Year 4

NUMBER AND PLACE VALUE

To add, subtract, multiply and divide successfully, pupils need to:
- read and write numbers up to 10 000 in numerals and in words
- count in multiples of 1 to 10, 25, 50, 100 and 1000, forwards or backwards
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- identify, represent and estimate numbers using different representations
- find 10, 100 or 1000 more or less than a given number
- compare and order numbers beyond 1000
- round any number to the nearest 10, 100 or 1000

DECIMALS

To add and subtract successfully, pupils need to:
- recognise and write decimal equivalents of any number of tenths or hundredths
- recognise the place value of each digit in a decimal to two decimal places
- compare and order numbers with the same number of decimal places up to two decimal places
- round decimals with one decimal place to the nearest whole number
- understand the effect of multiplying and dividing a one-digit or two-digit number by 10 and 100

ADDITION

Conceptual understanding and procedural fluency

To add successfully, pupils need to:
- consolidate recall of addition facts to 20 and related facts involving multiples of 100 and 1000, e.g. 1300 + 500 = 1800 and 500 + 1300 = 1800
- continue to add numbers mentally, including:
  - two two-digit numbers
  - three or more one-digit numbers
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- add numbers with up to four digits using the formal written method of columnar addition where appropriate, including calculations involving money, e.g. £13.56 + £38.54
- estimate and check the answer to a calculation, including using the inverse operation

Reason mathematically and solve problems

Pupils need to use and apply their understanding of, and fluency in, addition to:
- solve addition two-step problems in contexts, deciding which operations and methods to use and why
- solve simple measure and money problems involving decimals to two decimal places
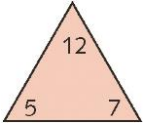
ADDITION Continued

Mental strategies

- Continue to use models and images when necessary:
  - trios

    $7 + 5 = 12$

    $5 + 7 = 12$

    $12 - 5 = 7$

    $12 - 7 = 5$

  - multiples of 10 addition and subtraction tables

+	0	10	20	30	40	50	60	70	80	90	100
0	0	10	20	30	40	50	60	70	80	90	100
10	10	20	30	40	50	60	70	80	90	100	110
20	20	30	40	50	60	70	80	90	100	110	120
30	30	40	50	60	70	80	90	100	110	120	130
40	40	50	60	70	80	90	100	110	120	130	140
50	50	60	70	80	90	100	110	120	130	140	150
60	60	70	80	90	100	110	120	130	140	150	160
70	70	80	90	100	110	120	130	140	150	160	170
80	80	90	100	110	120	130	140	150	160	170	180
90	90	100	110	120	130	140	150	160	170	180	190
100	100	110	120	130	140	150	160	170	180	190	200

+	110	120	130	140	150	160	170	180	190	200
0	110	120	130	140	150	160	170	180	190	200
10	120	130	140	150	160	170	180	190	200	210
20	130	140	150	160	170	180	190	200	210	220
30	140	150	160	170	180	190	200	210	220	230
40	150	160	170	180	190	200	210	220	230	240
50	160	170	180	190	200	210	220	230	240	250
60	170	180	190	200	210	220	230	240	250	260
70	180	190	200	210	220	230	240	250	260	270
80	190	200	210	220	230	240	250	260	270	280
90	200	210	220	230	240	250	260	270	280	290
100	210	220	230	240	250	260	270	280	290	300

- Continue to use the relationship between addition and subtraction
- Use knowledge of the commutative law, e.g.
  - put the larger number first and count on in steps of 1, 10 or 100
  - partition additions into hundreds, tens and ones, then recombine, e.g. $356 + 57 = 356 + 50 + 7$
    $$= 406 + 7$$
    $$= 413$$

- Identify near doubles, using doubles already known, e.g. $170 + 180$
- Add the nearest multiple of 10, 100 or 1000, and adjust
- Use patterns of similar calculations, e.g. $130 + 5 = 180$ and $1300 + 500 = 1800$
- Use knowledge of the associative law when adding more than two numbers, e.g. $24 + 27 + 16 = (24 + 16) + 27$
  $$= 40 + 27$$
  $$= 67$$

Written methods

- Add numbers with up to four digits, including money and measures (ThHTO + ThHTO)
- Estimate and check the answer to a calculation

Formal written method of columnar addition

$2456 + 5378$

```
    2 4 5 6
  + 5 3 7 8
    7 8 3 4
      1 1
```

Carry digits are recorded below the line, using the words 'carry ten', 'carry one hundred', or 'carry one thousand', not 'carry one'.

Where appropriate, place value columns are labelled, e.g. ThHTO, to remind children of the value of each of the digits.

If necessary, remind children of the expanded written method so that they fully understand the procedure, and the effectiveness and efficiency of the formal written method of columnar addition.

Year 4

SUBTRACTION

Conceptual understanding and procedural fluency

To subtract successfully, pupils need to:
- consolidate recall of subtraction facts to 20 and related facts involving multiples of 100 and 1000,
  e.g. 1800 – 500 = 1300 and 1800 – 1300 = 500
- continue to subtract numbers mentally, including:
  - two two-digit numbers
  - a three-digit number and ones
  - a three-digit number and tens
  - a three-digit number and hundreds
- subtract numbers with up to four digits using the formal written method of columnar subtraction where appropriate, including calculations involving money, e.g. £24.26 – £17.58
- estimate and check the answer to a calculation, including using the inverse operation
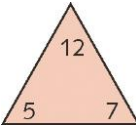
Reason mathematically and solve problems

Pupils need to use and apply their understanding of, and fluency in, subtraction to:
- solve subtraction two-step problems in contexts, deciding which operations and methods to use and why
- solve simple measure and money problems involving decimals to two decimal places

Mental strategies

- Continue to use models and images when necessary:
  - trios
    $$7 + 5 = 12$$
    $$5 + 7 = 12$$
    $$12 - 5 = 7$$
    $$12 - 7 = 5$$

  - multiples of 10 addition and subtraction tables

+	0	10	20	30	40	50	60	70	80	90	100
0	0	10	20	30	40	50	60	70	80	90	100
10	10	20	30	40	50	60	70	80	90	100	110
20	20	30	40	50	60	70	80	90	100	110	120
30	30	40	50	60	70	80	90	100	110	120	130
40	40	50	60	70	80	90	100	110	120	130	140
50	50	60	70	80	90	100	110	120	130	140	150
60	60	70	80	90	100	110	120	130	140	150	160
70	70	80	90	100	110	120	130	140	150	160	170
80	80	90	100	110	120	130	140	150	160	170	180
90	90	100	110	120	130	140	150	160	170	180	190
100	100	110	120	130	140	150	160	170	180	190	200

+	110	120	130	140	150	160	170	180	190	200
0	110	120	130	140	150	160	170	180	190	200
10	120	130	140	150	160	170	180	190	200	210
20	130	140	150	160	170	180	190	200	210	220
30	140	150	160	170	180	190	200	210	220	230
40	150	160	170	180	190	200	210	220	230	240
50	160	170	180	190	200	210	220	230	240	250
60	170	180	190	200	210	220	230	240	250	260
70	180	190	200	210	220	230	240	250	260	270
80	190	200	210	220	230	240	250	260	270	280
90	200	210	220	230	240	250	260	270	280	290
100	210	220	230	240	250	260	270	280	290	300

- Continue to use the relationship between addition and subtraction
- Calculate mentally a difference such as 5005 – 2998 by counting up from the smaller to the larger number
- Subtract the nearest multiple of 10, 100 or 1000, and adjust
- Use patterns of similar calculations, e.g. 18 – 5 = 13 and 1800 – 500 = 1300
- Use partitioning, e.g. 456 – 84 = 456 – 80 – 4
  $$= 376 - 4$$
  $$= 372$$

Year 4

SUBTRACTION Continued

Written methods

- Subtract numbers with up to four digits, including money and measures (ThHTO – ThHTO)
- Estimate and check the answer to a calculation

Formal written method of columnar subtraction (decomposition)

6418 – 2546

$$
\begin{array}{r}
{}^{5}\cancel{6}\,{}^{13}\cancel{4}\,{}^{11}\cancel{1}\,8 \\
-\ 2\,5\,4\,6 \\
\hline
3\,8\,7\,2
\end{array}
$$

Start by subtracting the least significant digits first, i.e. the ones, then the tens, then the hundreds and finally the thousands. Refer to subtracting the tens, for example, by saying '11 tens subtract four tens', not '11 subtract four'.

In this example the tens and the hundreds to be subtracted are larger than both the tens and hundreds you are subtracting from.

The calculation begins 8 subtract 6.

Then you exchange one of the 4 hundreds for 10 tens, crossing out 4 and writing a superscript 3, and crossing out the 1 and writing a superscript 11. The calculation then becomes 11 tens subtract 4 tens.

You then exchange one of the 6 thousands for 10 hundreds, crossing out the 6 and writing a superscript 5, and writing a superscript 1 in front of the 3 to make 13 hundreds. The calculation then becomes 13 hundreds subtract 5 hundreds.

Then finally 5000 subtract 2000.

Where appropriate, place value columns are labelled, e.g. ThHTO, to remind children of the value of each of the digits.

Year 4

MULTIPLICATION

Conceptual understanding and procedural fluency

To multiply successfully, pupils need to:
- consolidate recall of multiplication facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- recall and use multiplication facts for the 6, 7, 9, 11 and 12 multiplication tables
- use known multiplication facts to derive related facts involving multiples of 10 and 100, e.g. 200 x 3 = 600
- use place value, known and derived facts to multiply mentally, including: multiplying by 0 and 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- estimate and check the answer to a calculation, including using the inverse operation

Reason mathematically and solve problems

Pupils need to use and apply their understanding of, and fluency in, multiplication to:
- solve problems involving multiplying and adding, including using the distributive law and multiply two-digit numbers by one digit, including scaling problems and harder correspondence problems such as n objects are connected to m objects
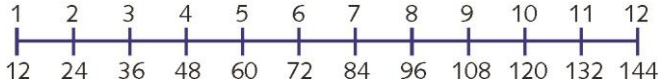
Mental strategies

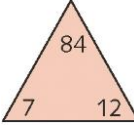- Continue to use models and images:

  - arrays

    $6 \times 7 = 42$

    $7 \times 6 = 42$

  - number lines

1	2	3	4	5	6	7	8	9	10	11	12
12	24	36	48	60	72	84	96	108	120	132	144

  - trios $7 \times 12 = 84$

    $12 \times 7 = 84$

    $84 \div 12 = 7$

    $84 \div 7 = 12$

    84

    7   12

  - multiplication square to 12 × 12

×	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

- Make connections between arrays, number patterns and counting in steps of a constant size

MULTIPLICATION Continued

Mental strategies continued

- Continue to use the inverse relationship between multiplication and division
- Continue to use doubling, e.g. connect the 3, 6 and 12 multiplication tables
- Use the 'key multiplication facts' of × 1, × 2, × 5, and × 10 to work out the answers to unknown multiplication facts,
  e.g. $7 \times 9 = (5 \times 9) + (2 \times 9)$
  $= 45 + 18$
  $= 63$
- Use closely related facts:
  - multiply by 9 or 11 by multiplying by 10 and adjusting
  - develop the × 12 table by adding facts from the × 10 and × 2 table
- Use factors, e.g. $8 \times 14 = 8 \times 2 \times 7$
- Use patterns of similar calculations, e.g. $8 \times 6 = 48$ and $8 \times 60 = 480$
- Understand and use the commutative law
- Understand and use the associative law, e.g. $6 \times 15 = 6 \times (5 \times 3)$
  $= (6 \times 5) \times 3$
  $= 30 \times 3$
  $= 90$
- Understand and use the distributive law, e.g. partitioning when multiplying a two-digit or three-digit number by a one-digit number, e.g.
  $356 \times 7 = (300 \times 7) + (50 \times 7) + (6 \times 7)$
  $= 2100 + 350 + 42$
  $= 2492$

Written methods

- Short multiplication:
  - Multiply a two-digit or three-digit number by a one-digit number (TO × O/HTO × O)
- Estimate and check the answer to a calculation

Grid method

356×7

×	300	50	6	
7	2100	350	42	= 2492

Expanded written method

356×7

```
    3 5 6
×       7
    _____
      4 2    (   6 × 7)
    3 5 0    (  50 × 7)
  2 1 0 0    (300 × 7)
  _____
  2 4 9 2
```

The first step is to show all of the calculations involved.

Children should describe what they do by referring to the actual values of the digits in the columns (e.g. when multiplying the tens in 356 × 7 it is 'fifty multiplied by seven', not 'five multiplied by seven', although the relationship 5 × 7 should be stressed).

Where appropriate, when using the expanded written method, place value columns are labelled, e.g. HTO, to remind children of the value of each of the digits.

Formal written method of short multiplication

356×7

```
    3 5 6
×  ₃ ₄ 7
  _____
  2 4 9 2
```

The expanded written method leads to the formal written method of short multiplication so that children fully understand the procedure, and the effectiveness and efficiency of the method.
The amount of time that should be spent teaching and practising the expanded written method will depend on how secure the children are in their recall of number facts and in their understanding of place value.
Where appropriate, place value columns are labelled, e.g. HTO, to remind children of the value of each of the digits.

DIVISION

Conceptual understanding and procedural fluency

To divide successfully, pupils need to:
- consolidate recall of division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables
- recall and use division facts for the 6, 7, 9, 11 and 12 multiplication tables
- use known division facts to derive related facts involving multiples of 10 and 100, e.g. $600 \div 3 = 200$
- use place value, known and derived facts to divide mentally, including dividing by 1
- recognise and use factor pairs in mental calculations
- divide two-digit and three-digit numbers by a one-digit number using formal written layout (without a remainder)
- estimate and check the answer to a calculation, including using the inverse operation

Reason mathematically and solve problems

Pupils need to use and apply their understanding of, and fluency in, division to:
- solve problems involving division in contexts, deciding which operations and methods to use and why
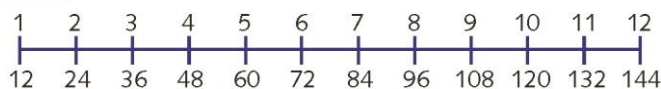
Mental strategies
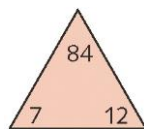
- Continue to use models and images:
  - arrays

    $42 \div 7 = 6$
    $42 \div 6 = 7$

  - number lines

1	2	3	4	5	6	7	8	9	10	11	12
12	24	36	48	60	72	84	96	108	120	132	144

  - trios

    $7 \times 12 = 84$
    $12 \times 7 = 84$
    $84 \div 12 = 7$
    $84 \div 7 = 12$

  - multiplication square to 12×12

×	2	3	4	5	6	7	8	9	10	11	12
1	2	3	4	5	6	7	8	9	10	11	12
2	4	6	8	10	12	14	16	18	20	22	24
3	6	9	12	15	18	21	24	27	30	33	36
4	8	12	16	20	24	28	32	36	40	44	48
5	10	15	20	25	30	35	40	45	50	55	60
6	12	18	24	30	36	42	48	54	60	66	72
7	14	21	28	35	42	49	56	63	70	77	84
8	16	24	32	40	48	56	64	72	80	88	96
9	18	27	36	45	54	63	72	81	90	99	108
10	20	30	40	50	60	70	80	90	100	110	120
11	22	33	44	55	66	77	88	99	110	121	132
12	24	36	48	60	72	84	96	108	120	132	144

- Make connections between arrays, number patterns and counting in steps of a constant size
- Continue to use the inverse relationship between multiplication and division
- Continue to use halving, e.g. connect the 3, 6 and 12 multiplication tables

Year 4

DIVISION Continued

Mental strategies continued

- Understand and use the distributive law, e.g. partitioning when dividing a three-digit number by a one-digit number,

$486 \div 9 = (450 \div 9) + (36 \div 9)$

$= 50 + 4$

$= 54$

Written methods

- Short division (without a remainder):
  - Divide a two-digit or three-digit number by a one-digit number (TO ÷ O/HTO ÷ O)
- Estimate and check the answer to a calculation

Expanded written method

$486 \div 9$

```
       5 4
   9)4 8 6
     4 5 0  (50 × 9)
       3 6
       3 6  (4 × 9)
          0
```

The first step is to show all of the calculations involved.

Children should describe what they are doing using phrases similar to the following: 'How many nines divide into 480 so that the answer is a multiple of 10? (50) There are 50 nines or 450, with 36 remaining. How many nines in 36? (4) So 486 divided by nine is 54.'

Formal written method of short division

```
      5 4
  9)4 8 ³6
```

The expanded written method leads to the formal written method of short division so that children fully understand the procedure, and the effectiveness and efficiency of the method.

The superscript 3 represents the 3 tens that are remaining after 9 has been divided into 480. It is written in front of the 6 to show that 36 now has to be divided by 9.

The amount of time that should be spent teaching and practising the expanded written method will depend on how secure the children are in their recall of number facts and in their understanding of place value.