Year 1

Addition	Subtraction	Multiplication (x2, x5,x 10)	Division
+ = signs and missing numbers	**Pictures / marks**	**Pictures and symbols**	**Pictures / marks**

Addition

+ = 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 bonds to 10 secure using this method.

Number lines (numbered)

7 + 4

0 1 2 3 4 5 6 7 8 9 10 11 12
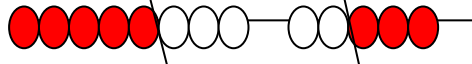
Recording by - drawing jumps on prepared lines

o   constructing own lines

(Teacher model number lines with missing numbers)

(Teachers model jottings appropriate for larger numbers)

Subtraction

Pictures / marks
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 = ☐ - ▽

Number lines (numbered)

11 – 7
(Counting back)

0 1 2 3 4 5 6 7 8 9 10 11 12

The difference between 7 and 11
(Counting up)

0 1 2 3 4 5 6 7 8 9 10 11 12

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

(Teachers model jottings appropriate for larger numbers)

Multiplication (x2, x5,x 10)

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

Use of bead strings to model groups of.

Arrays and repeated addition

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

2 + 2 + 2 + 2

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

0 1 2 3 4 5 6 7 8

Division

Pictures / marks

Children use pictures or shapes to share quantities.

$8 \div 2 = 4$

Teacher uses objects/ pictures to model division problems.

12 children get into teams of 4 to play a game. How many teams are there?

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Year 2

Addition	Subtraction	Multiplication (x 2, x3, x 5, x10)	Division

Addition

+ = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate, larger numbers.
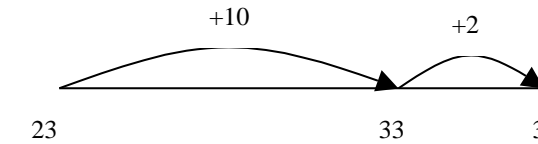
Extend to

14 + 5 = 10 + □

and **adding three numbers**

32 + □ + □ = 100   35 = 1 + □ + 5

Partition into tens and ones and recombine

12 + 23 = 10 + 2 + 20 + 3

= 30 + 5

= 35

refine to partitioning the second number only:

23 + 12 = 23 + 10 + 2

= 33 + 2

= 35

$$+10 \qquad +2$$

23   33   35

Add 9 or 11 by adding 10 and adjusting by 1
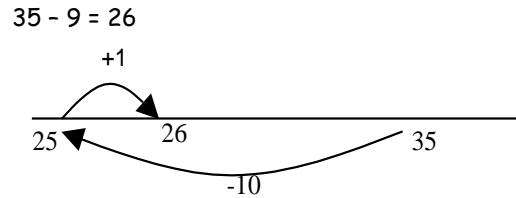
35 + 9 = 44
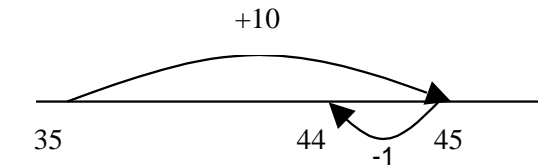
$$+10$$

35   44   45

-1

Subtraction

− = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate numbers.

Extend to 14 + 5 = 20 - □

Find a small difference by counting up

42 – 39 = 3

$$+1 \qquad +2$$

39   40   42
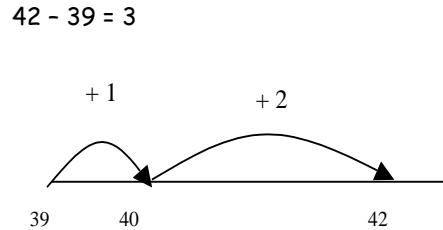
Subtract 9 or 11. Begin to add/subtract 19 or 21

35 – 9 = 26

$$+1$$

25   26   35

-10

Use known number facts and place value to subtract (partition second number only)

37 – 12 = 37 – 10 – 2

= 27 – 2

= 25

25   27   37

-2   -10
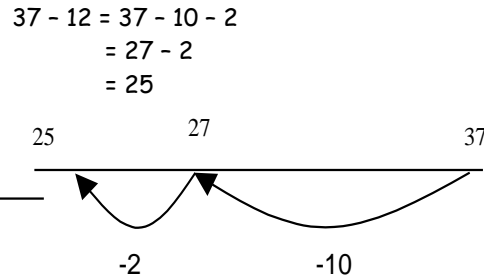
Multiplication (x 2, x3, x 5, x10)

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 ∇

Arrays and repeated addition

● ● ● ●   4 x 2 or 4 + 4
● ● ● ●

2 x 4

or repeated addition

2 + 2 + 2 + 2

0 1 2 3 4 5 6 7 8
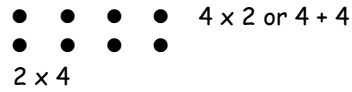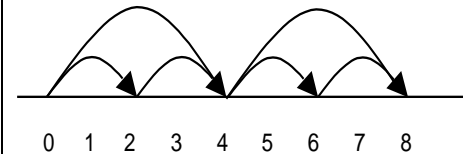
Doubling multiples of 5 up to 50

15 x 2 = 30

Partition

15 x 2

20 + 10 = 30

OR

x	10	5
2	20	10

Division

÷ = 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? (How many 2's make 6?)

0   2   4   6

Year 3

Addition	Subtraction	Multiplication (x2,x5,x10,x3,x4,x8)	Division

Addition

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

Partition into tens and ones and recombine
Partition both numbers and recombine.
Refine to partitioning the second number only
e.g.
36 + 53 = 53 + 30 + 6
$\qquad$ = 83 + 6
$\qquad$ = 89

$+30$ $\qquad$ $+6$

53 $\qquad$ 83 $\qquad$ 89

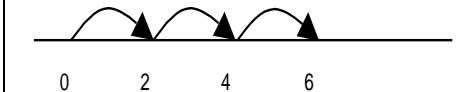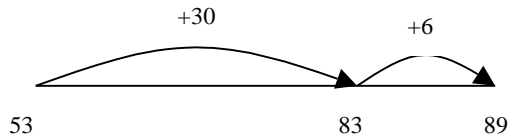**Add a near multiple of 10 to a two-digit number**
Continue as in Year 2 but with appropriate numbers
e.g. 35 + 19 is the same as 35 + 20 – 1.

Formal written method
Progress from no crossing of boundaries to crossing of boundary up to 3 digits.
83 + 42 = 125
80 + 3 $\qquad\qquad$ 83
+40 + 2 $\qquad\qquad$ + 42
120 + 5 =125 $\qquad$ 120
$\qquad\qquad\qquad\qquad$ 5
$\qquad\qquad\qquad\qquad$ 125

285 + 73 = 358
285
+73 *Show expanded and compact forms*
$\quad$ 8
150
200
358

Subtraction

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

Find a small difference by counting up
Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5.
Calculate change using a number line- when the numbers are looking at you, use a number line.

Subtract mentally a 'near multiple of 10' to or from a two-digit number
Continue as in Year 2 but with appropriate numbers e.g. 78 – 49 is the same as 78 – 50 + 1

Use known number facts and place value to subtract
Continue as in Year 2 but with appropriate numbers e.g.
97 – 15 =

82 $\qquad$ 87 $\qquad\qquad$ 97

-5 $\qquad$ -10
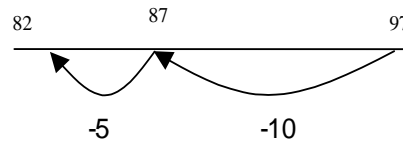
72

Formal written method

Columnar subtraction to subtract numbers with up to three digits:
Progress from no crossing of boundaries to crossing of boundary.
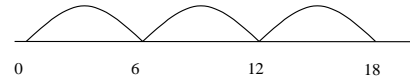
234 – 88 = 146

Calculations
234
- 88
146

Multiplication (x2,x5,x10,x3,x4,x8)

x = signs and missing numbers
Continue using a range of equations as in Year 2 but with Y3 appropriate numbers.
Number lines
6 x 3

0 $\quad$ 6 $\quad$ 12 $\quad$ 18

Arrays and repeated addition
Continue to understand multiplication as repeated addition and continue to use arrays (as in Year 2) .

Doubling multiples of 5 up to 50
35 x 2 = 70

Partition

x	30	5
2	60	10

Use known/ related facts and place value to carry out simple multiplications TU X U
Use the same method as above (partitioning), e.g. 32 x 3 = 96

x	30	2
3	90	6

Division

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

Understand division as sharing and grouping
15 ÷ 3 can be modelled as:
Sharing – 15 shared between 3 (see Year 2 diagram)
OR

0 $\quad$ 3 $\quad$ 6 $\quad$ 9 $\quad$ 12 $\quad$ 15

Or
18 ÷ 3 can be modelled as:
Sharing – 18 shared between 3 (see Year 2 diagram)

Grouping - How many 3's make 18?

0 $\,$ 3 $\,$ 6 $\,$ 9 $\,$ 12 $\,$ 15 $\,$ 18

Remainders

16 ÷ 3 = 5 r1
Sharing - 16 shared between 3, how many left over?
Grouping – How many 3's make 16, how many left over?
e.g.

0 $\,$ 3 $\,$ 6 $\,$ 9 $\,$ 12 $\,$ 15 16

Year 4

Addition	Subtraction	Multiplication (all up to 12 x 12)	Division

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with curriculum appropriate numbers.

Partition into tens and ones and recombine
Either partition both numbers and recombine or partition the second number only e.g.
55 + 37 = 55 + 30 + 7
= 85 + 7
= 92

+30 +7
55   85   92
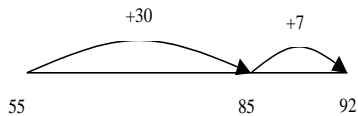
Add the nearest multiple of 10, then adjust
Continue as in Year 2 and 3 but with appropriate numbers e.g. 163 + 29 is the same as 163 + 30 - 1

Formal written methods
358 + 73 = 431

either   or

300+50+8   358
+   70+3   + 73
300+120+11 = 431   11
                                120
                                300
                                431

3587
+ 675
4262
1 1 1

The formal, efficient method of columnar addition will involve crossing of boundaries (at the tens, hundreds and/or

---

– = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Find a small difference by counting up
e.g. 5003 – 4996 = 7
This can be modelled on an empty number line (see complementary addition below).

Subtract the nearest multiple of 10, then adjust.
Continue as in Year 2 and 3 but with appropriate numbers.

Use known number facts and place value to subtract e.g.
92 – 15 =
77

77   82   92

-5   -10

Complementary addition
754 – 86 = 668

+14   +600   +54

86   100   700   754

Calculate decimal differences using a number line: 6.1 – 0.4 = 5.7

5.7   6.0   6.1

-0. 3   -0 .1

---

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

Partition
23 x 4 = 92

23 x 4 = (20 x 4) + (3 x 4)
= (80) + (12)
=   92

OR

Use the grid method of multiplication (as below)

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

x	20	3
7	140	21

x	70	2
30	2100	60
8	560	16

Moving to expanded, then compact methods of multiplication once conceptually secure (P.V).

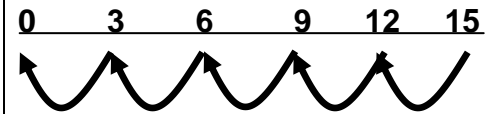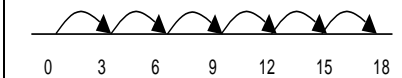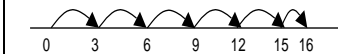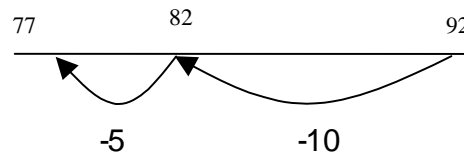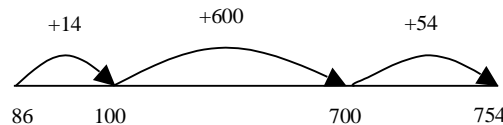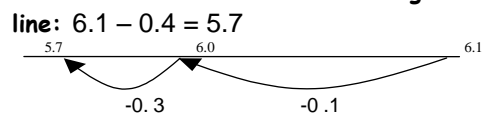
÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Sharing and grouping
30 ÷ 6 can be modelled as:
grouping – groups of 6 taken away and the number of groups counted e.g.

+6 +6 +6 +6 +6
0   6   12 18 24 30
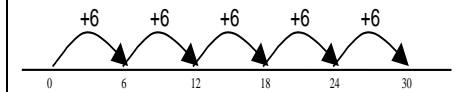
sharing – sharing among 6, the number given to each person
Remainders
41 ÷ 4 = 10 r1

+40
+1
10 groups
OR
0   1   41
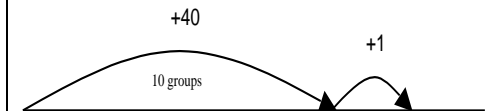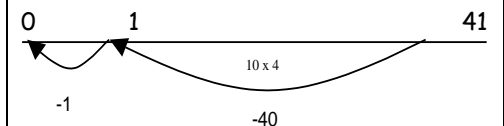
-1
-40
OR   41 = (10 x 4) + 1

Formal written method
72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20
72
-   50   (10 groups) or (10 x 5)
22
-   20   (4 groups) or (4 x 5)
2

Answer : 14 remainder 2

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thousands). Take a systematic approach to teaching this looking at crossing each boundary in turn before mixed practice.

Extend to decimals in the context of money (vertically)

£ 2.50 + £ 1.75 = £ 4.25

  £ 2.50
+ £ 1.75
  £ 4.25
   ₁

(Revert to expanded methods if the children experience any difficulty.)

Subtraction with at least four digits using formal method of columnar subtraction

For instance, 6467 – 2684 = 3783
Using expanded column subtraction where children experience difficulty with decomposition and need to 'see' this.

See NC appendix for e.g calculations

Add and subtract up to 4 digits

```
   32
x  24
____
    8    (4 x 2)
  120    (4 x 30)
   40    (20 x 2)
  600    (20 x 30)
____
  768
```

Place value must be secure before children move on to short methods of multiplication.

Short multiplication

24 × 6 becomes

```
    2   4
  ×     6
_____
  1 4   4
    ₂
```

Answer: 144

HTU ÷ U
Can progress from no remainder to remainders. Where remainders are involved, care needs to be taken to ensure they are interpreted correctly in context of problems.

$256 \div 7$ lies between $210 \div 7 = 30$ and $280 \div 7 = 40$

```
     256
 -    70    (10
            groups) or
            (10 × 7)
     186
 -   140    (20
            groups) or
            (20 × 7)
      46
 -    42    (6
            groups) or
            (6 × 7)
       4    (36 groups) or (36)
```
Answer: 36 remainder 4

Year 5 and Year 6 (upper KS2)

| Addition	Subtraction	Multiplication (all to 12 x 12)	Division

Addition

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

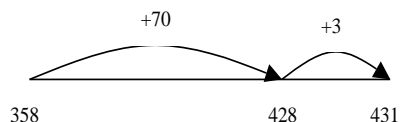**Partition into hundreds, tens and ones and recombine**
Either partition both numbers and recombine or partition the second number only e.g.
358 + 73 = 358 + 70 + 3
            = 428 + 3
            = 431

+70   +3

358   428   431
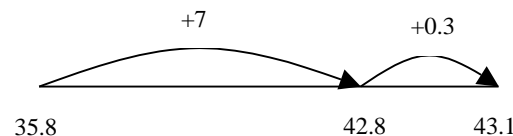
Model negative numbers using a number line.
Decimal fractions and recombine
Either partition both numbers and recombine or partition the second number only e.g.
35.8 + 7.3 = 35.8 + 7 + 0.3
            = 42.8 + 0.3
            = 43.1

+7   +0.3

35.8   42.8   43.1

Add the nearest multiple of 10, 100 or 1000, then adjust
Continue as in Year 2, 3, 4 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc.

Subtraction

– = signs and missing numbers
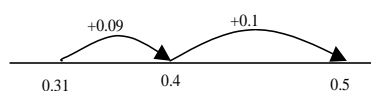Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Find a difference by counting up
e.g. 8006 – 2993 = 5013
This can be modelled on an empty number line.

0.5 – 0.31 = 0.19
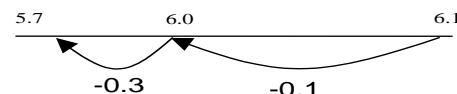This can be modelled on an empty number line (see complementary addition below).

+0.09   +0.1

0.31   0.4   0.5

Subtract the nearest multiple of 10 or 100, then adjust.
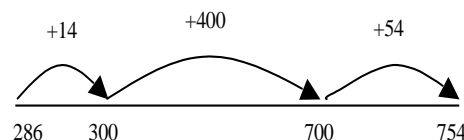Continue as in Year 2, 3 and 4 but with appropriate numbers.

Use known number facts and place value to subtract
6.1 – 0.4 = 5.7

5.7   6.0   6.1

-0.3   -0.1

Complementary addition
754 – 286 = 468

+14   +400   +54

286   300   700   754

OR   **754 - 286 = 468**

Multiplication (all to 12 x 12)

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

Partition
87 x 6 = 522

87 x 6 = (80 x 6) + (7 x 6)
        = (480) + (42)
        =   522

OR
 87
 X6
 42   (6 x 7)
480   (6 x 80)
522   (units, then tens, hundreds etc)

OR
Use the grid method of multiplication (as below)

Formal written methods
Grid method
72 x 38 is approximately 70 x 40 = 2800

X	70	2
30	2100	60
8	560	16

Extend to bigger numbers and simple decimals with one and two decimal places.
(USING GRID METHOD)

X	300	70	2
20	6000	1400	40
4	1200	280	8

Division

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

Sharing and grouping
Continue to understand division as both sharing and grouping (repeated subtraction). CHUNKING

Remainders
Quotients expressed as fractions or decimal fractions
$61 \div 4 = 15\frac{1}{4}$ or 15.25

+40   +20   +1

10 groups   5 groups

OR

0   1   21   61

5 groups   10 groups

-1   -20
            -40
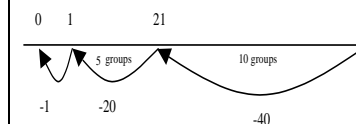
Formal written methods
977 ÷ 36 is approximately 1000 ÷ 40 = 25

```
    977                         977
-   360   (10 groups)     -    720
    (20 groups)
    617                         257
-   360   (10 groups) refine -  180    (5
    groups)
    257                  to       77
-   180   (5 groups)           -  72
(2 groups)
    77                            5
-   72    (2 groups)
    5
```
Answer: $27 \frac{5}{36}$

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Column 1

Formal method

```
   358
 +  73
   431
  11
```

789 + 642 becomes

```
    7  8  9
 +  6  4  2
 ─────────
    1  4  3  1
       1  1
```

Answer: 1431

| Numbers cross into thousands column.

Extend to numbers with range of digits

3587 + 675 = 4262

```
   3587
 +  675
   4262
   1 1 1
```

Revert to expanded methods if the children experience any difficulty.
Extend to decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

Column 2

```
14 (300)      can be refined to       14  (300)
400 (700)                            454 (754)
 54 (754)                            468
468
```

Include number line qs with more challenging numbers: 6467 – 2684 = 3783
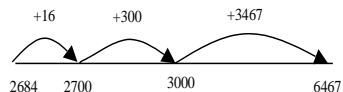
```
    +16        +300          +3467
  2684  2700        3000              6467
```

Subtraction with at least four digits using formal method of columnar subtraction

For instance, 6467 – 2684 = 3783
Using expanded column subtraction where children experience difficulty with decomposition and need to 'see' this.

See NC appendix for e.g calculations

Add and subtract up to 4 digits

Column 3

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

Columns must be lined up in order to aid addition following multiplication calcs.

Move from grid method to long multiplication:

24 × 16 becomes
```
      2
    2  4
 ×  1  6
 ─────────
    2  4  0
    1  4  4
 ─────────
    3  8  4
```
Answer: 384

124 × 26 becomes
```
    1  2
    1  2  4
 ×     2  6
 ─────────
    2  4  8  0
       7  4  4
 ─────────
    3  2  2  4
       1  1
```
Answer: 3224

Only move to compact method once children are secure:

24 × 6 becomes
```
    2  4
 ×     6
 ─────────
    1  4  4
       2
```
Answer: 144

342 × 7 becomes
```
    3  4  2
 ×        7
 ─────────
    2  3  9  4
       2  1
```
Answer: 2394

Column 4

Move from chunking to short division (bus stop method):

98 ÷ 7 becomes
```
      1  4
     ────────
   7 │ 9  ²8
```
Answer: 14

432 ÷ 5 becomes
```
      8  6  r2
     ────────────
   5 │ 4  ³3  2
```
Answer: 86 remainder 2

Long division = goal for year 6
With remainders as fractions and decimals

432 ÷ 15 becomes
```
           2  8  r12
        ─────────────
   1  5 │ 4  3  2
           3  0  0
        ─────────────
           1  3  2
           1  2  0
        ─────────────
              1  2
```
Answer: 28 remainder 12

432 ÷ 15 becomes
```
           2  8
        ─────────────
   1  5 │ 4  3  2
           3  0  0     15×20
        ─────────────
           1  3  2
           1  2  0     15×8
        ─────────────
              1  2
```
$\frac{12}{15} = \frac{4}{5}$

Answer: $28 \frac{4}{5}$

Year 6

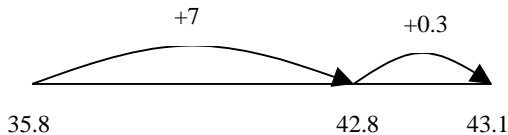| Addition	Subtraction	Multiplication	Division

Addition

+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Partition into hundreds, tens, ones and decimal fractions and recombine
Either partition both numbers and recombine or partition the second number only e.g.

$35.8 + 7.3 = 35.8 + 7 + 0.3$
$= 42.8 + 0.3$
$= 43.1$

+7   +0.3

35.8   42.8   43.1

Add the nearest multiple of 10, 100 or 1000, then adjust
Continue as in Year 2, 3, 4 and 5 but with appropriate numbers including extending to adding 0.9, 1.9, 2.9 etc

Pencil and paper procedures
Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.
$124.9 + 117.25 = 242.15$
Using number line
Revert to expanded methods if the children experience any difficulty.
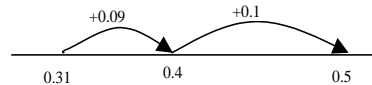Extend to decimals (either one or two decimal places).

Subtraction

– = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.
Find a difference by counting up
e.g. $0.5 – 0.31 = 0.19$
This can be modelled on an empty number line (see complementary addition below).

+0.09   +0.1

0.31   0.4   0.5

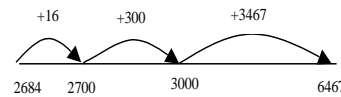**Subtract the nearest multiple of 10, 100 or 1000, then adjust**
Continue as in Year 2, 3, 4 and 5 but with appropriate numbers.
Use known number facts and place value to subtract
Continue as year 5
Pencil and paper procedures
Number Line
Complementary addition
$6467 – 2684 = 3783$

+16   +300   +3467

2684 2700   3000   6467   **OR**

6467 – 2684 = 3783

  16 (2700)   can be refined to
316 (3000)
300 (3000)
3467 (6467)
3467 (6467)
3783
3783
(Decomposition for G&T children only when secure.)

Multiplication

x = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers
Partition
$87 \times 6 = 522$

$87 \times 6 = (80 \times 6) + (7 \times 6)$
$= (480) + (42)$
$= 522$
OR
 87
 X6
 42   (6 x 7)
480   (6 x 80)
522   (units, then tens, hundreds etc)
OR
Use the grid method of multiplication (as below)
Pencil and paper procedures
Grid method
372 x 24 is approximately 400 x 20 = 8000

x	300	70	2
20	6000	1400	40
4	1200	280	8

Extend to decimals with up to two decimal places.

Moving to formal methods of multiplication for decimals. Carrying numbers underneath.

Division

÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.
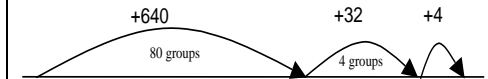**Sharing and grouping**
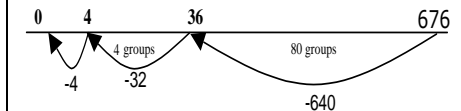Continue to understand division as both sharing and grouping (repeated subtraction).
Remainders
Quotients expressed as fractions or decimal fractions
$676 ÷ 8 = 84.5$

+640   +32   +4
80 groups   4 groups

OR

0   4   36   676
4 groups   80 groups
-4   -32
-640

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

  977   977
- 360   (10 groups)   - 720
  (20 groups)
  617   257
- 360   (10 groups) **refine** - 180   (5 groups)
  257   **to**   77
- 180   (5 groups)   - 72
  (2 groups)
  77   5
- 72   (2 groups)
  5
Answer: $27 \frac{5}{36}$
(Formal method to continue to be taught to present Y6 04 – 05)

St Mary & St Pancras C. E Primary School