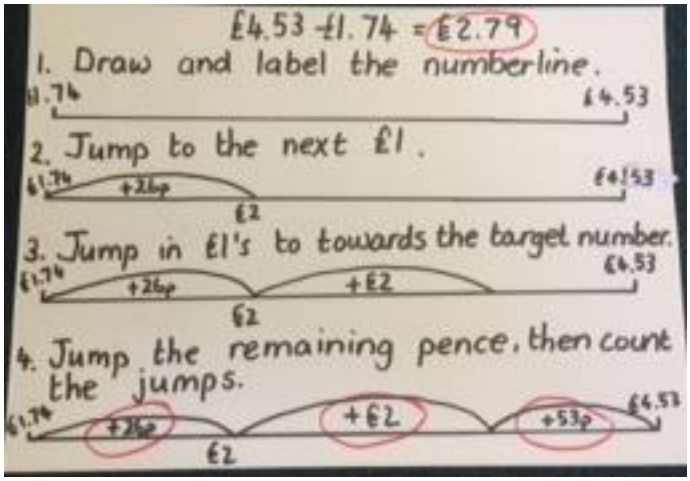
Children will move to Y4 using whichever method they were using as they transitioned from Y3. By the end of Y4, children should be using the written method confidently and with understanding. They will also be subtracting:

- 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*





Standard written method
The previous stages reinforce what happens to numbers when they are subtracted using more formal written methods. It is important that the children have a good understanding of place value and partitioning.



Y5

End of Year Objective:
Subtract whole numbers with more than 4 digits *and decimals with two decimal places in the context of length and money*, including formal written methods (column subtraction).

Children should continue to use the decomposition method to solve calculations such as:

$$\begin{array}{r} {}^{6}\cancel{7}\,{}^{1}0\,{}^{6}\cancel{7}\,{}^{1}2 \\ -\ 3\ 2\ 2\ 6 \\ \hline 3\ 8\ 4\ 6 \end{array} \qquad \begin{array}{r} {}^{2}\cancel{3}\ .\ {}^{13}\cancel{4}\,{}^{1}2 \\ -\ 1\ .\ 7\ 6 \\ \hline 1\ .\ 6\ 6 \end{array}$$

They will also be subtracting:

- 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:
Subtract whole numbers and decimals using formal written methods (column subtraction).

Children should extend the decomposition method and use it to subtract whole numbers and decimals with any number of digits.

$$\begin{array}{r} {}^{5}\cancel{6}\,{}^{13}\cancel{4}\,{}^{1}3\ 2 \\ -\ \ 4\ 6\ 8\ 1 \\ \hline 1\ 7\ 5\ 1 \end{array} \qquad \begin{array}{r} {}^{3}\cancel{4}\,{}^{1}1\,{}^{6}\cancel{7}\ .\ {}^{11}\cancel{2}\,{}^{1}0 \\ -\ \ 3\ 4\ .\ 7\ 1 \\ \hline 3\ 8\ 2\ .\ 4\ 9 \end{array}$$

When subtracting 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.

It is important to reinforce zero as a placeholder.

They will also be subtracting:

- numbers with different numbers of digits, understanding the place value
- *decimals with up to two decimal places (with mixed numbers 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.