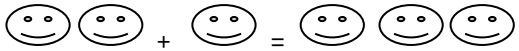
St Andrew's CE Primary School

Whole School Written Calculation Policy
Pencil and paper procedures
Key Stages 1 and 2

Addition

Year 1

Counting on using objects and numicon



Also using numicon

+ = signs and missing numbers

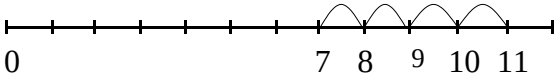
3 + 4 = □ □ = 3 + 4
3 + □ = 7 7 = □ + 4
□ + 4 = 7 7 = 3 + □
□ + ∇ = 7 7 = □ + ∇

Promoting covering up of operations and numbers.

Number lines

(Teacher model number lines with missing numbers)

7 + 4 = 11



Partition into tens and ones and recombine (Spring/Summer Term)

12 + 23 = 10 + 2 + 20 + 3
= 30 + 5
= 35

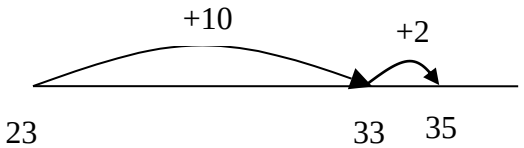
Year 2

+ = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate, larger numbers.
Extend to
14 + 5 = 10 + □
and adding three numbers
32 + □ + □ = 100 35 = 1 + □ + 5

Refine to partitioning the second number only into tens and ones:
(Autumn Term)

23 + 12 = 23 + 10 +2
= 33 + 2
= 35



Partition into tens and ones and recombine (Spring & Summer Term)

Partition both numbers and recombine

36 + 53 =
30 + 6
50 + 3
80 + 9 = 89

Teach all three partitioning methods but this is the preferred style to adopt.

24 + 17
20+ 10 = 30
4 + 7 = 11 Preferred version
41

Mental Method – ongoing

(Use a visual image)

Add 9 or 11 by adding 10 and adjusting by 1

35 + 9 = 44

Year 3

+ = signs and missing numbers

Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers

balanced equations

10 + 5 = 20 - □

Continue as in Year 2 but with appropriate numbers
e.g. 35 + 19 is the same as 35 + 20 – 1

Pencil and paper procedures
(Autumn Term)

36 + 53 =

```
  36
+53
   9
  80
  89
```

Pencil and paper procedures
(Spring Term)

358 + 73 = 431

```
   358
+   73
    11
   120
  300
  431
```

Pencil and paper procedures – compact method
(Summer Term)

```
  36
+53
 89
```

Add a near multiple of 10 to a two-digit number
(Use a visual image)
Mental Method – ongoing
(Use a visual image)

Add19/29 etc or 11/21 etc by adding 10/20 etc and adjusting by 1

35 + 9 = 44
35 +19=54

Addition

Year 4

+ = signs and missing numbers

Continue using a range of equations but with appropriate, larger numbers

balanced equations

6 X 5 = □ + 15

Pencil and paper procedures
Compact method, showing numbers carried underneath

```
  358
+  73
 431
  11
```

Pencil and paper procedures
(Summer Term)
Extend to numbers with at least four digits and decimals (money context)

3587 + 675 = 4262

```
  3587
+  675
  4262
   111
```

Year 5

+ = signs and missing numbers

Continue using a range of equations but with appropriate, larger numbers

balanced equations

8 X 6 = n + 23

Pencil and paper procedures
(All Terms)

Extend to numbers with at least four digits

3587 + 675 = 4262

```
  3587
+  675
  4262
   111
```

Extend to decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

```
  124.90
+ 117.25
  242.15
   11
```

add in a zero to keep the place value

Year 6

+ = signs and missing numbers

Continue using a range of equations but with appropriate, larger numbers

balanced equations

n X 6 = n + 23

Pencil and paper procedures
(All Terms)

Extend to numbers with at least four digits

63527 + 73984

```
   63527
+  73984
 13 7511
   111
```

Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.
124.9 + 117.25 = 242.15

```
  7124.90
+ 1117.25
 8 242.15
   11
```

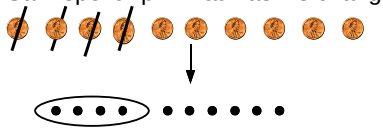
add in a zero to keep the place value

Subtraction

Year 1

Pictures / marks/objects/numicon

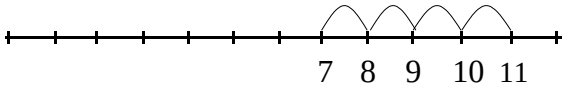
Sam spent 4p. What was his change from 10p?



- = signs and missing numbers

7 - 3 = □ □ = 7 - 3
7 - □ = 4 4 = □ - 3
□ - 3 = 4 4 = 7 - □
□ - ∇ = 4 4 = □ - ∇

The difference between 7 and 11
(Counting back/taking away)
To reinforce concept. Practical strategies essential to see 'difference'.



Recording by - drawing jumps on prepared lines
- constructing own lines

(Teachers model jottings appropriate for larger numbers)

Year 2

- = signs and missing numbers

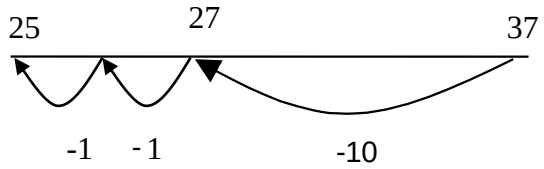
Continue using a range of equations as in Year 1 but with appropriate numbers.
Extend to 14 + 5 = 20 - □

Mental Method

Subtract 9 or 11. Begin to add/subtract 19 or 21
35 – 9 = 26
To be taught using a100 square

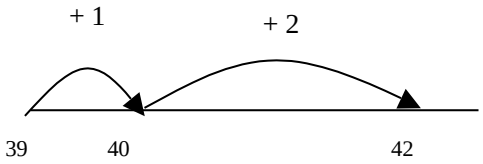
Use known number facts and place value to subtract (partition second number only) (Autumn & Spring Term)

37 – 12 = 37 – 10 – 2
= 27 – 2
= 25



Find a small difference by counting up

42 – 39 = 3



Summer Term

Unit digits do not cross tens boundaries (without decomposition)

58 – 24
50 - 20 =30
8 - 4= 4
34

42 – 27
30 40 – 20=10
1 2 - 7= 5
15

Year 3

- = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate numbers.
Extend to 26 + 43 = 82 - □

Find a small difference by counting up

Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

Mental Method

Subtract 9 or 11. Add/subtract 19 or 21

35 – 9 = 26

Use known number facts and place value to subtract
Pencil and paper procedures
(Autumn & Spring Terms)

Unit digits do not cross tens boundaries (without decomposition)

98
- 37
1 (8-7)
60 (90-30)
61

197
- 15
2
80
100
182

(Summer Term) crossing 10's boundaries

92 – 38 = 54

92
-38

90 + 2 → 80 + 12
30 + 8 - 30 + 8
50 + 4

Subtraction

Year 4	Year 5	Year 6
- = signs and missing numbers Continue using a range of equations as in Year 3 but with appropriate numbers. Extend to 126 + 43 = 200 - □ **Mental Method** *Subtract 9 or 11. Add/subtract 19 or 21with confidence* **Use known number facts and place value to subtract** **Pencil and paper procedure:** **(All Terms) Use decomposition** $\begin{array}{r} {}^{8}\not{9}\,{}^{1}2 \\ -\ 3\,8 \\ \hline 5\,4 \end{array}$ **Extend using larger numbers and decimal numbers**	**- = signs and missing numbers** Continue using a range of equations as in Year 4 but with appropriate numbers. Extend to 186 + 137 = 420 - □ **Pencil and paper procedures** **(All Terms)** $\begin{array}{r} {}^{2}\not{3}\,{}^{4}\not{5}\,{}^{1}2 \\ -\ 1\,7\,8 \\ \hline 1\,7\,4 \end{array}$ **Extend using larger numbers and decimal numbers**	**- = signs and missing numbers** Continue using a range of equations as in Year 5 but with appropriate numbers. Extend to 387 + 469 = 1200 - □ **Pencil and paper procedures** **(All Terms)** $\begin{array}{r} {}^{2}\not{3}\,{}^{4}\not{5}\,{}^{1}2 \\ -\ 1\,7\,8 \\ \hline 1\,7\,4 \end{array}$ **Extend using larger numbers and decimal numbers**

Multiplication

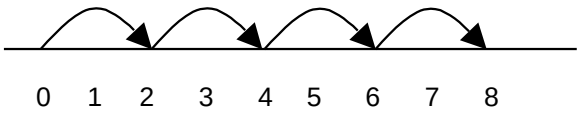
Year 1

Pictures and symbols/objects/numicon

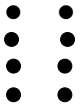
There are 3 sweets in one bag.
How many sweets are there in 5 bags?

(Recording on a number line modelled by the teacher when solving problems)

4x2 (4 lots of 2)



Arrays (Spring Term)
4 lots of 2



Times Tables
Square numbers 2,5,10, doubles and halves to ten.

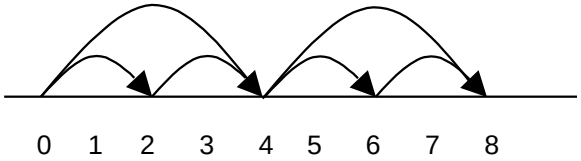
Year 2

x = signs and missing numbers

7 x 2 = □ □ = 2 x 7
7 x □ = 14 14 = □ x 7
□ x 2 = 14 14 = 2 x □
□ x ∇ = 14 14 = □ x ∇

Autumn & Spring Terms
Arrays and repeated addition

4 x 2 or 4 + 4
2 x 4
or repeated addition
2 + 2 + 2 + 2



Mental Method
Doubling multiples of 5 up to 60
15 x 2 = 30**Partition**
(10 x 2) + (5 x 2)

20 + 10
= 30

Summer Term
35 x 2 = 70

Partition

x	T 30	O 5
2	60	10

Times Tables
Square numbers 2,5,10, multiplication and division facts, odd and even numbers

Year 3

x = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Autumn & Spring Terms

Grid method
TU x U
23 x 7 is approximately 20 x 10 = 200

23 x 7 = 161

x	T 20	U 3
7	140	21

140
+ 21
161

Summer Term
Compact method TO X O

Estimate and check
23 x 7 is approximately 20 x 10 = 200

23 x 7 = 161

23
x 7
161
2

Times Tables
Square numbers 3,4,8 multiplication and division facts.

Multiplication

Year 4

x = signs and missing numbers
Continue using a range of equations as in Year 3 but with appropriate numbers

Pencil and paper procedures (Autumn & Spring Terms)
HTO x O - **Short Multiplication**
Estimate and check
23 x 7 is approximately 20 x 10 = 200

23 x 7 = 161

```
  2 23
    7
 1561
   1  2
```

TO x TO & HTO x TO – **Long Multiplication expanded**
123x53=

```
  H T O
  123
X  53
    9
   60
  300
  150
 1000
 5000
 6519
    1
```

Summer Term – compact method

```
  H T O
  123
X  53
  369
 6150
 1 1
 6519
    1
```

Times Tables
Square numbers
All tables to 12x multiplication and division facts.

Year 5

x = signs and missing numbers
Continue using a range of equations as in Year 4 but with appropriate numbers

Estimate and check
1125 x 7 is approximately 1000 x 7 = 7000

Pencil and paper procedures – compact method (All Terms)
1125 x 7 = 7875
This method to be used when multiplying by 1 digit

```
  1 1 2 5
x         7
  7 8 7 5
    1   3
```

Extend using larger numbers and decimals

Pencil and paper procedures –long multiplication (All Terms)
Estimate and check

```
  2372
    78
 18976
 2 5 1
166040
 2 5 1
185016
 1 1 1
```

Extend using larger numbers and decimals

Times Tables
Square numbers
All tables to 12x multiplication and division facts.

Year 6

x = signs and missing numbers
Continue using a range of equations as in Year 5 but with appropriate numbers

4987 x 8 = 39896
Continue with the compact method when multiplying by 1 digit

Pencil and paper procedures –compact method multiplication (All Terms)
Estimate and check

```
  2372
    78
 18976
 2 5 1
166040
 2 5 1
185016
 1 1 1
```

Pencil and paper procedures –compact method multiplication (All Terms)

Estimate and check
7.2 x 3.8 is approximately 7 x 4 = 28

7.2 x 3.8

```
    U . 1/10 1/100
  7.2
X 3.8
 5.76
21.60
27.36
  1
```

Times Tables
Square numbers
All tables to 12x multiplication and division facts.

Division

Year 1

Pictures / marks

9 children get into teams of 3 to play a game. How many teams are there? (Grouping)

Finding ½ and ¼

Using objects/numicon to find ½ and ¼ of numbers practically.

½ of odd numbers

(Spring)

Using objects to find ½ of odd numbers

3 and ½ 3 and ½

Year 2

÷ = signs and missing numbers

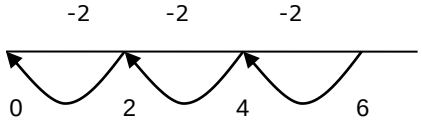
6 ÷ 2 = □ □ = 6 ÷ 2
6 ÷ □ = 3 3 = 6 ÷ □
□ ÷ 2 = 3 3 = □ ÷ 2
□ ÷ ∇ = 3 3 = □ ÷ ∇

Understand division as sharing and grouping

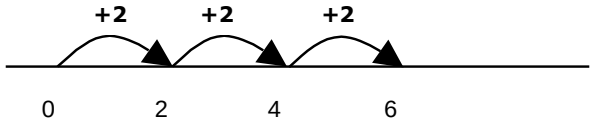
Sharing – 6 sweets are shared between 2 people. How many do they have each?

6 ÷ 2 can be modelled as:

Grouping – There are 6 sweets. How many people can have 2 each? (repeated subtraction)



(How many 2's make 6?) Counting on in 2s to make 6.



Year 3

÷ = signs and missing numbers

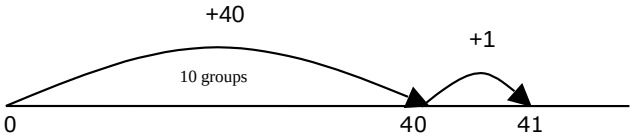
Continue using a range of equations as in Year 2 but with appropriate numbers.

Understand division as sharing and grouping

(Autumn Term)

Remainders

41÷ 4 = 10 r1



OR 41 = (10 x 4) + 1

Spring Term - Chunking method

56÷ 4 = 14
-40 (10x4)
16
-16 (4x4)
0

Summer Term - Bus stop method (with no remainders)

$$4\overline{)\,5\;16}\quad 1\;4$$

Division

Year 4

÷ = signs and missing numbers
Continue using a range of equations as in Year 3 but with appropriate numbers.

Pencil and paper procedures – **Bus stop method – short division (All Terms)**

146 ÷ 8 is approximately 150 ÷ 10 = 15

```
  0 1 8 r2
8 ⟌1¹4⁶6
```

Extend by dividing by 7 and 9 and begin to show remainders as simple fractions e.g. 2/8 is 1/4

Pencil and paper procedures - (Spring &Summer Term)

Using chunking method for division for long division

552 ÷ 24 = 23

```
    23
24 ⟌5¹52
  - 480   (20 x 24)
    72    (3 x 24)
```

Year 5

÷ = signs and missing numbers
Continue using a range of equations as in Year 4 but with appropriate numbers.

Pencil and paper procedures - Compact Method (Autumn/Spring Term)

146 ÷ 8 is approximately 150 ÷ 10 = 15
This method to be used when multiplying by 1 digit

```
  0 1 8 r2
8 ⟌1¹4⁶6
```

With Remainders

Pencil and paper procedures – (Summer Term)

```
  0 1 8 r ¼  (or .25)
8 ⟌1¹4⁶6
```

Remainders

Return to chunking method for division by 2 digit numbers
Quotients expressed as fractions or decimal fractions
61 ÷ 4 = 15 ¼ or 15.25

```
    23 r ⅓
24 ⟌560
  - 480   (20 x 24)
    80
    72    (3 x 24)
     8
```

Year 6

÷ = signs and missing numbers
Continue using a range of equations as in Year 5 but with appropriate numbers.

Continue with pencil and paper procedures for Year 5

Remainders

Quotients expressed as fractions or decimal fractions
676 ÷ 8 = 84.5

Pencil and paper procedures
977 ÷ 36 is approximately 1000 ÷ 40 = 25

Using chunking for division of larger number and dividing by 2-digit numbers as Year 5