

Platt Church of England Primary School



PROGRESSION IN THE TEACHING OF CALCULATION

This leaflet has been written to help you in supporting your child in mathematics.

$$2 + 2 = 4$$

The answers are still the same but the way we teach children to calculate may be different from the way you were taught.

By teaching in stages, we ensure that children really understand what they are doing rather than just following a set of instructions.

ADDITION

At Key Stage 1 children begin to add two digit numbers by using informal methods. For example;

$$\begin{array}{r} 23 + 32 \\ = (20 + 30) + (3 + 2) \\ \quad 50 \quad + \quad 5 \quad = \quad 55 \end{array}$$

- We call this method partitioning, as we partition each number into tens and units.
- We always add the tens first
- We start with easy examples

$$20 + 30 = 50$$

then

$$\begin{array}{r} 20 + 32 \\ = (20 + 30) + 2 \\ \quad 50 \quad + \quad 2 \quad = \quad 52 \end{array}$$

or

$$\begin{array}{r} 23 + 30 \\ = (20 + 30) + 3 \\ \quad 50 \quad + \quad 3 \quad = \quad 53 \end{array}$$

and finally

$$\begin{array}{r} 25 + 37 \\ = (20 + 30) + (5 + 7) \\ \quad 50 \quad + \quad 12 \quad = \quad 62 \\ \quad 50 \quad + \quad (10 + 2) \quad = \quad 62 \end{array}$$

The aim is that eventually children will be able to add two 2 digit numbers mentally.

In Year 3, children continue to develop informal methods for addition but towards the end of Year 3 or at the beginning of Year 4, we begin to introduce a formal method that can be used when we are dealing with large numbers

<u>Step 1</u>	23 + 32	=	20 + 3	
		+	<u>30 + 2</u>	
			50 + 5	= 55

<u>Step 2</u>	35 + 39	=	30 + 5	
		+	<u>30 + 9</u>	
			60 + 14	= 74

<u>Step 3</u>	352 + 139	=	300 + 50 + 2	
		+	<u>100 + 30 + 9</u>	
			<u>400 + 80 + 1</u>	
			10	= 491

When children really understand this method and are getting accurate answers, we show them the more compact method. This is generally by the end of Year 4.

$\begin{array}{r} 35 \\ + 39 \\ \hline 74 \end{array}$	<u>Leading to</u>	$\begin{array}{r} 352 \\ + 189 \\ \hline 541 \end{array}$
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SUBTRACTION

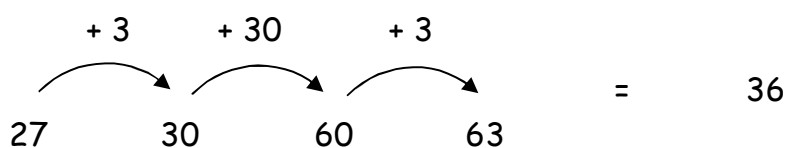
When children learn to subtract larger numbers, we start with informal methods

For example by Year 3

63	-	27	=
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This sum is worked out by counting up from the smallest number using a blank number line

e.g. How far is it from 27 to 63?



Therefore $63 - 27 = 36$

We begin to teach more formal methods by end of Year 3 or beginning of Year 4

Step 1	$67 - 23$	$=$	$60 \quad 7$		
			$- \quad \underline{20 \quad 3}$		
			$40 \quad + \quad 4$	$=$	44

Step 2	$63 - 27$	$=$	50		
			$\underline{60} \quad 13$		
			$- \quad \underline{20 \quad 7}$		
			$30 \quad + \quad 6$	$=$	36

Step 3	$363 - 127$	$=$	50		
			$300 \quad \underline{60} \quad 13$		
			$- \quad \underline{100 \quad 20 \quad 7}$		
			$200 \quad + \quad 30 \quad + \quad 6$	$=$	236

Finally we move to the more compact method, when we feel children are ready for this. Some children will find the final compact method very difficult so they will continue to use informal methods into Year 6.

The compact method taught at this school is known as 'decomposition' 5

Examples:

$$\begin{array}{r}
 5 \\
 \cancel{6} \quad 13 \\
 - \quad \underline{2 \quad 7} \\
 3 \quad 6
 \end{array}$$

$$\begin{array}{r}
 5 \\
 3 \quad \cancel{6} \quad 13 \\
 - \quad \underline{1 \quad 2 \quad 7} \\
 2 \quad 3 \quad 6
 \end{array}$$

$$\begin{array}{r}
 3 \quad 11 \\
 4 \quad \cancel{2} \quad 14 \\
 - \quad \underline{1 \quad 7 \quad 8} \\
 2 \quad 4 \quad 6
 \end{array}$$

MULTIPLICATION

In Year 3, children begin to use informal methods to multiply two digit numbers, for example;

$$23 \times 3 = (20 \times 3) + (3 \times 3) \\ 60 + 9 = 69$$

This method is developed in Year 4 to a more formal layout. This is referred to as the 'grid' method.

Step 1

$$23 \times 3 = \begin{array}{r|l|l} \times & 20 & 3 \\ \hline 3 & 60 & 9 \end{array} = 69$$

Step 2

$$236 \times 4 = \begin{array}{r|l|l|l} \times & 200 & 30 & 6 \\ \hline 4 & 800 & 120 & 24 \end{array} = 944$$

In Year 5, pupils learn to multiply two digits by two digits, for example;

$$23 \times 14 = (20 \times 10) + (20 \times 4) + (3 \times 10) + (3 \times 4)$$

This is set out in the same way.

Step 3

$$23 \times 14 = \begin{array}{r|l|l} \times & 20 & 3 \\ \hline 10 & 200 & 30 \\ \hline 4 & 80 & 12 \end{array} = \begin{array}{r} 230 \\ + \underline{92} \\ \hline 322 \end{array}$$

In Year 6, pupils may be taught a more traditional method if the teacher feels they are ready for it. For example;

Step 4

$$\begin{array}{r} 23 \times 14 = \\ \times \quad \underline{14} \\ 230 \\ \underline{92} \\ 322 \end{array}$$

However, most are encouraged to continue using the grid method, as analysis of exam results shows this to be a more reliable method for most children.

DIVISION

In Key Stage 1 the children work on the two concepts of sharing and grouping

Division of two digit numbers is also approached in a different way.

For example;

$27 \div 6$ is expressed as;

“How many times can I take 6 from 27?”

In Year 4;

Step 1

$$\begin{array}{r} 27 \\ \underline{-6} \\ 21 \\ \underline{-6} \\ 15 \\ \underline{-6} \\ 9 \\ \underline{-6} \\ 3 \end{array} \quad \text{Answer} = 4 \text{ with } 3 \text{ remaining}$$

This method is called 'repeated subtraction'

Step 2

$$27 \div 6$$

$$\begin{array}{r} 27 \\ - 24 \\ \hline 3 \end{array} \quad (6 \times 4)$$

Answer = 4 r 2

In Year 5;

Step 3

$$98 \div 3$$

$$\begin{array}{r} 98 \\ - 30 \\ \hline 68 \\ - 30 \\ \hline 38 \\ - 30 \\ \hline 8 \\ - 6 \\ \hline 2 \end{array} \quad \begin{array}{l} (10 \times 3) \\ (10 \times 3) \\ (10 \times 3) \\ (2 \times 3) \end{array}$$

Answer = 32 r 2

Step 4

$$98 \div 3$$

$$\begin{array}{r} 98 \\ - 90 \\ \hline 8 \\ - 6 \\ \hline 2 \end{array} \quad \begin{array}{l} (30 \times 3) \\ (2 \times 3) \end{array}$$

Answer = 32 r 2

In Year 6 this leads very easily into long division.

Step 5

$$492 \div 16$$

$$\begin{array}{r} 492 \\ - 160 \quad (10 \times 16) \\ \hline 332 \\ - 160 \quad (10 \times 16) \\ \hline 172 \\ - 160 \quad (10 \times 16) \\ \hline 12 \end{array}$$

Answer = 30 r 12

Step 6

$$492 \div 16$$

$$\begin{array}{r} 492 \\ - 480 \quad (30 \times 16) \\ \hline 12 \end{array}$$

Answer = 30 r 12

Pupils find this method much easier to understand than the traditional method of long division.