



Wreay C of E Primary School **Progression through Calculations for Subtraction**

MENTAL CALCULATIONS (ongoing)

These are a **selection** of mental calculation strategies:

(Ideas are taken from the new National Curriculum September 2014)

Mental recall of addition and subtraction facts

$$10 - 6 = 4$$

$$17 - \square = 11$$

$$20 - 17 = 3$$

$$10 - \square = 2$$

Find a small difference by counting up

$$82 - 79 = 3$$

Counting on or back in repeated steps of 1, 10, 100, 1000

$$86 - 52 = 34 \text{ (by counting back in tens and then in ones)}$$

$$460 - 300 = 160 \text{ (by counting back in hundreds)}$$

Subtract the nearest multiple of 10, 100 and 1000 and adjust

$$24 - 19 = 24 - 20 + 1 = 5$$

$$458 - 71 = 458 - 70 - 1 = 387$$

Use the relationship between addition and subtraction

$$36 + 19 = 55$$

$$19 + 36 = 55$$

$$55 - 19 = 36$$

$$55 - 36 = 19$$

WHEN USING A NUMBERLINE FOR ADDITION THE JUMPS SHOULD BE MADE ABOVE THE LINE AND BELOW FOR SUBTRACTION.

MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.



THE FOLLOWING ARE STANDARDS THAT WE EXPECT THE MAJORITY OF CHILDREN TO ACHIEVE BY THE END OF THE ACADEMIC YEAR.

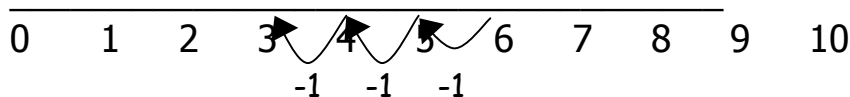
RECEPTION

Children are encouraged to develop a mental picture of the number system in their heads to use for calculation. They develop ways of recording calculations using pictures etc.

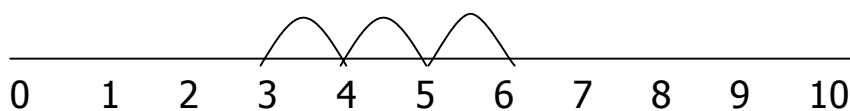


They use numberlines and practical resources to support calculation. Teachers *demonstrate* the use of the numberline.

$$6 - 3 = 3$$

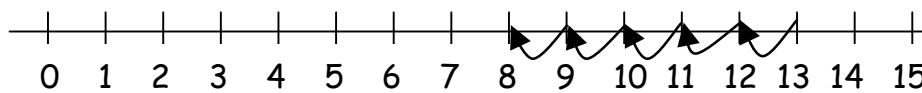


The numberline should also be used to show that $6 - 3$ means the 'difference between 6 and 3' or 'the difference between 3 and 6' and how many jumps they are apart.



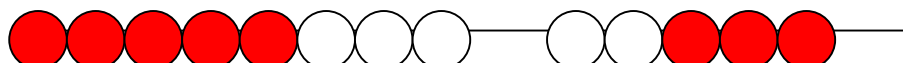
Children then begin to use numbered lines to support their own calculations - using a numbered line to count back in ones.

$$13 - 5 = 8$$



Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3 then counting back 2.

$$13 - 5 = 8$$





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YEAR 1

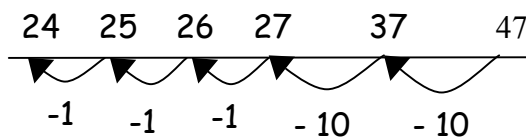
- ✓ Represent and use number bonds and related subtraction facts with 20.
- ✓ Subtract one-digit numbers and two-digit numbers to 20.
- ✓ Solve one step problems involving subtraction, use concrete objects and pictorial representations, and missing number problems such as $7 = \Delta - 9$
- ✓ Vocabulary associated with subtraction: *take away, difference between, less than.*

Children will begin to use empty number lines to support calculations.

Counting back

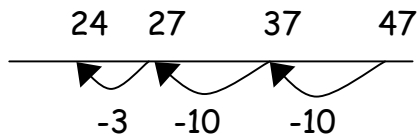
- ✓ First counting back in tens and ones.

$$47 - 23 = 24$$



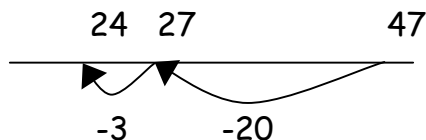
- ✓ Then helping children to become more efficient by subtracting the units in one jump (by using the known fact $7 - 3 = 4$).

$$47 - 23 = 24$$



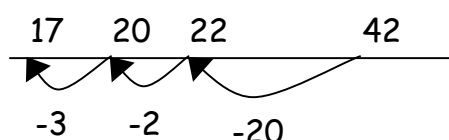
- ✓ Subtracting the tens in one jump and the units in one jump.

$$47 - 23 = 24$$



- ✓ Bridging through ten can help children become more efficient.

$$42 - 25 = 17$$





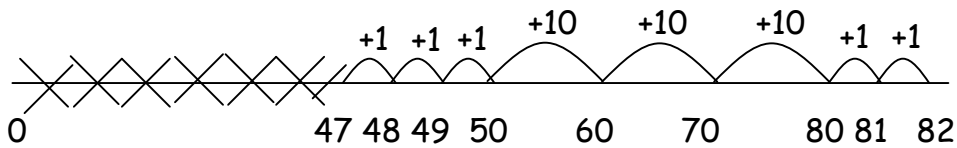
Counting on

If the numbers involved in the calculation are close together or near to multiples of 10, 100 etc, it can be more efficient to count on.

Count up from 47 to 82 in jumps of 10 and jumps of 1.

The number line should still show 0 so children can cross out the section from 0 to the smallest number. They then associate this method with 'taking away'.

$$82 - 47$$



Help children to become more efficient with counting on by:

- ✓ Subtracting the units in one jump;
- ✓ Subtracting the tens in one jump and the units in one jump;
- ✓ Bridging through ten.



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YEAR 2

Continue with strategies in Year 1. Start to introduce subtracting concrete objects, pictorial representations and mentally, including:

- ✓ A two-digit number and ones
- ✓ A two-digit number and tens
- ✓ Two two-digit numbers

Show that addition of two numbers can be done in any order (commutative) and subtraction from of one number from another cannot.

Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Children will begin to use informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies.

Partitioning and decomposition

This process should be demonstrated using arrow cards to show the partitioning and base 10 materials to show the decomposition of the number.

NOTE When solving the calculation $89 - 57$, children should know that 57 **does NOT EXIST AS AN AMOUNT** it is what you are subtracting from the other number. Therefore, when using base 10 materials, children would need to count out only the 89.

$$\begin{array}{r} 89 \\ - 57 \\ \hline \end{array} = \begin{array}{r} 80 \\ 50 \\ \hline 30 \end{array} \begin{array}{l} \rightarrow 9 \\ \rightarrow 7 \\ \rightarrow 2 \end{array} = 32$$

The arrows represent the '+' for the partitioning of the numbers however; some children may find this confusing when they are subtracting. Arrow cards could also be used.

Teachers could support children further by:

- Remind them to use place value headings when completing written calculations. This does not just have to be done in year 2 but until the child is confident.
- When using the interactive smartboard squares should be used to model to children how the columns should be lined up correctly and how it should be represented in their books.

Initially, the children will be taught using examples that do not need the children to exchange.



From this the children will begin to exchange.

$$\begin{array}{r} 71 \\ - 46 \\ \hline \end{array} = \quad =$$

Step 1

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

Step 2

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

The calculation should be read as e.g. take 6 from 1.

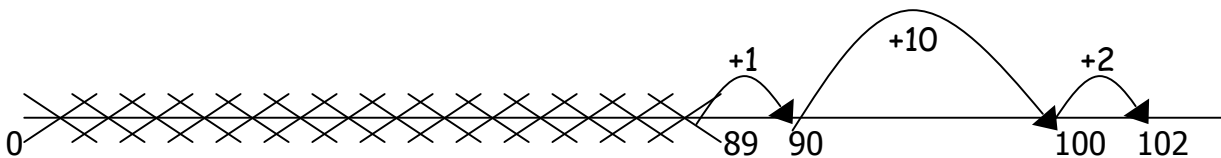
This would be recorded by the children as

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

Children should know that units line up under units, tens under tens, and so on.

Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.

$$102 - 89 = 13$$



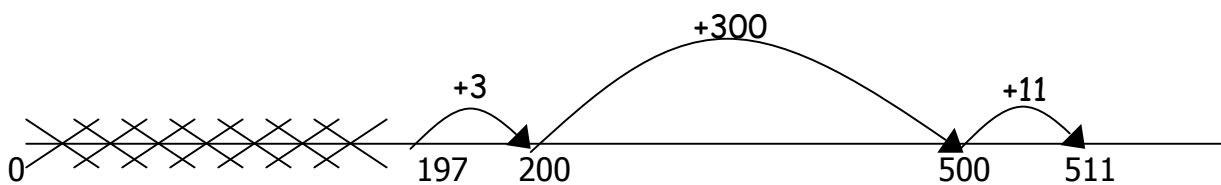


Alternatively, children can set the amounts to whole numbers, i.e. 895 – 438 and convert to pounds after the calculation.

NB If your children have reached the concise stage they will then continue this method throughout the rest of Key Stage 2. They will not go back to using the expanded methods.

Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.

$$511 - 197 = 314$$





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YEAR 4

Continue with partitioning and decomposition as in Year 3 but using larger numbers (4 digits).

Partitioning and decomposition

$$\begin{array}{r} \text{Step 1} \quad 754 \\ - 286 \\ \hline \end{array} = \begin{array}{r} 700 \rightarrow 50 \rightarrow 4 \\ - 200 \rightarrow 80 \rightarrow 6 \\ \hline \end{array}$$

$$\begin{array}{r} \text{Step 2} \quad 700 \rightarrow 40 \rightarrow 14 \\ - 200 \rightarrow 80 \rightarrow 6 \\ \hline \end{array} \quad (\text{adjust from T to U})$$

$$\begin{array}{r} \text{Step 3} \quad 600 \rightarrow 140 \rightarrow 14 \\ - 200 \rightarrow 80 \rightarrow 6 \\ \hline 400 + 60 + 8 = 468 \end{array} \quad (\text{adjust from H to T})$$

This would be recorded by the children as

$$\begin{array}{r} \overset{600}{\cancel{700}} \rightarrow \overset{140}{\cancel{50}} \rightarrow 14 \\ - \overset{200}{\cancel{200}} \rightarrow \overset{80}{\cancel{80}} \rightarrow 6 \\ \hline 400 + 60 + 8 = 468 \end{array}$$

Decomposition

$$\begin{array}{r} 6141 \\ \cancel{754} \\ - 286 \\ \hline 468 \end{array}$$

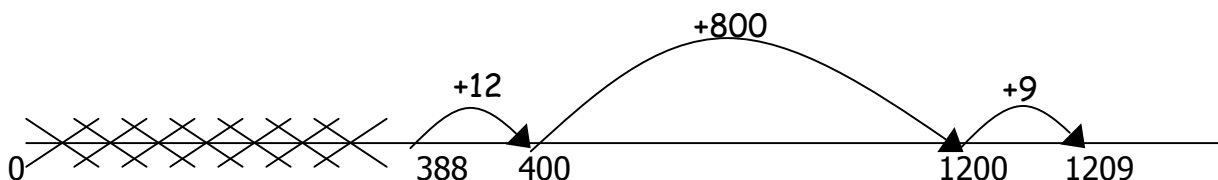
Children should:

- ✓ be able to subtract numbers with different numbers of digits;
- ✓ begin to find the difference between two decimal fractions with up to three digits and the same number of decimal places;
- ✓ know that decimal points should line up under each other.

NB If your children have reached the concise stage they will then continue this method through into year 6. They will not go back to using the expanded methods.

Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.

$$1209 - 388 = 821$$





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Year 5

Decomposition

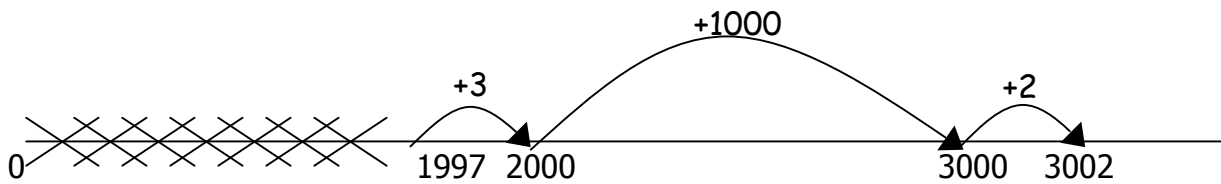
$$\begin{array}{r} 5 \ 13 \ 1 \\ 6 \cancel{4} \ 6 \ 7 \\ - \ 2 \ 6 \ 8 \ 4 \\ \hline 3 \ 7 \ 8 \ 3 \end{array}$$

Children should:

- ✓ be able to subtract numbers with different numbers of digits;
- ✓ be able to subtract two or more decimal fractions with up to three digits and either one or two decimal places;
- ✓ know that decimal points should line up under each other.

Where the numbers are involved in the calculation are close together or near to multiples of 10, 100 etc counting on using a number line should be used.

$$3002 - 1997 = 1005$$





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Year 6

Pupils practise subtraction for larger numbers, using the formal written methods including subtraction with decimals and negative numbers.

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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 approximate their answers before calculating.

Children should be encouraged to check their answers after calculation using an appropriate strategy.

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