Year 1

Addition

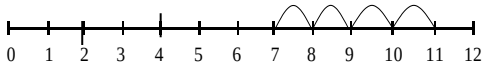
+ = signs and missing numbers

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

Promoting covering up of operations and numbers.

Number lines (numbered)

7 + 4



Recording by - drawing jumps on prepared lines

- constructing own lines

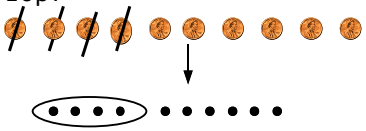
(Teacher model number lines with missing numbers)

(Teachers model jottings appropriate for larger numbers)

Mental Strategies
e.g. Know addition facts to 10

Subtraction

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

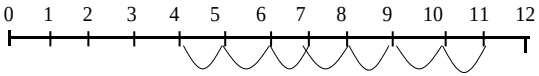


- = signs and missing numbers

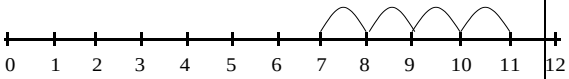
7 - 3 = □ □ = 7 - 3
7 - □ = 4 4 = □ - 3
□ - 3 = 4 4 = 7 - □
□ - ∇ = 4 4 = □ - ∇

Number lines (numbered)

11 – 7
(Counting back)



The difference between 7 and 11
(Counting up)



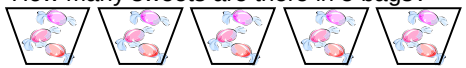
Recording by - drawing jumps on prepared lines
- constructing own lines

(Teachers model jottings appropriate for larger numbers)

Mental Strategies
e.g. Know subtraction facts to 10

Multiplication

Pictures and symbols
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)

Multiplication tables

Know facts for the 2 x tables

Division

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

Year 2

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

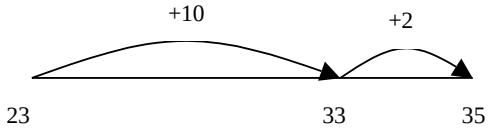
Partition into tens and ones and recombine

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

refine to partitioning the second number only:

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

Number lines (numbered then empty)

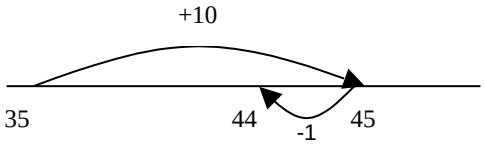


Mental Strategies

e.g. Know by heart addition facts to 10 (then 20)

Add 9 or 11 by adding 10 and adjusting by 1. Begin to add 19 or 21

35 + 9 = 44



Subtraction

- = signs and missing numbers

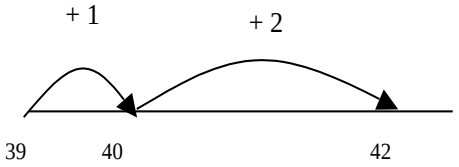
Continue using a range of equations as in Year 1 but with appropriate numbers.

Extend to 14 + 5 = 20 - □

Find a small difference by counting up

42 – 39 = 3

Number lines (numbered then empty)

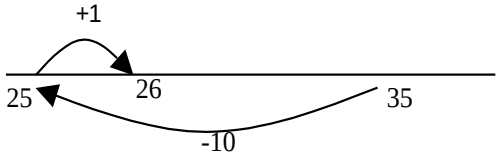


Mental Strategies

e.g. Know by heart subtraction facts to 10 (then 20)

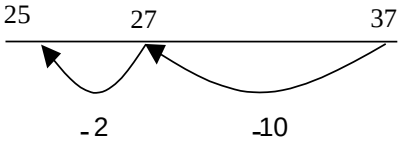
Subtract 9 or 11 by subtracting 10 and adjusting by 1. Begin to subtract 19 or 21

35 – 9 = 26



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

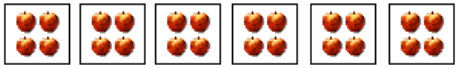
37 – 12 = 37 – 10 – 2
= 27 – 2
= 25



Multiplication

Pictures and Symbols

There are 4 apples in one box. How many apples in 6 boxes?



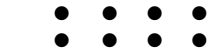
Multiplication tables

Know by heart facts for 2, 5 and 10 x tables

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



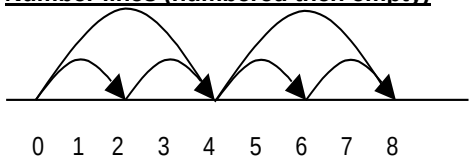
4 x 2 or 4 + 4

2 x 4

or repeated addition

2 + 2 + 2 + 2

Number lines (numbered then empty)



Doubling by partitioning

15 x 2

10 + 5
↓ ↓ x 2
20 + 10 = 30

OR

15 x 2 = 30

10 x 2 = 20
5 x 2 = 10
20 + 10 = 30

Division

Pictures and Symbols

4 eggs fit in a box. How many boxes would you need to pack 20 eggs?

÷ = signs and missing numbers

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

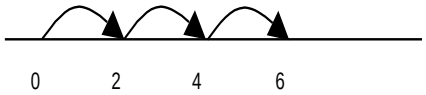
Understand division as sharing and grouping

6 ÷ 2 can be modelled as:

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

Grouping – There are 6 sweets. How many people can have 2 each? (How many 2's make 6?)

Number lines (numbered then empty)



Halving by partitioning

16 ÷ 2

10 + 6
↓ ↓ ÷ 2
5 + 3 = 8

OR 16 ÷ 2 = 8

10 ÷ 2 = 5
6 ÷ 2 = 3
5 + 3 = 8

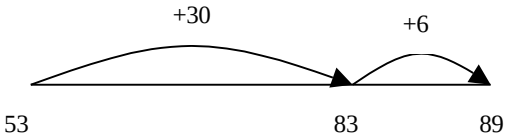
Year 3

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
= 83 + 6
= 89

Number Lines



Mental Strategies

e.g. Know by heart addition facts to 20

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).

Pencil and paper procedures
(TU + TU then HTU + TU, HTU + HTU)

83 + 42 = 125

leading to:

83	83
+ 42	+ 42
120	5
5	120
125	125

Subtraction

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

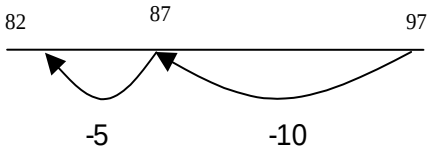
Find a small difference by counting up
Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

Mental Strategies
e.g. Know by heart subtraction facts to 20.

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).

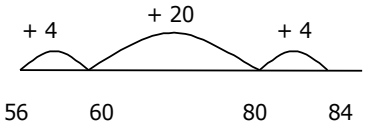
Use known number facts and place value to subtract
(Continue as in Year 2 but with appropriate numbers e.g. 97 – 15 = 82).

Number Lines



Pencil and paper procedures
(TU-TU then HTU-TU, HTU-HTU)

Complementary addition
84 – 56 = 28



Multiplication

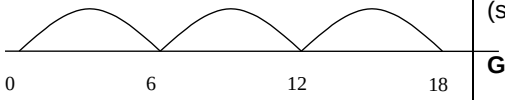
Pictures and Markings
A spider has 8 legs.
How many legs do 4 spiders have?

Multiplication tables
Know by heart facts for the 2, 3, 4, 5, 6, 10 x tables

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

Number lines

6 x 3



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

Doubling by partitioning
35 x 2 = 70
30 x 2 = 60
5 x 2 = 10
60 + 10 = 70

OR
30 + 5
↓ ↓ x 2
60 + 10 = 70

Use known facts and place value to carry out simple multiplications
e.g. 32 x 3 = 96

30 + 2
↓ ↓ x 3
90 + 6 = 96

Division

Pictures and Markings
8 children can travel in a minibus.
How many minibuses would you need to take 29 children to a football match?

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

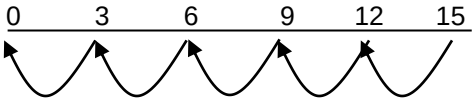
Understand division as sharing and grouping
Divisions can be modelled as:

Sharing – 15 shared between 3
(see Year 2 diagram)

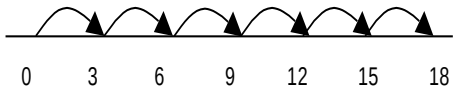
Grouping - How many 3s make 18?

Number Lines

Sharing

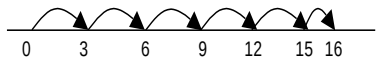


Grouping



Halving by partitioning
As Year 2 but with appropriate numbers

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



Year 4

Addition

+ = signs and missing numbers

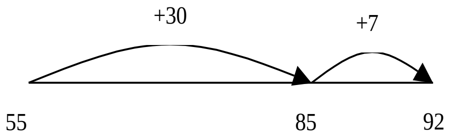
Continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

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

Number lines



Mental Strategies

e.g. Add the nearest multiple of 10, then adjust (Continue as in Year 2 and 3 but with appropriate numbers e.g. 63 + 29 is the same as 63 + 30 – 1)

Pencil and paper procedures

(HTU+TU then HTU+HTU)

e.g. 358 + 73

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

leading to

```
  358
+  73
  431
  1 1
```

Extend to decimals in the context of money (vertically)
(Revert to expanded methods if the children experience any difficulty)

Subtraction

- = signs and missing numbers

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

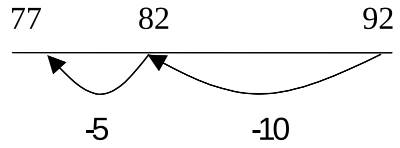
Find a small difference by counting up

e.g. 5003 – 4996 = 7
This can be modelled on an empty number line (see complementary addition below).

Mental Strategies

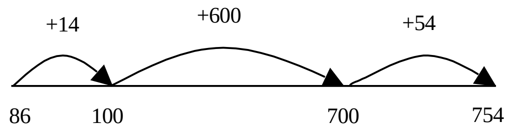
e.g. Subtract the nearest multiple of 10, then adjust (Continue as in Year 2 and 3 but with appropriate numbers).
Use known number facts and place value to subtract e.g. 92 – 15 = 77
92 – 10 = 82
82 – 5 = 77

Number lines



Pencil and paper procedures

(HTU-TU then HTU-HTU)
Complementary addition e.g. 754 – 86 = 668




```
 754                  OR     754
-  86                      -  86
    4  →90                    14  → 100
   10  →100                  600  → 700
  600  →700                   54  → 754
   50  →750                  668
    4  →754
  668
```

(Extend to decimals in the context of money)
Extend to decomposition for HA

Multiplication

x = signs and missing numbers

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

Multiplication tables

Know by heart facts for x tables (up to 10x)

Partitioning

23 x 4 = 92

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

Pencil and paper procedures

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

x	20	3	
7	140	21	= 161

x	70	2	
30	2100	60	2160
8	560	16	+ 576
			2736
			1

Developing standard written method

```
 23                 leading to    23
x 4                              x 4
 80   (4 x 20)                    12   (4 x 3)
 12   (4 x 3)                     80   (4 x 20)
 92                               92
```

leading to

```
  23
x  4
  92
  1
```

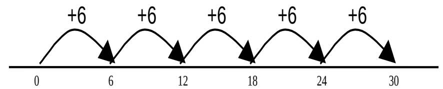
Division

÷ = signs and missing numbers

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

Sharing and grouping

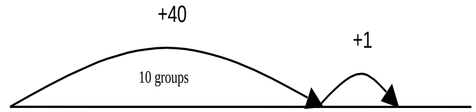
30 ÷ 6 can be modelled as:
Grouping – groups of 6 taken away and the number of groups counted e.g.



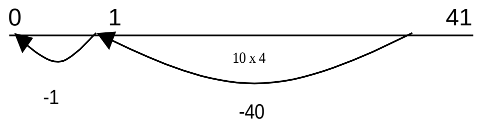
Sharing – sharing among 6, the number given to each person

Remainders

41 ÷ 4 = 10 r1



OR



OR 41 = (10 x 4) + 1

Pencil and paper procedures (TU ÷ U)

72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20

Chunking

```
   72
-  50   (10 groups) or (10 x 5)
   22
-  20   (4 groups) or (4 x 5)
    2
```

Answer : 14 remainder 2

Year 5

Addition

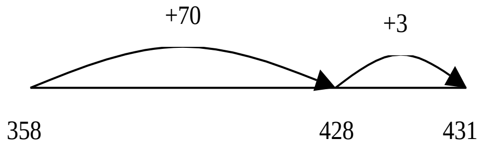
+ = signs and missing numbers

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



Mental Strategies

e.g. Add the nearest multiple of 10 or 100, then adjust (Continue as in Year 2, 3 and 4 but with appropriate numbers e.g. 458 + 79 = is the same as 458 + 80 – 1).

Pencil and paper procedures

(HTU + HTU then ThHTU + ThHTU)

Formal method, showing numbers carried underneath

```
  358
+  73
  431
  1 1
```

Extend to numbers with at least four digits

3587 + 675 = 4262

```
  3587
+  675
  4262
  1 11
```

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).

Model negative numbers using a number line.

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

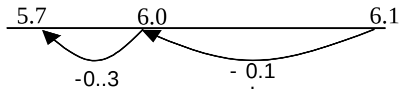
This can be modelled on an empty number line (see complementary addition below).

Mental Strategies

e.g. 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



Pencil and paper procedures

(HTU - HTU then ThHTU - ThHTU)

Complementary addition

754 – 286 = 468

Using an empty number line (see Year 4)

OR

```
  754                                   754
- 286                                 - 286
   14   →300  can be refined to          14 →300
  400   →700                            454 →754
   54   →754                            468
  468
```

Decomposition (teacher uses expanded form first to explain)

```
          600 + 140
                40 + 14
 754 = 700 + 50 + 4          ⁶7¹⁴5¹4
-286   200 + 80 + 6        -  2 8 6
       400 + 60 + 8           4 6 8
```

Extend to decimals (same number of decimal places). Check sums using inverse operation.

Multiplication

x = signs and missing numbers

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

Partitioning

47 x 6 = 92

47 x 6 = (40 x 6) + (7 x 6)
= (240) + (42)
= 282

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures

(HTU x U, TU x TU)

Grid method

72 x 38 is approximately 70 x 40 = 2800

x	70	2	
30	2100	60	2160
8	560	16	+ 576
			2736
			1

Standard Written Method

```
  346                               346
x   9                             x   9
   54    (9 x 6)   leading to      3114
  360   (9 x 40)                    4 5
 2700   (9 x 300)
 3114

   87               leading to       87
 x 26                              x 26
  140   (20 x 7)                   1740   (20 x 87)
 1600   (20 x 80)                  11
   42   (6 x 7)                 +   522   (6 x 87)
  480   (6 x 80)                    4
 2262                              2262
 1 1                               1
```

Extend to multiplying decimals fractions with one decimal place by a single digit.

Division

÷ = signs and missing numbers

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

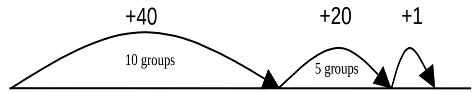
Sharing and grouping

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

Remainders

Quotients expressed as fractions or decimal fractions

61 ÷ 4 = 15 ¼ or 15.25



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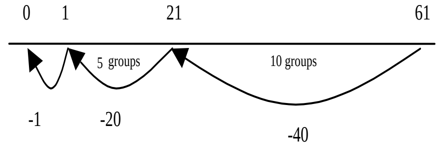


Pencil and paper procedures (HTU ÷ U)

256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40

Standard Written Method

```
      36 r 4
  7 | 256
-      70    (10 groups)   or (10 x 7)
      186
-     140    (20 groups)   or (20 x 7)
       46
-      42     (6 groups)   or  (6 x 7)
        4
```

Compact short division for HA.

Year 6

Addition

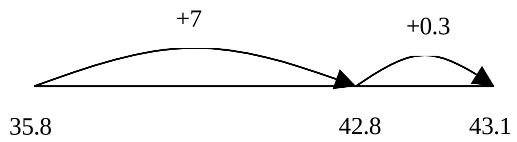
+ = signs and missing numbers

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



Mental Strategies

e.g. 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

(ThHTU + ThHTU)

Extend to numbers with any number of digits and decimals with 1 and 2 decimal places.

124.9 + 117.25 = 242.15

  124.9
+ 117.25
  242.15
  11

Revert to expanded methods if the children experience any difficulty.
Extend to decimals (either one or two decimal places).

Subtraction

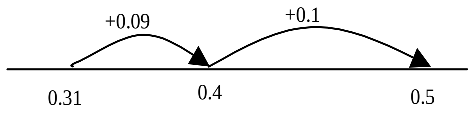
- = signs and missing numbers

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).



Mental Strategies

e.g. 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

(ThHTU – ThHTU then any number of digits)

Complementary addition (used if children experience difficulty with decomposition)

6467 – 2684 = 3783

Using an empty number line (see Year 4)

OR

  6467
- 2684
  16 →2700
  300 →3000
  3467 →6467
  3783
  1

refined to

  6467
- 2684
  316 →3000
  3467 →6467
  3783
  1

Decomposition

5 13 1
~~6~~ 4 6 7
- 2 6 8 4
  3 7 8 3

(check calculations using inverse)

Revert to expanded methods if children experience any difficulty

Extend to decimal fractions (1 or 2 dec. places)

Multiplication

x = signs and missing numbers

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

Partitioning

87 x 6 = 522

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

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures

(ThHTU x U, HTU x TU)

Grid method

372 x 24 is approximately 400 x 20 = 8000

x	300	70	2	
20	6000	1400	40	7440
4	1200	280	8	+1488
				8928
				1

Standard Written Method

(approximate first)

  4346
x   8
 34768
  234

  352
x 27
  7040   (20 x 352)
  1
+ 2464   (7 x 352)
  3 1
  9504
  1

Extend to multiplying decimals with up to two decimal places by a single digit.

Division

÷ = signs and missing numbers

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

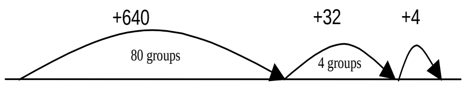
Sharing and grouping

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

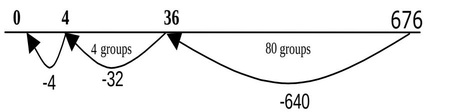
Remainders

Quotients expressed as fractions or decimal fractions

676 ÷ 8 = 84.5



OR



Pencil and paper procedures (HTU ÷ TU)

977 ÷ 36 is approximately 1000 ÷ 40 = 25

Standard Written Method

   27 $^{5}/_{36}$
36 | 977
- 360 (10 x 36)
   617
- 360 (10 x 36)
   257
- 180 (5 x 36)
   77
- 72 (2 x 36)
   5

   27 $^{5}/_{36}$
36 | 977
- 720 (20x)
   257
- 180 (5x)
   77
- 72 (2x)
   5

Extend to decimal fractions with up to 2 decimal places

Extend to efficient compact division for HA.