St. Andrew's

Church of England Primary School

Learning for Living – Life in all its Fullness

Written Calculations

Dear Parent/Carer,

This booklet has been put together as a guide to support you when working on written calculations with your child.

Many parents find that their children are using methods or strategies different from those used by them. This can often cause confusion when trying to support your child at home. It is important that methods used in school are reinforced at home so as to not to cause unnecessary confusion for the child.

The purpose of this booklet is to show the progression from mental to written strategies in the four number operations. This will enable you to support your child with strategies with which you may previously have been unfamiliar.

It is important to be aware that some children will need to consolidate earlier methods whilst some will be working on more complex strategies. Your child's teacher will be able to tell you which of the methods your child may be using.

Children may find it useful to use the 'E A R S' acronym to help them decide whether their method is: Effective, Accurate, Reliable and Systematic. It is important to remember the value of any method as long as it works!

The Four Operations

There are four operations in Maths that help us to problem-solve. They are addition, subtraction, multiplication and division. There are lots of words and phrases that mean the same thing as addition, subtraction, division and multiplication.
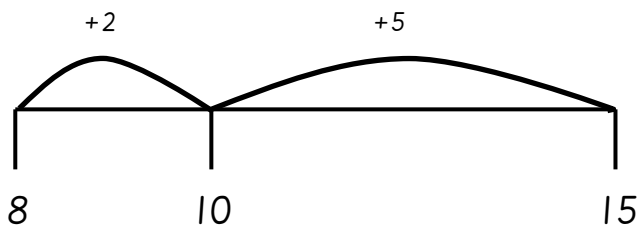
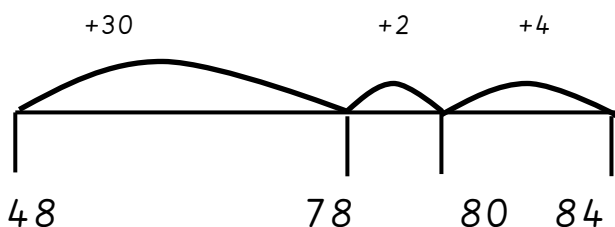| Addition	Subtraction	Multiplication	Division
+	−	×	÷
add	decrease	double	divisible by
altogether	difference between	groups of	factor
both	how many are left?	multiple of	halve
increase	how much less?	product	left over
more than	how much left?	times	remainder
plus	minus	twice as much	share
sum	take away		
total			

Addition

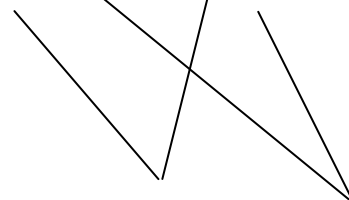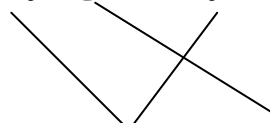| Stage 1 Number line	Stage 2 Partitioning
The number line helps to record the steps on the way to calculating the total, initially in jumps of units, then in jumps of larger numbers. 8+7 = 15 +2 +5 8 10 15 48+36 = 84 +30 +2 +4 48 78 80 84 The steps often bridge through a multiple of 10.	Once children can confidently use a number line, they should be encouraged to record their calculation as a partitioned number sentence. $13+11=$ $20 + 4=$ $13+19=$ $20 + 12 =$

Stage 3 Column Partitioning 2 (KS2)	Stage 4 Standard Written Method
This stage moves to developing understanding of 'carrying over' into the tens. Amounts 'carried over' are recorded above to prevent children from forgetting to add it to the total. 47+76 = | 40	7
70	6 | 110 +13 = 123 The addition of the tens is described 'forty plus 70 plus 13 equals one hundred and twenty three.	Later, extending to adding three two-digit numbers, two three-digit numbers and numbers with different numbers of digits. 1 46 +37 83

Subtraction

Stage 1 Number line	Stage 2 Partitioning
By counting up 15-7 = 8 +3 +5 7 10 15 105-77 =28 +3 +20 +5 77 80 100 105	Once children can confidently use a number line, they should be encouraged to record their calculation as a partitioned number sentence. 33 - 11= 22 30 - 10 = 20 (tens) 3 - 1 = 2 (units) 20 + 2 = 22 (tens + units)

Stage 3 Column Partitioning	Stage 4 Standard Method
Subtraction can be recorded using a vertical method whilst beginning to adopt a standard written method approach. This method would normally be used when a 10does not need to be bridged. 74 - 22 = 52 74 -20 - 2 _____ _____	The correct place value language needs to be used e.g. Can you subtract 20 from 70? 74 - 27 = $$70 + 4 \longrightarrow \begin{matrix} 60+10 & 14 \\ \cancel{70} + \cancel{4} \end{matrix}$$ -20 + 7 -20 + 7 40 + 7 = 47

Example:
741 − 367 =

700 + 40 + 1	600 130 10 $\cancel{700}$ + $\cancel{40}$ + 1	6 1 11 $\cancel{741}$	374
-300 + 60 + 7	-300 + 60 + 7	-367	+367
	300 + 70 + 4 = 374	374	741
			1 1

Multiplication

Stage 1
Arrays and number line

A number line helps the children see that multiplication makes the number larger.

+3   +3   +3   +3   +3   +3   +3

0   3   6   9   12   15   18   21

Repeated addition and arrays

★ ★ ★ ★ ★
★ ★ ★ ★ ★
★ ★ ★ ★ ★   3 x 5 = 15

Use of language such as 'groups of or 'lots of'.

Stage 3a   Stage 3b
Short Multiplication

```
   23              23
 x  8            x   8
   24   (8x3)      184
  160   (8x20)      2
  184
```

Stage 4
Long Multiplication (KS2)

56 x 27 =
56 x 27 is approximately 60 x 30 = 1800

```
   56
 x 27
  392
 1120
 1512
   1
```

Stage 2
Grid method

23 x 8 =

X	20	3
8	160	24

```
  160
+  24
  184
```

56 x 27 =
56 x 27 is approximately 60 x 30 = 1800

X	20	7
50	1000	350
6	120	42

```
  1000
   350
   120
+   42
  1512
```
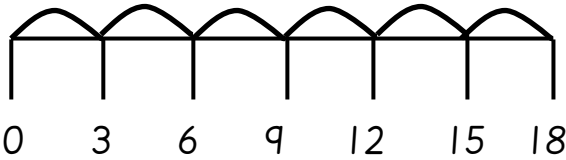
Column addition used to add answers together.

Division

The number line helps children to see that the number gets smaller when it is divided. Begin to ask questions such as "I wonder how many 3's I can get out of 18?" If we were to share 18 sweets between 3 children, how many would they get each?
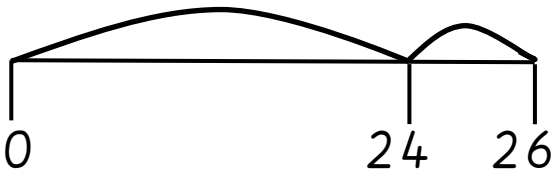
$18 \div 3 = 6$

```
   ∩  ∩  ∩  ∩  ∩  ∩
  |  |  |  |  |  |  |
  0  3  6  9  12 15 18
```

By counting up in threes, children can see how many 3's (or chunks of 3) they are adding from the original number.

Extend to using a number line to relate to times tables they recognise. Remainders may also be introduced.

$26 \div 3 = 8r2$

$(3 \times \textcircled{8} = 24) \qquad r2$

```
        ∩             ∩
   |          |    |
   0         24   26
```

> Children might prefer to draw times tables arrays if they are unsure of times table facts.
> E.g $3 \times 8 = 24$

Stage 2
Chunking TU ÷ U

This method often referred to as 'chunking' is based on subtracting multiples of the divisor, or 'chunks'. Chunking is useful for reminding children of the link between division and subtraction.

$97 \div 9 =$

```
      10 r 7
  9 | 97
    -90 ( 10 x 9)
    ___
       7
```

> Write the number of chunks first.

Initially children subtract several chunks, but with practise they should look for the biggest multiples of the divisor (9 in this example) that they can then subtract from the original number (90)

Stage 3
Chunking HTU ÷ U (KS2)

$196 \div 6 =$

```
      32 r 4
  6 | 196
    -180 ( 30 x6)
    ____
      16
    - 12 ( 2 x 6)
    ____
       4
```

> Circle the numbers you are adding at the end to avoid adding the 6 by accident.

```
        27
  36 | 972
     -720 ( 20 x 36)
     ____
      252
     -180 ( 5 x 36)
     ____
       72
     - 72 ( 2 x 36)
     ____
        0
```

To calculate 748 divided by 51,

First, set the sum out as shown:

$$51\overline{)748}$$

We work out 74 divided by 51, and write the answer (1) above the 4.

1 × 51 = 51, so we write this underneath 74.

Subtract 51 from 74 to get the remainder (23).

```
     1
51)748
  -51
   23
```

We now bring down the next digit (8) and write it on the end of the 23.

```
     1
51)748
  -51
  238
```

We now work out 238 divided by 51, and write the answer (4) above the 8. You use estimation skills here: 51 is roughly 50 and 4 × 50 = 200. You can work out 51 × 4 = 204 separately.

We write 204 underneath the 238 and subtract to find the remainder. There are no more digits to bring down, so we have our answer:

```
    14
51)748
  -51
   238
  -204
    34
```

So the answer is 14 remainder 34.