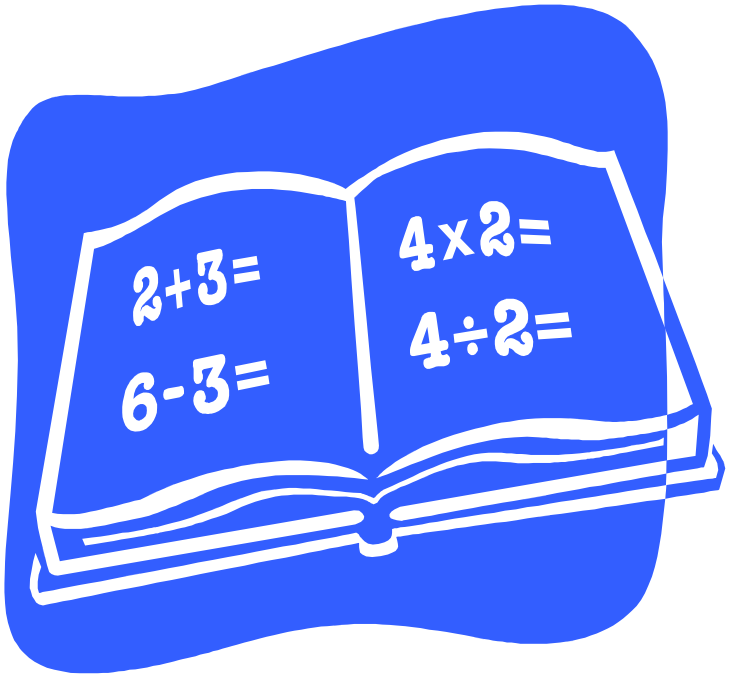
Calculations Policy / Pathway



Addition

Year 1

+ = signs and missing numbers

Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

2 = 1+ 1
2 + 3 = 4 + 1
3 = 3
2 + 2 + 2 = 4 + 2

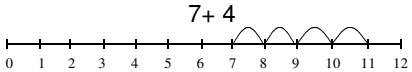
Missing numbers need to be placed in all possible places.

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

Activities
Children should have access to a wide range of counting equipment, everyday objects, as well as hoops, sorting trays, number tracks and numbered number lines.

Teacher modelling
Drawing jumps on numbered number lines to support understanding of the mental method

Children
To create their own jumps using rulers, fingers, pens, bodies etc.



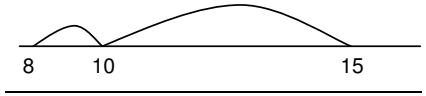
Year 2

+ = 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
32 + + = 100 35 = 1 + + 5

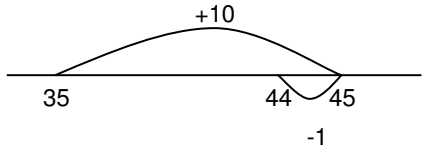
Partition into tens and ones and recombine
12 + 23 = 10 + 2 + 20 + 3
= 30 + 5
= 35

Count on in tens and ones
23 + 12 = 23 + 10 + 2
= 33 + 2
= 35

Partitioning and bridging through 10.
The steps in addition often bridge through a multiple of 10
e.g.
Children should be able to partition the 7 to relate adding the 2 and then the 5.
8 + 7 = 15



Add 9 or 11 by adding 10 and adjusting by 1
e.g.
Add 9 by adding 10 and adjusting by 1
35 + 9 = 44



Year 3

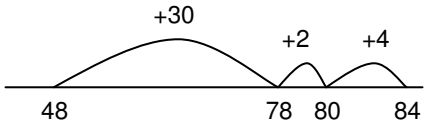
+ = signs and missing numbers
Continue using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

Partition into tens and ones
- Partition both numbers and recombine.
- Count on by partitioning the second number only e.g.

36 + 53 = 53 + 30 + 6
= 83 + 6
= 89

Add a near multiple of 10 to a two-digit number
Secure mental methods by using a number line to model the method. Continue as in Year 2 but with appropriate numbers
e.g. 35 + 19 is the same as 35 + 20 – 1.

Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.
48 + 36 = 84



pencil and paper procedures
83 + 42 = 125

either ***or***

1. Vertical expansion

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

2. Horizontal expansion

80 + 3
+ 40 + 2
120 + 5 = 125

Addition

Year 4	Year 5	Year 6
+ = 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 **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** 367 + 185 = 431 **either** **or** 367 300 + 60 + 7 +185 100 + 80 + 5 12 400 +140+12 = 552 140 400 552 **leading to** 367 +185 552 1 1 Extend to decimals in the context of money.	**+ = 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 **Add or subtract 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** Extend to numbers with at least four digits 3587 + 675 = 4262 3587 + 675 4262 1 1 1 Revert to expanded methods if the children experience any difficulty. Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits). 72.8 +54.6 127.4 1 1	**+ = 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 **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, 2 and/or 3 decimal places. 13.86 + 9.481 = 23.341 13.86 + 9.481 23.341 1 1 1 Revert to expanded methods if the children experience any difficulty.

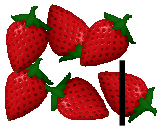
Subtraction

Year 1

- = signs and missing numbers

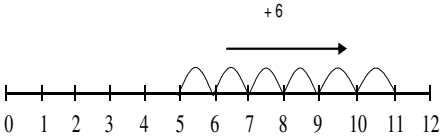
7 - 3 = = 7 - 3
7 - = 4 4 = - 3
- 3 = 4 4 = 7 -
- ∇ = 4 4 = - ∇

- Understand subtraction as 'take away'



- Find a 'difference' by counting up;

I have saved 5p. The socks that I want to buy cost 11p. How much more do I need in order to buy the socks?



- Use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number.

I have 11 toy cars. There are 5 cars too many to fit in the garage. How many cars fit in the garage?

-5

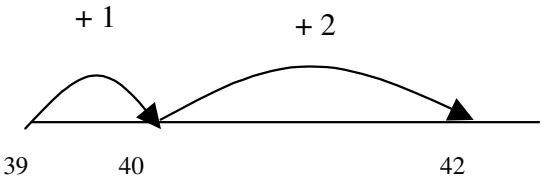
Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences
Recording by
- drawing jumps on prepared lines
- constructing own lines

Year 2

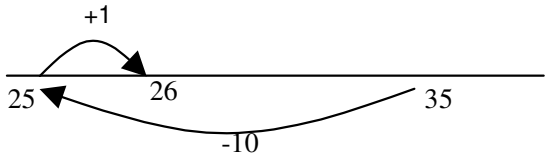
- = signs and missing numbers

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

Find a small difference by counting up
42 – 39 = 3

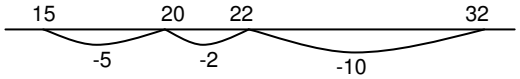


Subtract 9 or 11. Begin to add/subtract 19 or 21
35 – 9 = 26



Use known number facts and place value to subtract
(partition second number only)
37 – 12 = 37 – 10 – 2
= 27 – 2
= 25

Bridge through 10 where necessary
32 - 17



Year 3

- = 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

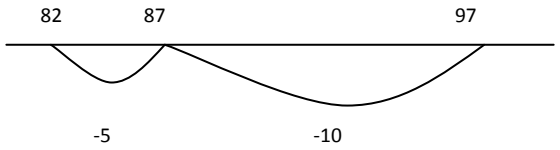
Continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

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

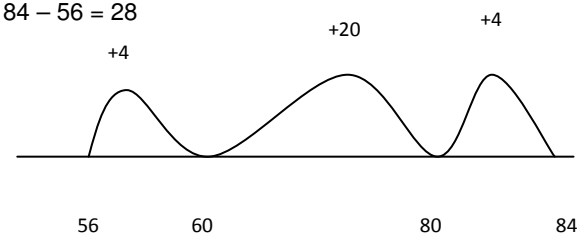
Use known number facts and place value to subtract

Continue as in Year 2 but with appropriate numbers e.g.**97 – 15 = 72**



With practice, children will need to record less information and decide whether to count back or forward. It is useful to ask children whether counting up or back is the more efficient for calculations
such as 57 – 12, 86 – 77 or 43 – 28.

Pencil and paper procedures
Complementary addition
84 – 56 = 28



Subtraction

Year 4

- = 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

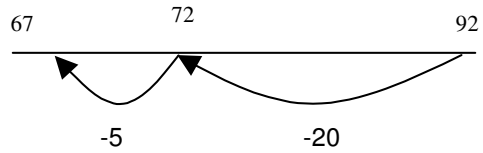
This can be modelled on an empty number line (see complementary addition below). Children should be encouraged to use known number facts to reduce the number of steps.

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

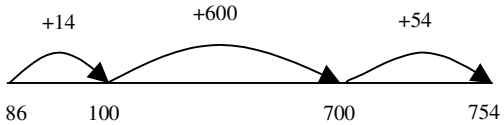
92 – 25 = 67



Pencil and paper procedures

Complementary addition

754 – 86 = 668



For those children with a secure mental image of the number line they could record the jumps only:

754 – 86 = 668

14 (100)
600 (700)
54 (754)
668

Year 5

- = 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

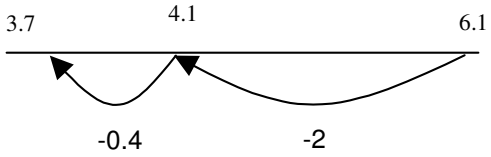
This can be modelled on an empty number line (see complementary addition below).

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

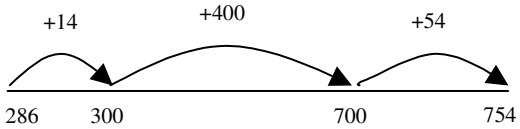
6.1 – 2.4 = 3.7



Pencil and paper procedures

Complementary addition

754 – 286 = 468



OR

754 - 286 = 468

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

Reduce the number of steps to make the calculation more efficient.

Extend to 2 places of decimals

Year 6

- = 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. 8000 – 2785 = 5215

To make this method more efficient, the number of steps should be reduced to a minimum through children knowing:

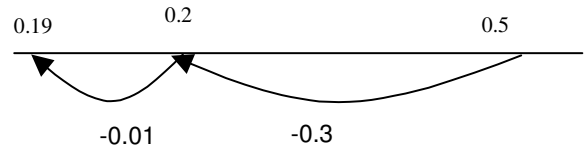
- Complements to 1, involving decimals to two decimal places (0.16 + 0.84)
- Complements to 10, 100 and 100

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

0.5 – 0.31 =

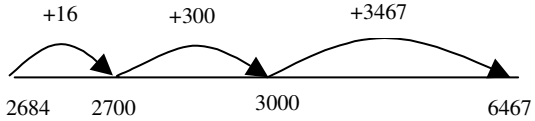


0.19

Pencil and paper procedures

Complementary addition

6467 – 2684 = 3783

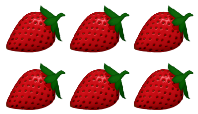
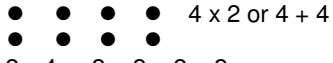


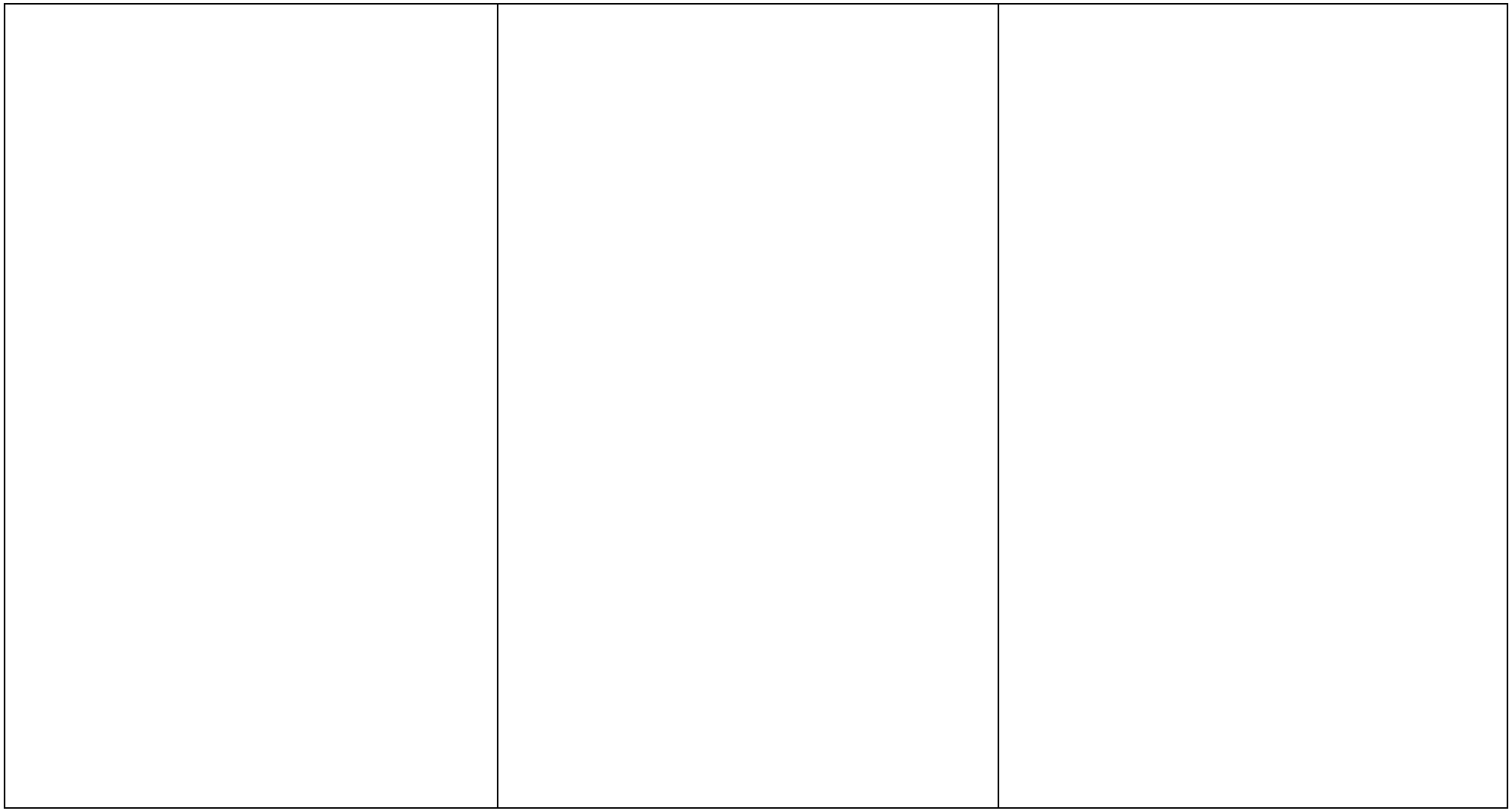
OR

6467 – 2684 = 3783

16 (2700) can be refined to 316 (3000)
300 (3000) 3467 (6467)
3467 (6467) 3783
3783

Reduce the number of steps to make the calculation more efficient. *Extend to 2 places of decimals.*

	Multiplication	
Year 1	Year 2	Year 3
Multiplication is related to doubling and counting groups of the same size.  Looking at columns 2 + 2 + 2 3 groups of 2 Looking at rows 3 + 3 2 groups of 3 Counting using a variety of practical resources Counting in 2s e.g. counting socks, shoes, animal's legs… Counting in 5s e.g. counting fingers, fingers in gloves, toes… Counting in 10s e.g. fingers, toes… **Pictures / marks** There are 3 sweets in one bag. How many sweets are there in 5 bags? 	**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 2 + 2 + 2 + 2 Doubling multiples of 5 up to 50 15 x 2 = 30 Partition Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: 6 = 5 + 1 so e.g. Double 6 is the same as double five add double one. AND double 15 10 + 5 ↓ ↓ 20 + 10 = 30 OR X | 10 | 5 2 | 20 | 10 = 30	**x = signs and missing numbers** Continue using a range of equations as in Year 2 but with appropriate numbers. **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 =70 Use known facts and place value to carry out simple multiplications Use the same method as above (partitioning), e.g. 32 x 3 = 96 x | 30 | 2 3 | 90 | 6 =96

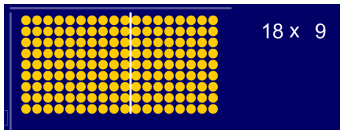


Multiplication

Year 4

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

Partition
Continue to use arrays:



18 x 9 = 162

18 x 9 = (10 x 9) + (8 x 9) = 162

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures

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

x	20	3	
7	140	21	= 161

Year 5

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

Partition
47 x 6 = 282

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

OR

Use the grid method of multiplication (as below)

Pencil and paper procedures
Grid method
72 x 38 is approximately 70 x 40 = 2800

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

Extend to simple decimals with one decimal place.

Year 6

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) = 522

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	= 7440
4	1200	280	8	= 1488
				8928

Extend to decimals with up to two decimal places.

Division

Year 1

Sharing
Requires secure counting skills
-see counting and understanding number strand
Develops importance of one-to-one correspondence
See appendix for additional information on x and ÷ and aspects of number

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

Practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.

Grouping
Sorting objects into 2s / 3s/ 4s etc
How many pairs of socks are there?

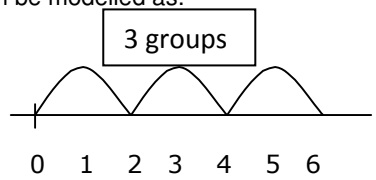
There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there?
Jo has 12 Lego wheels. How many cars can she make?

Year 2

÷ = signs and missing numbers
6 ÷ 2 = = 6 ÷ 2
6 ÷ = 3 3 = 6 ÷
÷ 2 = 3 3 = ÷ 2
÷ ∇ = 3 3 = ÷ ∇

Grouping
Link to counting and understanding number strand
Count up to 100 objects by grouping them and counting in tens, fives or twos;…
Find one half, one quarter and three quarters of shapes and sets of objects
6 ÷ 2 can be modelled as:
There are 6 strawberries.
How many people can have 2 each? How many 2s make 6?

6 ÷ 2 can be modelled as:



In the context of money count forwards and backwards using 2p, 5p and 10p coins

Practical grouping e.g. in PE

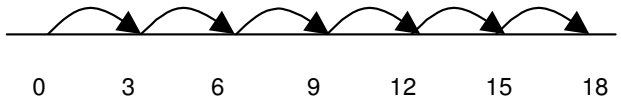
12 children get into teams of 4 to play a game. How many teams are there?

Year 3

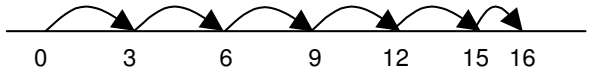
÷ = signs and missing numbers
Continue using a range of equations as in Year 2 but with appropriate numbers.

Understand division as sharing and grouping
18 ÷ 3 can be modelled as:
Sharing – 18 shared between 3 (see Year 1 diagram)

OR
Grouping - How many 3's make 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.



Division

Year 4

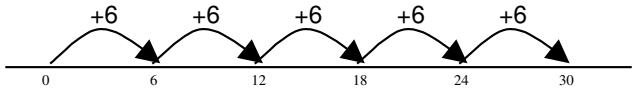
÷ = signs and missing numbers

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 placed on no. line and the number of groups counted e.g.



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

Remainders

41 ÷ 4 = 10 r1

41 = (10 x 4) + 1

Pencil and paper procedures

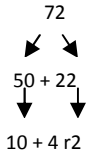
72 ÷ 5 lies between 50 ÷ 5 = 10 and 100 ÷ 5 = 20

∗ Partition the dividend into multiples of the divisor:

e.g 72 = 50 + 22

50 ÷ 5 = 10

22 ÷ 5 = 4r2 → 10 + 4r2 = 14 r 2



OR

72		
-	50	(10 groups)
22		
-	20	(4 groups)
2		

Answer : 14 remainder 2

∗ For a more detailed explanation see paper 'Updating division'.

Year 5

÷ = signs and missing numbers

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

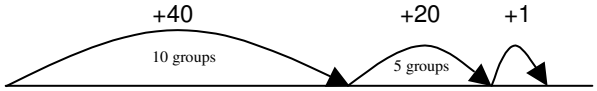
Sharing and grouping

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



Pencil and paper procedures

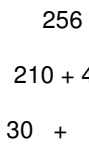
256 ÷ 7 lies between 210 ÷ 7 = 30 and 280 ÷ 7 = 40

∗ Partition the dividend into multiples of the divisor:

e.g. 256 = 210 + 46

210 ÷ 7 = 30

46 ÷ 7 = 6r4 → 30 + 6r4 = 36r4



OR

256		
-	210	(30 groups)
46		
-	42	(6 groups)
4		

Answer: 36 remainder 4

∗ For a more detailed explanation see paper 'Updating division'.

Year 6

÷ = signs and missing numbers

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

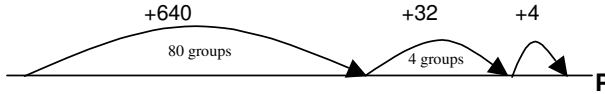
Sharing and grouping

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

Remainders

Quotients expressed as fractions or decimal fractions

676 ÷ 8 = 84.5



Pencil and paper procedures

977 ÷ 36 is approximately 1000 ÷ 40 = 25

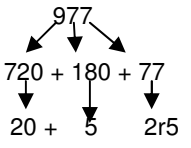
∗ Partition the dividend into multiples of the divisor:

e.g. 977 = 720 + 180 + 77

720 ÷ 36 = 20

180 ÷ 36 = 5

77 ÷ 36 = 2r5 → 20 + 5 + 2r5 = 27r5



OR

977		
-	720	(20 groups)
257		
-	180	(5 groups)
77		
-	72	(2 groups)
5		

Answer: $27\ ^{5}/_{36}$

∗ For a more detailed explanation see paper 'Updating division'.