Scalford C of E Primary School

Calculation Policy

Created: - February 2015: P Leonard – Maths Coordinator

Signed: Chair of Governors……………………………………………………………

Signed: Head teacher MAWaring

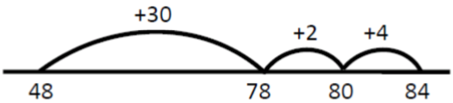
To be reviewed: February 2017

+ + + + + ADDITION + + + + +

1. Number lines

When counting on a number line we split up the number we are adding to make it easier. This can be done in more than one way:

48 + 36 = 84



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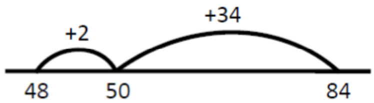


2. Expanded method

We use this method as a stepping stone to column addition as it makes each stage of the calculation clearer. It can be done in more than one way:

47
+76
13 we say "seven add six equals"
110 we say "forty add seventy equals"
123

40 + 70 = 110
7 + 6 = 13
123

Don't forget – it is really important to line up the columns correctly.

3. Column addition

This is perhaps the most familiar method. Note that when adding up the tens column (and higher columns) we still try to refer to "4 tens + 7 tens = 11 tens" and not "4 + 7 = 11" as this makes the value of each number clearer.

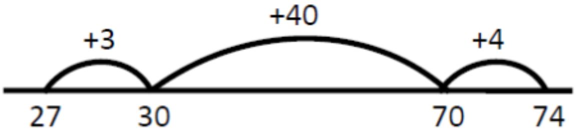
47
+76
123
1 1

- - - - - SUBTRACTION - - - - -

1. 'Counting up' method

This can be done is several ways, but involves counting up from the lower number, back to the higher one (a bit like when giving change). For example:

74 – 27 = 47



Adding the numbers along the top of this number line gives you the answer.

74
-27
3 ⇨ 30
40 ⇨ 70
4 ⇨ 74
47

⇨ meaning 'takes us to'

Here, adding the numbers down the centre gives you the answer.

2. Expanded method

This is a stepping stone to the familiar method of column subtraction. The numbers are split or 'partitioned' to make the process clearer:

741 – 367 becomes:

700 + 40 + 1
becomes:
- 300 + 60 + 7

600 130
$\cancel{700} + \cancel{40} + {}^{1}1$
- 300 + 60 + 7
300 + 70 + 4

3. Compact method (or column subtraction)

Although many of us were taught to 'borrow', we do not use this word as it does not make it clear what the mathematical process is. Therefore we use words such as *change*, *exchange, take, steal* or *swap*. E.g. "we change a ten into 10 units".

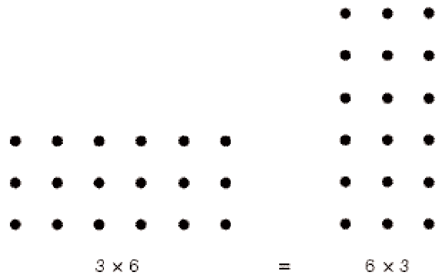
6 13
$\cancel{7}\ \cancel{4}\ {}^{1}1$
- 3 6 7
3 7 4

x x x x MULTIPLICATION x x x x

1. Arrays and visual representations

Children begin by drawing objects and rectangular groups of spots (arrays) are a good way of showing how multiplication can be considered in two ways.

E.g. 3 x 6 = 18 or 6 x 3 = 18



2. Grid method

This very visual method of multiplying involves ‘partitioning’ each number (separating the tens from units), arranging the numbers around a grid and ensuring that each number is multiplied with every other number, before everything is added up to calculate the final answer.

So 38 x 7 becomes:

x	7
30	
8	

And then:

x	7
30	210
8	56
	266

The same method can be used for larger numbers. So 36 x 48 becomes:

x	30	6
40	1200	240
8	240	48

1440 + 288 = 1728

Children are taught to use times tables to help solve the larger calculations. For example:

7 x 3 = 21
so, 7 x 30 = 210

The grid method can also be used for larger numbers and decimals.

3. Expanded method

This is the stepping stone between the grid method and short (or compact) multiplication. If it helps, the individual calculations can be written at the side as below:

```
     38              leading to:      38
    x 7                              x 27
     56  (7x8)                         56  (7x8)
    210  (7x30)                       210  (7x30)
    266                               160  (20x8)
                                      600  (20x30)
                                     1026
                                      1 1
```

4. Short (or compact) multiplication

```
  38     eventually leading to:     38
 x  7                             x 27
 266                               266
   5                               760
                                  1026
```

Of course, it is always important to keep the columns lined up correctly!

÷ ÷ ÷ ÷ ÷ DIVISION ÷ ÷ ÷ ÷ ÷

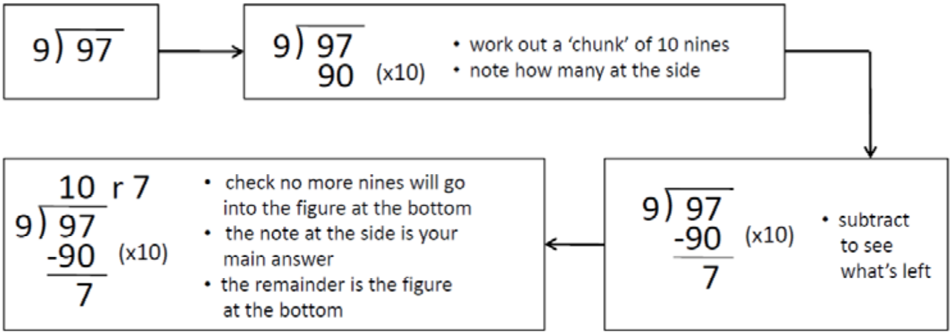
1. Simple division

The most basic method we use involves splitting the number into more easily manageable chunks. So:

```
84 ÷ 7 =     becomes:     70  +  14  (multiples of 7)
                          ⇩÷7    ⇩÷7
                          10  +   2 =  12
```

2. Expanded method (or ‘multiples of the divisor’ or ‘chunking’)

This method subtracts easily calculated multiples or ‘chunks’ away from the starting number. So the method for calculating 97 ÷ 9 can be broken down thus:



This leads to more complex calculations with more chunks:

32 r 4
6)196
-60 (x10)
136
-60 (x10)
76
-60 (x10)
16
-12 (x2)
4

And finally to more compact methods with larger chunks:

32 r 4
6)196
-180 (x30)
16
-12 (x2)
4

This can then be used for larger numbers and decimals.

3. Compact method (‘bus-stop’ method)

This method is very convenient for calculations involving single-digit divisors but it is much less useful if dividing by larger numbers. It is taught only once children have mastered the previous method as it requires no understanding of the underlying division process.

32 r 4
6)1^{1}96