



Maths- progression in  
written calculations

Addition & Subtraction

The new curriculum, which came into force in September 2014, gives very clear guidance as to how we should be teaching addition, subtraction, multiplication and division.

Aims of this workshop:

To look at how we teach maths in our school and the methods we use.

To look at the progression of addition and subtraction throughout our school

To give parents the opportunity to look at strategies we use in school in order to support their child/ children at home

## What does the new curriculum say?

### Aims:

"...all pupils to become fluent in the fundamentals of mathematics including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately."

### What has changed?

The main change in the new strategy is the renewed focus on formal written strategies. These methods are also introduced earlier than in the previous curriculum.

## How does this impact the children?

During the last academic year, we started implementing the use of formal methods across both phases of the Junior school.

Children will be using formal methods from Year 3 and will be less likely to use informal strategies such as number lines when adding and subtracting.

## Addition

There is a large jump from the year 2 to the year 3 curriculum:

### Year 2:

add and 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

adding three one-digit numbers

applying their increasing knowledge of mental and written methods

### Year 3:

add and subtract numbers with up to three digits,  
using formal written methods of columnar addition and subtraction

Children are likely to enter Year 3 with a variety of informal written methods e.g. pictorial, number lines. They are likely to have better mental skills than written skills. It is really important we don't lose the focus on mental skills- they are crucial to understanding the number system and not relying on rote learning of written methods.

Partitioned column  
addition

$$27 + 42 = 69$$

$$\begin{array}{r} 20 \ 7 \\ + 40 \ 2 \\ \hline 60 \ 9 \end{array}$$

Children need to turn a horizontally written calculation into a vertical one.

Place value knowledge is crucial! Lots of practise needed with partitioning.

$$365 + 478 = 843$$

$$\begin{array}{r} 300 \ 60 \ 5 \\ + 400 \ 70 \ 8 \\ \hline 700 \ 130 \ 13 \\ \hline \end{array}$$

Use jottings to explore place value

$$\begin{array}{r} 700 \ 130 \ 13 \\ \curvearrowright \quad \curvearrowright \end{array}$$

would become

$$800 \ 40 \ 3 = 843$$

Move to expanded  
vertical method

$$365 + 478 = 843$$

$$\begin{array}{r} 365 \\ +478 \\ \hline 13 \text{ (5 + 8)} \\ 130 \text{ (60 + 70)} \\ \hline 700 \text{ (300 + 400)} \\ \hline 843 \end{array}$$

Start with least significant digits- units/ ones

Restricts digits to the "correct" column. The reason for this is due to importance of place value especially when adding vertically.



Use compact method of addition with carrying

$$365 + 478 = 843$$

$$\begin{array}{r} 365 \\ + 478 \\ \hline 843 \\ \hline \end{array}$$

Important to keep referring to the place value all the time.

Important to have consistency in where the carried digits are put and they should be crossed off when added in to the correct column.

Year 3	add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
Year 4	add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
Year 5	add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
Year 6	solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why solve problems involving addition, subtraction, multiplication and division

## Subtraction

Many children find subtraction difficult and it is often because they struggle with mental subtraction. It is important to focus on mental subtraction as much, if not more, than mental addition.

Key facts are:

- subtraction bonds to 10 and 20 e.g. 20-8,
- halving all even numbers to 100
- being able to take a single digit number away from any number

Context and practical resources are even more important with subtraction and should be used or accessible during teaching and independent work

Partitioned subtraction (no decomposition)

$$35 - 12 = 23$$

$$\begin{array}{r} 30 \ 5 \\ - 10 \ 2 \\ \hline 20 \ 3 \end{array}$$

Partitioning is very important

Children should see calculations written horizontally and vertically- and be able to change them independently.

Partitioned subtraction with decomposition/ repartitioning in units

$$143 - 39 = 104$$

$$\begin{array}{r} 100 \quad 40 \quad 3 \\ - \quad \quad 30 \quad 9 \\ \hline \end{array}$$



$$\begin{array}{r} 100 \quad 30 \quad 13 \\ - \quad \quad 30 \quad 9 \\ \hline 100 \quad 0 \quad 4 \\ \hline \end{array}$$

Use practical resources or a context to ensure children understand why repartitioning is necessary.

Partitioned subtraction with decomposition/ repartitioning in tens and units

$$242 - 157 = 85$$

$$\begin{array}{r} 200 \quad 40 \quad 2 \\ - 100 \quad 50 \quad 7 \\ \hline \end{array}$$



$$\begin{array}{r} 200 \quad 30 \quad 12 \\ - 100 \quad 50 \quad 7 \\ \hline \end{array}$$



$$\begin{array}{r} 100 \quad 130 \quad 12 \\ - 100 \quad 50 \quad 7 \\ \hline 80 \quad 5 \\ \hline \end{array}$$

This method is very time consuming as so much repartitioning has to go on.

Once children understand, they can quickly move on to a more compact format.

Partitioned subtraction with decomposition

$$242 - 127 = 115$$

$$\begin{array}{r} 200 \quad \overset{30}{\cancel{40}} \quad ^1 2 \\ - 100 \quad 20 \quad 7 \\ \hline 100 \quad 10 \quad 5 \end{array}$$

This is still repartitioning but in a more compact form.

'Give' and 'take' rather than borrowing as we don't give it back!

### Compact subtraction

$$242 - 63 = 179$$

$$\begin{array}{r} \overset{1\ 3\ 1}{2}42 \\ - \quad 63 \\ \hline 179 \end{array}$$

$$3462 - 1784 = 1678$$

$$\begin{array}{r} \overset{2\ 1\ 1\ 1}{3}462 \\ - \quad 1784 \\ \hline 1678 \end{array}$$

Should be taught alongside expanded subtraction to begin with so children can see where the numbers come from.

May need to go back to practical methods at the start.

Children should be able to explain the method using correct vocabulary, especially regarding place value



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