

PROGRESSION THROUGH CALCULATIONS FOR SUBTRACTION



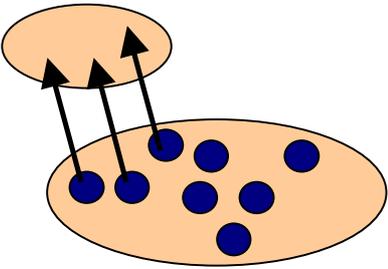
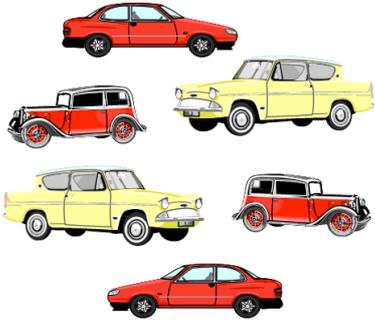
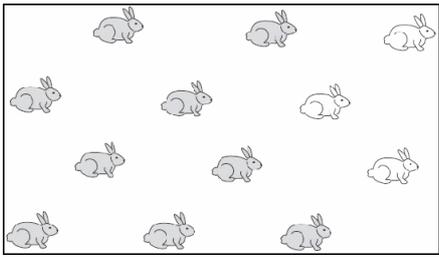
Models and images to support mental calculations

Being able to subtract numbers mentally without pencil and paper is very important and there is a set amount of time during each lesson where this can be practised. A variety of mental strategies are taught throughout school eg. counting up, subtraction facts, subtracting by 10 or 100 and adjusting etc.

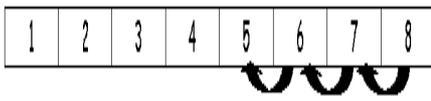
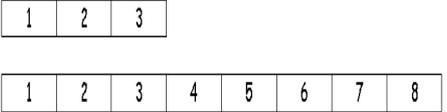
MANY MENTAL CALCULATION STRATEGIES WILL CONTINUE TO BE USED. THEY ARE NOT REPLACED BY WRITTEN METHODS.

Reception

Children are encouraged to work practically to understand the concept of subtraction as taking away, and by comparing two objects to find difference, how many more or less e.g.

		
<p><i>There are eight biscuits on this plate. Take three of the biscuits to eat. How many biscuits are left on the plate?</i></p>	<p><i>Here are six toy cars. How many more cars are needed to make a set of eight cars?</i></p>	<p><i>What is the difference between the number of grey rabbits and the number of white rabbits?</i></p>

Teacher demonstrates use of number tracks to check results of practical activities.

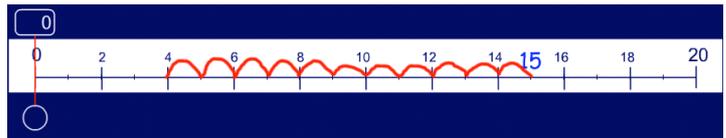
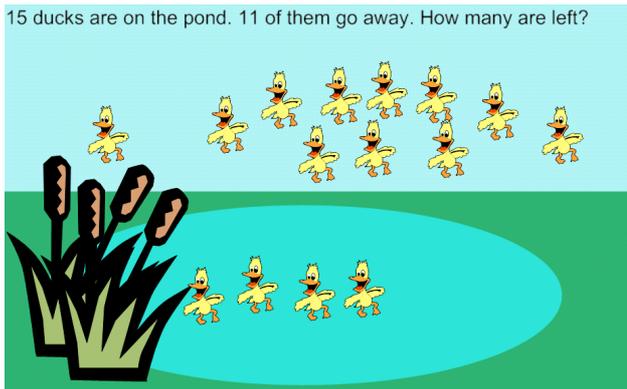
		
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Year 1

Taking away

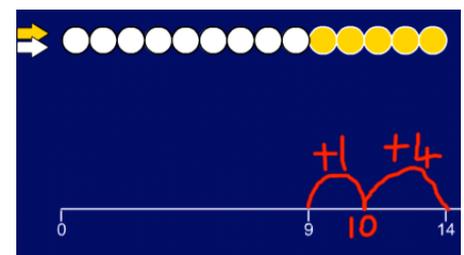
Children interpret subtraction as 'taking away'. They represent 'taking away' using objects and with number sentences, recognising that the number of objects remaining is the answer in a calculation such as $15 - 11 = 5$. They begin to rely less on manipulating practical resources and use strategies such as counting back on a number line or software that provides images and diagrams.

15 ducks are on the pond. 11 of them go away. How many are left?



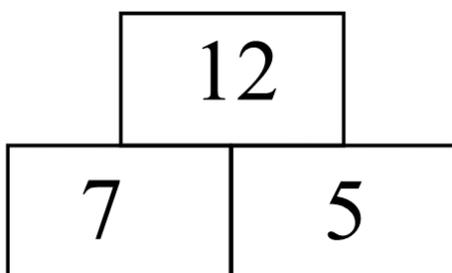
Finding the difference

Children build on their understanding of subtraction to interpret $14 - 9$ as finding the difference between 14 and 9 or: 'How many more must I add to 9 to get 14?' They use a counting on strategy and record the process as steps on a number line.



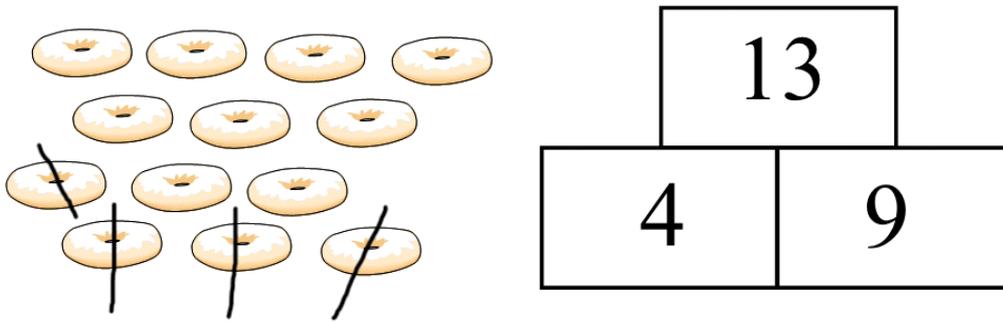
Inverse relationship

They construct sequences of calculations involving subtraction such as: $5 - 1 = 4$, $6 - 2 = 4$, $7 - 3 = 4$, ... They continue sequences such as: $12 - 0 = 12$, $12 - 1 = 11$, $12 - 2 = 10$, ... to build up patterns of calculations that highlight the underlying process of subtraction. They begin to recognise that subtraction and addition 'undo each other'.



e.g. $7 + 5 = 12$ and $12 - 7 = 5$

Children apply their knowledge to problems for example, they work out how many biscuits are left on a plate of 13 biscuits if 4 are eaten. They solve problems such as finding the biggest and smallest possible differences between a pair of numbers from the set 8, 5, 12 and 6.



Using +/- and = signs

Children record addition and subtraction number sentences using the operation signs + and -. They generate equivalent statements using the equals sign, for example:

$$7 = 6 + 1; 7 = 5 + 2 \dots \text{etc}$$

$$7 = 8 - 1; 7 = 9 - 2 \dots \text{etc}$$

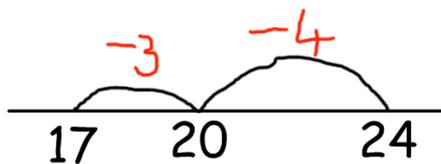
They recall the number that is 1 or 10 more or less than a given number and use this to support their calculations, for example to give answers to $12 + 1$, $13 - 1$ and $30 + 10$ and $60 - 10$.

Year 2

Children use the language of subtraction accurately. They read $16 - 4 = 12$ as 'sixteen minus four equals twelve'. They use their knowledge of number facts to add or subtract mentally a one digit number or a multiple of 10 to or from any two digit number. Children discuss and decide whether to: put the larger number first and count on or back. They use number lines, hundred squares and jottings to help them to carry out calculations.

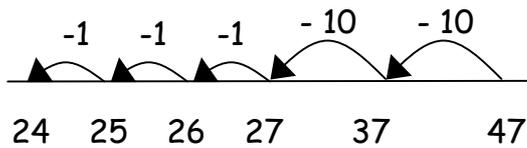
Counting back

$$24 - 7 = 17$$



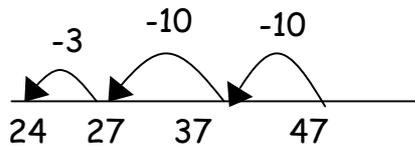
- counting back in tens and ones.

$$47 - 23 = 24$$

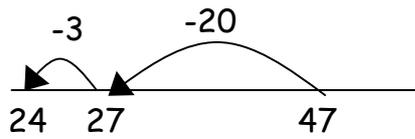


- Then helping children to become more efficient by subtracting the units in one jump (by using the known fact $7 - 3 = 4$).

$$47 - 23 = 24$$

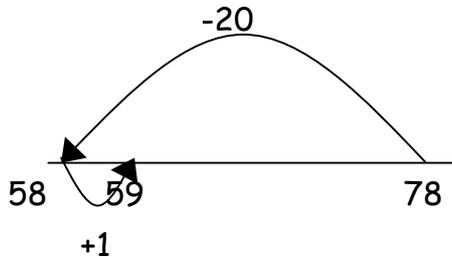


- Subtracting the tens in one jump and the units in one jump.



- Subtracting a multiple of 10 and adjusting

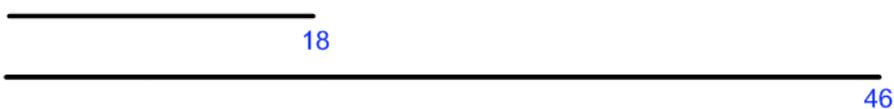
$$78 - 19 = 59$$



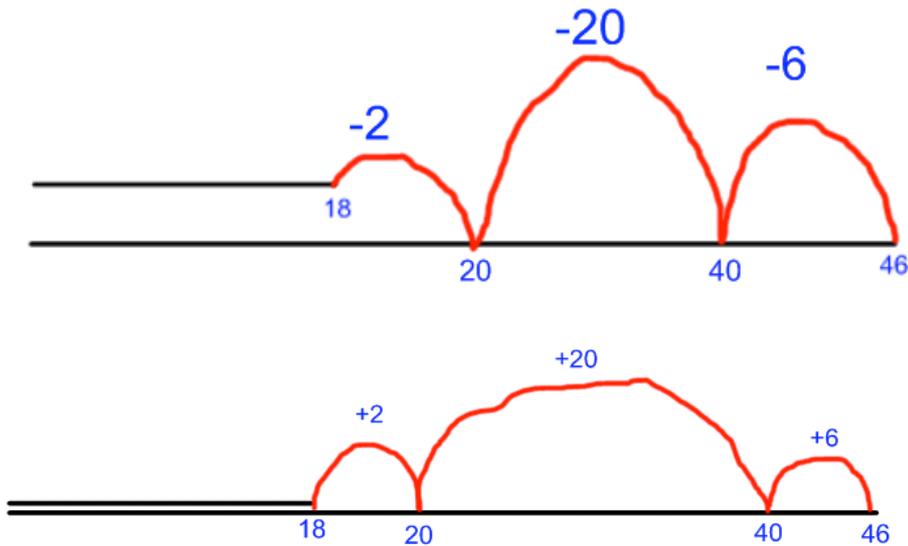
Finding the difference

e.g. Work out the difference between 46 and 18.

Children should be encouraged to solve these types of calculation by representing both numbers initially on separate number lines and reinforcing the language of how many more or less, e.g.



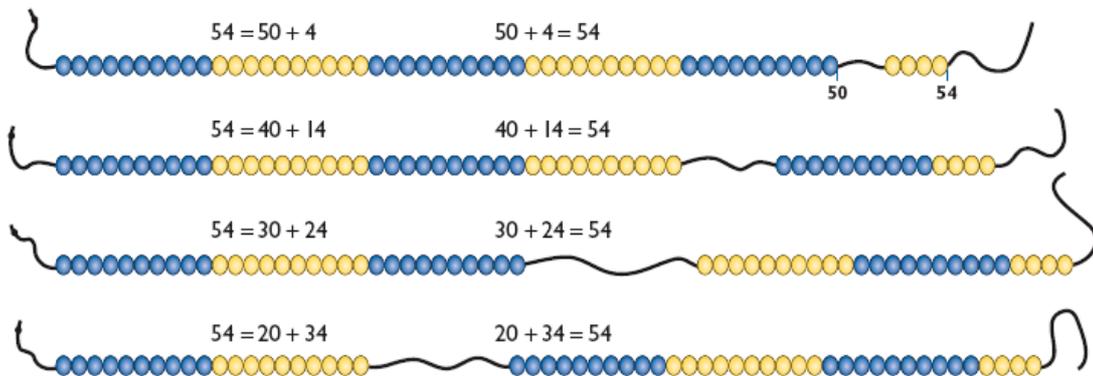
Through modelling and discussion, explore how this can be represented as $46 - \square = 18$



Complementary addition (counting on) can be a useful checking strategy. Children should be encouraged to decide which strategy to use depending on the numbers involved.

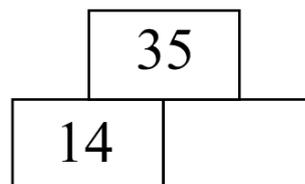
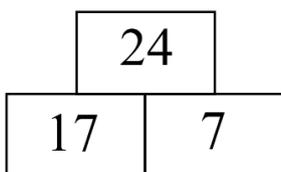
Towards a standard written method

In preparation for understanding decomposition and division strategies taught in key stage 2, it is important that children gain experience of partitioning beyond simple tens and ones, e.g.



Inverse relationship

Children know that addition and subtraction are inverse operations and can state the subtraction calculation corresponding to a given addition calculation and vice versa. They check their answers for example, to confirm $24 - 7 = 17$, they add 17 and 7.



$14 + \square = 35$. What is the missing number? How do you know? What subtraction could you do to find the answer?

Year 3 / 4

Towards a standard written method

During work on place value children need to continue to develop their understanding of partitioning beyond hundreds, tens and ones, e.g.

$$325 - 58 = 267$$

$$\begin{array}{r} 200 + 110 + 15 \\ - \quad \quad 50 + 8 \\ \hline 200 + 60 + 7 \end{array}$$

Children begin to use their knowledge of place value and partitioning of three-digit numbers to develop their written methods for addition and subtraction of two- and three-digit numbers using expanded methods of recording. This method can be extended for HTU -HTU or decimal fractions.

Decomposition

The decomposition method is only introduced once children have sufficient mental methods and understand the principles of the method. Children should know that units line up under units, tens under tens, and so on. Initially, the children will be taught using examples that do not need the children to exchange ("take one and not give it back"), but will then move on to more challenging questions.

$$236 - 48 = 188$$

$$\begin{array}{r} 1 \cancel{2}^{12} \cancel{3}^{16} \\ - \quad 48 \\ \hline 188 \end{array}$$

Year 5 / 6

Decomposition:

$$2362 - 548 = 1814$$

$$\begin{array}{r} 2 \ 3 \ \overset{5}{\cancel{6}} \ \overset{12}{1} \\ - \ 5 \ 4 \ 8 \\ \hline 1 \ 8 \ 1 \ 4 \end{array}$$

$$72.5 - 45.7 = 16.5$$

$$\begin{array}{r} \overset{6}{\cancel{7}} \ \overset{11}{\cancel{2}} \ \overset{12}{.5} \\ - \ 4 \ 5 \ . \ 7 \\ \hline 1 \ 6 \ . \ 5 \end{array}$$

By the end of Y6 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;*

By the end of Year 6, children will have developed 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.