'Working together in Friendship and Faith, Learning for Life'

How we teach maths calculations @ KS2

Contents

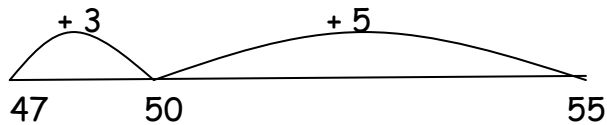# Addition

Addition is the operation to which we attribute the word 'sum' in its truest sense, as the solution to an addition problem is the 'sum'.
* Children should be encouraged to use the correct vocabulary and use the word calculation(s) instead of sum(s).

Mental method, using the number line:

47 + 8 = 55

Mental method, using partitioning:

e.g. 34 + 62 = (30 + 60) + (4 + 2) = 90 + 6 = 96

e.g. 47 + 76 = (40 + 70) + (7 + 6) = 110 + 13 = 123

Written methods:

1. Introduction to vertical layout, using partitioning (not crossing tens/hundreds)

* 335 + 452 = 787

$$300 + 30 + 5$$
$$+ 400 + 50 + 2$$
$$\overline{700 + 80 + 7} = 787$$

2. a. **Vertical layout**, working from units (crossing tens/hundreds)

* 47 + 76 = 123

```
   4 7
 + 7 6
   1 3
 1 1 0
 1 2 3
```

* 368 + 493 = 861

```
   3 6 8
 + 4 9 3
     1 1
   1 5 0
   7 0 0
   8 6 1
```

b. **Compact vertical layout**

* 47 + 76 = 123

```
   4 7
 + 7 6
   1 1
 1 2 3
```

* 24.6 + 36.7 = 61.3

```
   2 4 . 6
 + 3 6 . 7
     1 1
   6 1 . 3
```
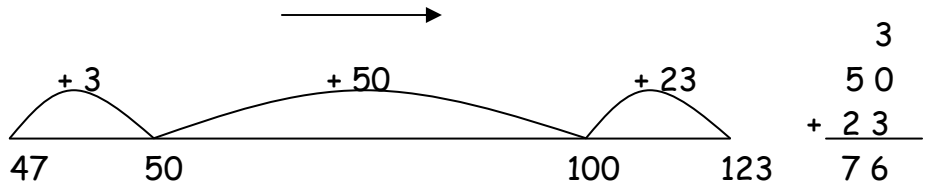
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Subtraction

The solution to a subtraction problem is the difference between the two numbers and children should be encouraged in the use of correct vocabulary. The use of language such as 'take away sums' should be discouraged.
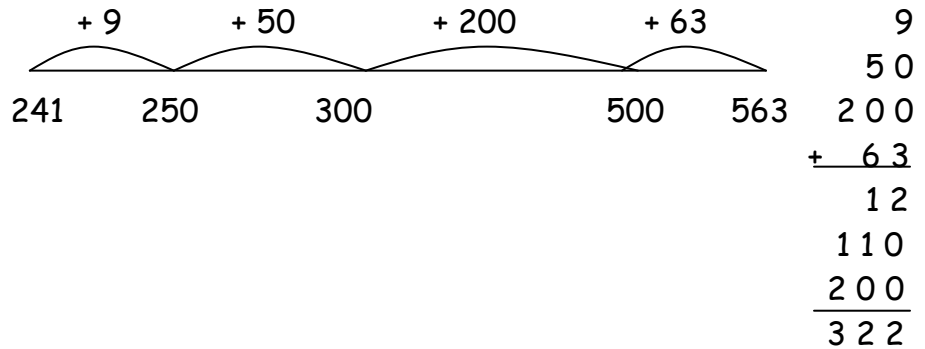
Mental Method, using the number line:
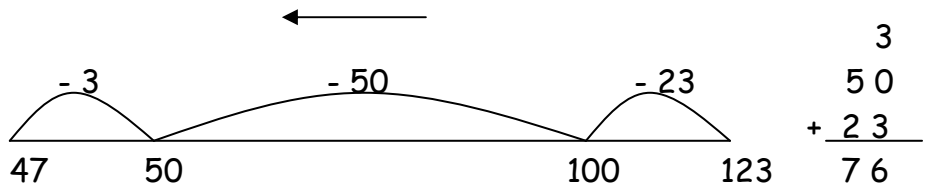
Counting on

$$* 123 - 47 = 76$$

```
        + 3        + 50        + 23          3
                                             5 0
                                           + 2 3
     47     50              100    123       7 6
```

$$* 563 - 241 = 322$$

```
      + 9      + 50    + 200    + 63          9
                                             5 0
    241    250    300         500   563    2 0 0
                                           +  6 3
                                             1 2
                                           1 1 0
                                           2 0 0
                                           3 2 2
```

Counting back

$$* 123 - 47 = 76$$

```
        - 3        - 50        - 23          3
                                             5 0
                                           + 2 3
     47     50              100    123       7 6
```

Decomposition:

1. $563 - 241 = 322$

```
     5 6 3
   - 2 4 1
         2
       2 0
     3 0 0
     3 2 2
```

Progressing to

2. $563 - 248 = 315$

```
        5
     5 6¹3
   - 2 4 8
     3 1 5
```

3. $641.6 - 438.2 = 203.4$

```
      3
    6 4¹1 . 6
    4 3 8 . 2
    2 0 3 . 4
```

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Multiplication

The product of the two or more numbers is the result of multiplying them together. The use of the word 'times' should be discouraged when talking about methods of multiplication despite its use in 'times tables'. 'Times' suggests the repeated addition which children should be less reliant upon as they progress through the key stage.

Mental method, using partitioning

38 x 7 = (30 x 7) + (8 x 7) = 210 + 56 = 266

Written method:

1. Grid layout

* 38 x 7 = 266

x	30	8	
7	210	56	= 266

Supported by jottings
30 x 7 = 3 x 7 x 10 = 210
8 x 7 = 57
210 + 50 + 7 = 266

* 238 x 7 = 1666

x	200	30	8	
7	1400	210	56	= 1666

Supported by jottings
200 x 7 = 2 x 7 x 100 = 1400
30 x 7 = 3 x 7 x 10 = 210
8 x 7 = 56
1400 + 200 + 10 + 56 = 1666

* 56 x 27 = 1512

x	50	6
20	1000	120
7	350	42

1 1 2 0
+ 3 9 2
─────────
1 5 1 2

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2. **Vertical method**

* 38 x 7 = 266

```
    3 8
  ×   7
    5 6 (8 x 7)
  2 1 0 (30 x 7)
  2 6 6
```

* 56 x 27 = 1512   (expanded method)

```
        5 6
      × 2 7
        4 2 (6 x 7)
      3 5 0 (50 x 7)
      1 2 0 ( 6 x 20)
    1 0 0 0 (50 x 20)
    1 5 1 2
```

* 56 x 27 = 1512   (compact method)

```
        5 6
      × 2 7
      3 9 2 (56 x 7)
    1 1 2 0 (56 x 20)
    1 5 1 2
```

* 34.6 x 21.2 = 733.52   (compact method)

```
        3 4 . 6
      × 2 1 . 2
      
            6 . 9 2 (34.6 x 0.2)
          3 4 . 6   (34.6 x 1)
        6 9 2 . 0   (34.6 x 20)
          1  1   1
        7 3 3 . 5 2
```

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Division

Dividend: In division the dividend is the number being divided.
Divisor: In a division the divisor is the number you are dividing by.
Quotient: The quotient is the result you get when you perform a division.

$$\begin{array}{r} 7\ 0\ 3 \\ 6\ \overline{)4\ 2\ 1\ _18} \end{array}$$ quotient

divisor $6\overline{)4\ 2\ 1\ _18}$ dividend

When dividing we can primarily say that we are grouping or sharing. The difference between the two lies most often in the way that the question is put.

Mental method with jottings, using partitioning

$81 \div 3 = (60 + 21) \div 3 = $ 27 $\begin{array}{r} 20\ +\ 7 \\ 3\ \overline{)\ 60\ +\ 21} \end{array}$

Written method

1. Efficient standard method (short division)

* 2 5 6 ÷ 7 = 36 r 4 $\begin{array}{r} 3\ 6\ r\ 4 \\ 7\ \overline{)\ 2\ 5\ _46} \end{array}$

Progressing to

* 2 5 6 ÷ 7 = 36.57 $\begin{array}{r} 3\ 6\ .\ 5\ 7 \\ 7\ \overline{)\ 2\ 5\ _46\ .\ _40\ _50} \end{array}$

This method of finding the remainder as a decimal is important for children, as it is necessary in the context of money. In the example above, '£36 r 4' does not mean anything in monetary terms. The answer of £36.57 is more accurate.

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Written method

1. Efficient standard method (long division)

* 4 3 5 ÷ 2 5 = 17r10

```
                    0  1  7  r 10
            25 |  4  3  5
                  0  ↓  |
                  4  3  |
                - 2  5  ↓
                  1  8  5
                - 1  7  5
                  0  1  0
```

Progressing to

* 4 3 5 ÷ 2 5 = 17.4

```
                    0  1  7 . 4
            25 |  4  3  5 . 0
                  0  ↓  |
                  4  3  |
                - 2  5  ↓
                  1  8  5
                - 1  7  5  ↓
                  0  1  0  0
                   - 1  0  0
                     0  0  0
```