



PROGRESSION THROUGH CALCULATIONS FOR SUBTRACTION

(We acknowledge Lancashire County Council as the main source for this document with some amendments specific to the Horwich and Blackrod Cluster) .

It is imperative that children gain concrete experiences through play and manipulation before moving to any structured work or method. This is essential when any new concept is introduced.

- These standards are age-related expectations and therefore we expect the majority of children to achieve them.
- New learning is likely to be taught to groups rather than the whole class to acknowledge the different learning stages of the children.
- Children should understand that subtraction is the removing or taking away one quantity from another (not necessarily the smaller number from the larger one) or finding the difference between two separate quantities.
- Children should understand that, unlike addition, subtraction is **not** commutative.
- Ensure that children understand the = sign means is the same as, not makes, and that children see calculations where the equals sign is in a different position, e.g. $9 - 5 = 4$ and $4 = 9 - 5$.
- Children should be encouraged to approximate before calculating and check whether their answer is reasonable.

By the end of year 6, children will have a range of calculation methods, mental and written. Selection will depend upon the numbers involved.

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

- 1) they are not ready.
- 2) they are not confident.

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

Reception

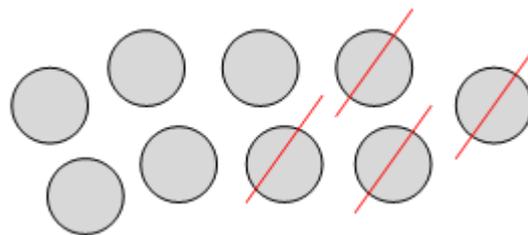
Early Learning Goal:

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

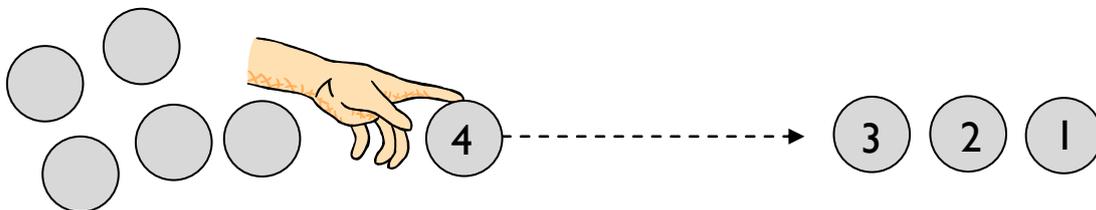
Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They should experience practical calculation opportunities using a wide variety of equipment, e.g. small world play, role play, counters, cubes etc. They develop ways of recording calculations using pictures, 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 is shown as 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 recounting. They will then touch count the amount that is left to find the answer.



Those who are ready may record their own calculations. They may record this as $8 - 5 = 3$

Resources:

A wide variety of equipment, e.g. small world play, role play, counters, cubes , Numicon, ITPs, Models and images etc.

Key Vocabulary:

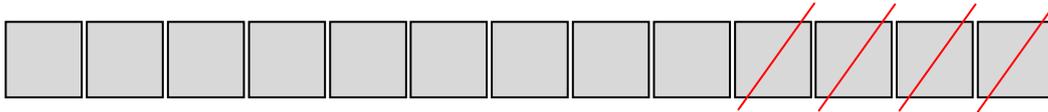
Subtract, take away, less than, equals, bigger, smaller, lower

Y1

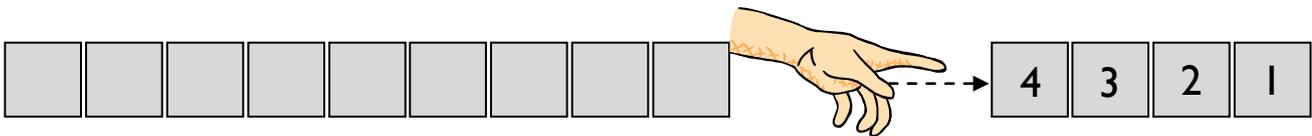
End of Year Objective:

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

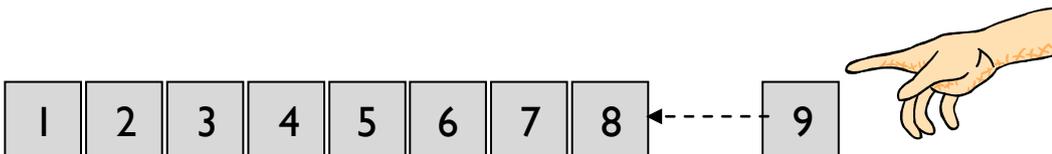
Children will continue to use practical equipment and taking away strategies. To avoid the need to exchange for subtraction at this stage, it is advisable to continue to use equipment such as counters, cubes and the ones from the Base 10 equipment, but not the tens, e.g. $13 - 4$



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



Touch count to find the number that remains.



Resources:

A wide variety of equipment, e.g. small world play, role play, counters, cubes etc.
Number tracks, Base Ten, Numicon, ITPs, Models and images

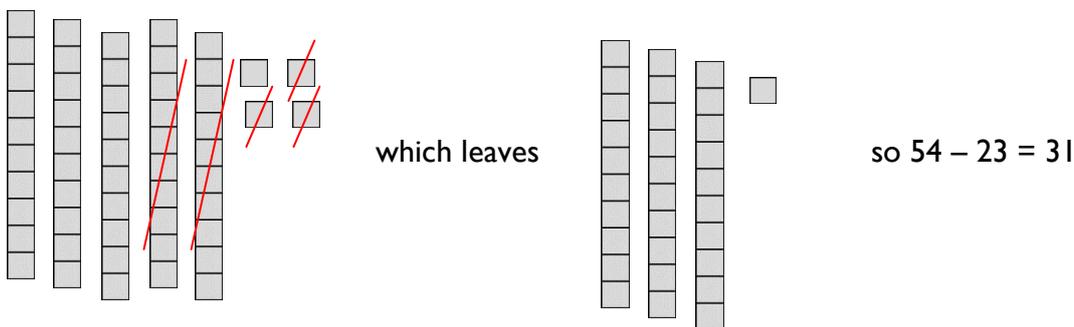
Vocabulary: Subtract, take away, less than, equals, bigger, smaller, lower

Y2

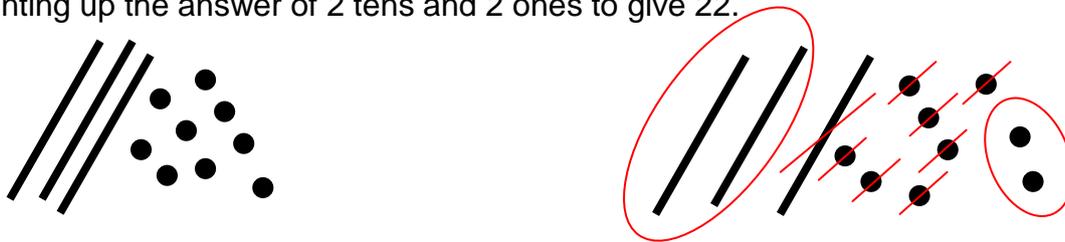
End of Year Objective:

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. For example, to calculate $54 - 23$, children would count out 54 using the Base 10 equipment (5 tens and 4 ones). They need to consider whether there are enough ones to remove 3, in this case there are, so they would remove 3 ones and then two tens, counting up the answer of 3 tens and 1 (one) to give 31.

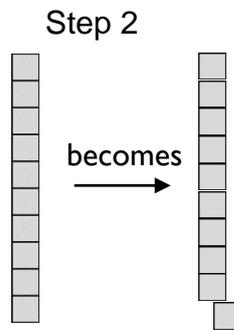
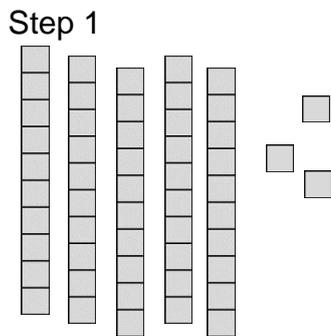


Children can also record the calculations using their own drawings of the Base 10 equipment (as slanted lines for the 10 rods and dots for the ones blocks), e.g. to calculate $39 - 17$ children would draw 39 as 3 tens (lines) and 4 ones (dots) and would cross out 7 ones and then one ten, counting up the answer of 2 tens and 2 ones to give 22.

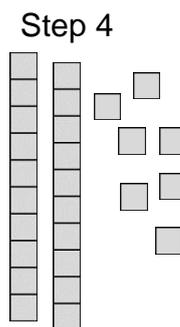
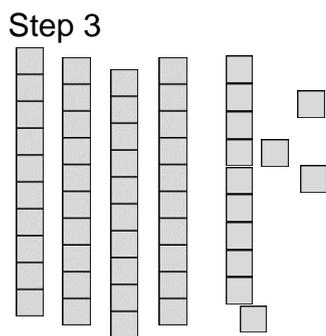


Circling the tens and ones that remain will help children to identify how many remain.

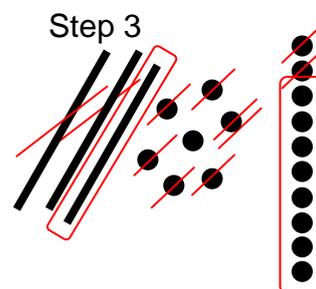
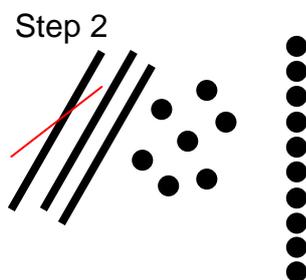
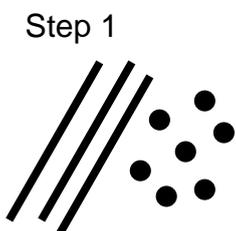
When the amount of ones to be subtracted is greater than the ones in the original number, an exchange method is required. This relies on children's understanding of ten ones being an equivalent amount to one ten. To calculate $53 - 26$, by using practical equipment, they would count out 53 using the tens and ones, as in Step 1. They need to consider whether there are enough ones to remove 6. In this case there are not so they need to exchange a ten into ten ones to make sure that there are enough, as in step 2.



The children can now see the 53 represented as 40 and 13, still the same total, but partitioned in a different way, as in step 3 and can go on to take away the 26 from the calculation to leave 27 remaining, as in Step 4.



When recording their own drawings, when calculating $37 - 19$, children would cross out a ten and exchange for ten ones. Drawing them in a vertical line, as in Step 2, ensures that children create ten ones and do not get them confused with the ones that were already in place.



Circling the tens and ones that remain will help children to identify how many remain.

Resources:

Base Ten, Numicon
ITPs, Models and images

Key Vocabulary:

Subtract, take away, less than, equals, bigger, smaller, remove, tens, ones, exchange, partition, calculation

Y3

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

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. This process should be demonstrated using arrow cards to show the partitioning and Base 10 materials to represent the first number, removing the ones and tens as appropriate (as with the more informal method in Y2).

Step 1

Step 2

Step 3

Emphasise that the second (bottom) number is being subtracted from the first (top) number rather than the lesser number

This will be recorded by the children as:

$$\begin{array}{r}
 80 \quad 9 \\
 - 50 \quad 7 \\
 \hline
 30 \quad 2 = 32
 \end{array}$$

Children can also use jottings of the Base 10 materials (as in Year 2) to support with their calculation, as in the example below.

$$\begin{array}{r}
 \begin{array}{c} \text{//////} \\ 80 \\ - 50 \\ \hline 30 \end{array} \quad \begin{array}{c} \bullet\bullet\bullet \\ 9 \\ - 7 \\ \hline 2 \end{array} \\
 \hline
 30 \quad 2 = 32
 \end{array}$$

From this the children will begin to solve problems which involve exchange. Children need to consider whether there are enough ones to remove 6. In this case there are not (Step 1) so they need to exchange a ten into ten ones to make sure that there are enough, as they have been doing in the method for Year 2 (Step 2). They should be able to see that the number is just partitioned in a different way, but the amount remains the same ($71 = 70 + 1 = 60 + 11$).

Step 1



$$\begin{array}{r}
 70 \\
 - 40 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 1 \\
 - 6 \\
 \hline
 \end{array}$$

Step 2



$$\begin{array}{r}
 60 \\
 - 40 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 11 \\
 - 6 \\
 \hline
 \end{array}$$

Step 3



$$\begin{array}{r}
 60 \\
 - 40 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 11 \\
 - 6 \\
 \hline
 \end{array}$$

Step 4



$$\begin{array}{r}
 60 \\
 - 40 \\
 \hline
 20
 \end{array}
 \quad
 \begin{array}{r}
 11 \\
 - 6 \\
 \hline
 5
 \end{array}$$

This will be recorded by the children as:

$$\begin{array}{r}
 60 \\
 \cancel{70} \quad 11 \\
 - 40 \quad 6 \\
 \hline
 20 \quad 5 = 25
 \end{array}$$

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

Resources:

Base Ten, Numicon, arrow cards, ITPs, Models and images

Key Vocabulary:

Subtract, take away, less than, equals, bigger, smaller, removal, tens, ones, digits, partition, calculation, exchange, expanded decomposition, multiples, count

Y4

End of Year Objective:

Subtract numbers with up to 4 digits and decimals with one decimal place using the formal written method of columnar subtraction where appropriate.

Children will move to Y4 using whichever method they were using as they transitioned from Y3.

Step 1

$$\begin{array}{r} 700 \quad 50 \quad 4 \\ - 200 \quad 80 \quad 6 \\ \hline \end{array}$$

Step 2 (exchanging from tens to ones)

$$\begin{array}{r} 700 \quad \overset{40}{\cancel{50}} \quad 4 \\ - 200 \quad 80 \quad 6 \\ \hline \end{array}$$

Step 3 (exchanging from hundreds to tens)

$$\begin{array}{r} \overset{600}{\cancel{700}} \quad \overset{140}{\cancel{50}} \quad 4 \\ - 200 \quad 80 \quad 6 \\ \hline \end{array}$$

Step 4 (Calculate)

$$\begin{array}{r} \overset{600}{\cancel{700}} \quad \overset{140}{\cancel{50}} \quad 4 \\ - 200 \quad 80 \quad 6 \\ \hline 400 \quad 60 \quad 8 = 468 \end{array}$$

This would be recorded by the children as:

$$\begin{array}{r} \overset{600}{\cancel{700}} \quad \overset{140}{\cancel{50}} \quad 4 \\ - 200 \quad 80 \quad 6 \\ \hline 400 \quad 60 \quad 8 = 468 \end{array}$$

When children are ready, this leads on to the compact method of decomposition:

$$\begin{array}{r} 4 \quad \overset{6}{\cancel{7}} \quad \overset{14}{\cancel{5}} \quad 4 \\ - 3 \quad 2 \quad 8 \quad 6 \\ \hline 1 \quad 4 \quad 6 \quad 8 \end{array}$$

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.*

Children will be able to use the inverse to check their calculations.

In mental calculations children will be counting on using larger and larger numbers with number lines.

Resources:

Arrow cards, ITPs, Models and images

Key Vocabulary:

Subtract, take away, less than, equals, bigger, smaller, hundreds, tens, ones, digits, partition, calculation, decimal, adjustment, compact

Y5

End of Year Objective:

Subtract whole numbers with more than 4 digits *and* decimals with two decimal places, including formal written methods (columnar subtraction).

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

$$\begin{array}{r} \overset{6}{7} \cancel{} \overset{6}{0} \overset{6}{7} \cancel{} \overset{1}{2} \\ - 3 2 2 6 \\ \hline 3 8 4 6 \end{array}$$

$$\begin{array}{r} \overset{2}{3} \cancel{} \overset{13}{4} \cancel{} \overset{1}{2} \\ - 1 7 6 \\ \hline 1 6 6 \end{array}$$

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

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In mental calculations children will be counting on using larger and larger numbers with number lines.

Resources:

ITPs, Models and images, number line (finding the difference)

Key Vocabulary:

Subtract, take away, less than, equals, bigger, smaller, hundreds, tens, ones, digits, partition, calculation, decimal, adjustment, compact, fraction

