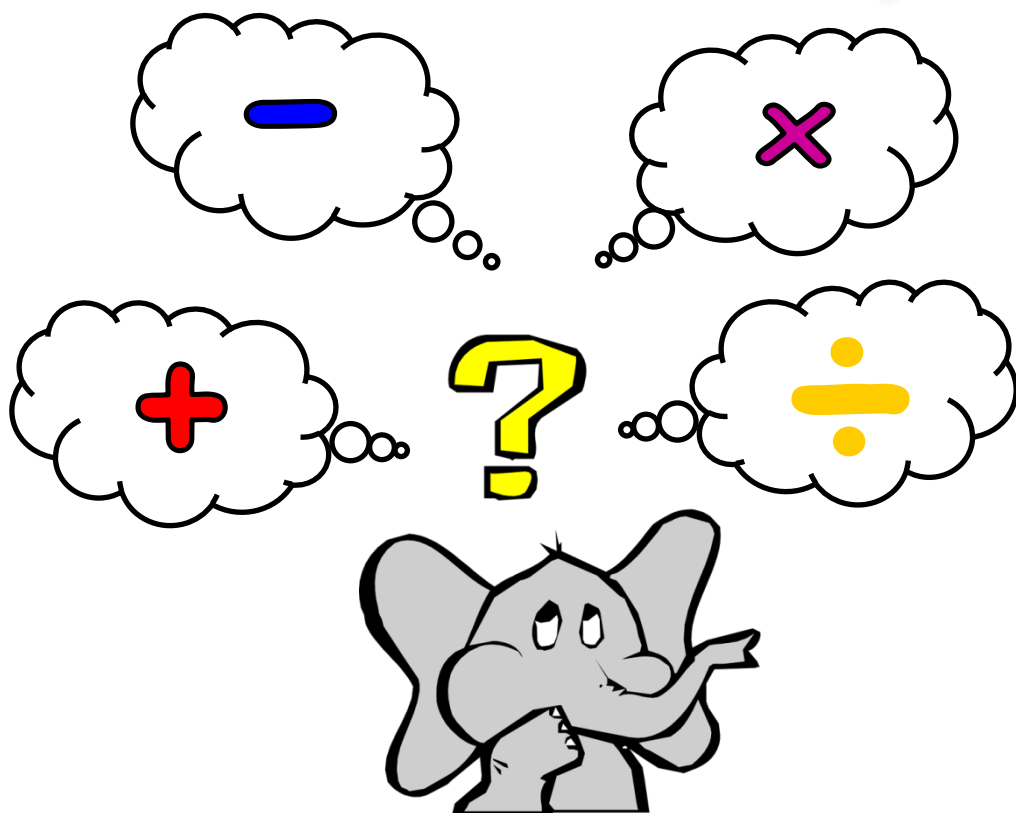# St. Leonard's C.E. Primary Mathematics Calculation Policy

Counting

Every maths lesson should begin with some form of counting!

Early Learning Goal:
 - children count reliably with numbers from 1 to 20, place them in order

Year 1 Pos Requirement:
- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.
- count, read and write numbers to 100 in numerals, count in different multiples, including ones, twos, fives and tens.

Year 2 Pos Requirement:
- count in steps of 2, 3 and 5 from 0, and count in tens from any number, forwards or backwards.

Year 3 Pos Requirement:
- count from 0 in multiples of 4, 8, 50, 100; finding 10 or 100 more or less than a given number.
- count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.

Year 4 Pos Requirement:
- count in multiples of 6, 7, 9, 25 and 1000.
- count backwards through zero to include negative numbers.
- count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten.

Year 5 & 6 Pos Requirement:
- count forwards and backwards in steps of powers of 10 for any given number up to 1 000 000.
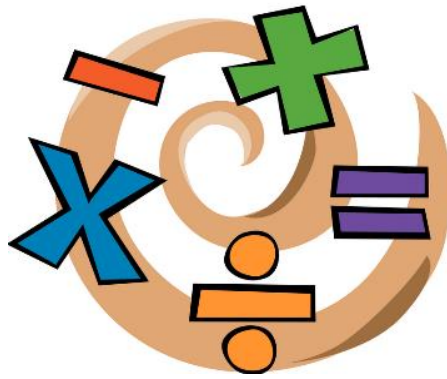
The following is intended to ensure effective progression in WRITTEN CALCULATIONS.

Please note the following:

➢ The method outlined for your year group is the 'expected standard' that should be modelled to all pupils.

➢ Teachers can use their professional judgement to differentiate methods according to ability but must refer to guidance in either year below or year above.

➢ Children should be encouraged to use mental calculations when appropriate.

➢ Note: New PoS encourages teachers to use 'ones' however it is still acceptable to use 'units' (Use interchangeably)

Addition

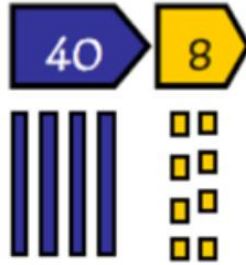## Models and Images

100 square
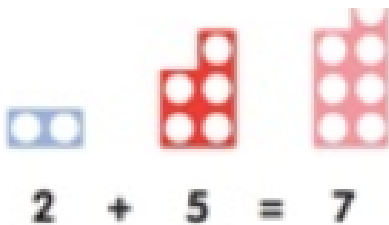Number lines
Bead strings
Straws
Dienes
Place value cards
Place value dice
Place value counters
Numicon

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

40 8

$2 + 5 = 7$

| 1 | 4 | 8 |
| hundreds | tens | ones |

sum   addition   total
make   more
and
   add   plus
altogether   increase

Addition: Reception

Recognise numbers up to 20 and understand the meaning of each number by recognising and knowing their clusters

1 one	2 two	3 three
4 four	5 five	6 six
7 seven	8 eight	9 nine

1	2	3	4	5	6
					7
13	12	11	10	9	8
14					
15	16	17	18	19	20

Count on in ones and say which number is one more than a given number using a number line or number track to 20.

Begin to relate addition to combining two groups of objects using practical resources, role play, stories and songs.

and   makes 5

2 + 1 = 3
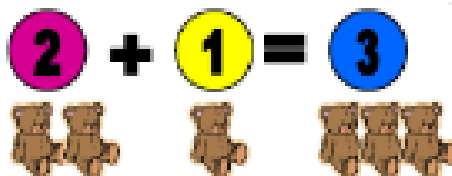
Know that counting on is a strategy for addition. Use numbered number lines to 20.

3 + 5

+3

5   6   7   8

Addition: Year 1

Year 1 PoS Statutory Requirements :
- ✓ Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- ✓ Given a number, identify one more or one less
- ✓ Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
- ✓ Represent and use number bonds and related subtraction facts within 20
- ✓ Add and subtract one-digit and two-digit numbers to 20, including zero.
- ✓ Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems

Identify and represent numbers using objects and pictorial representations (multiple representations)

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Count on in ones to and across 100 and find one more than a given number.

Memorise and reason with number bonds to 10 and 20 in several forms.

$+ \boxed{} = \boxed{10}$

1 digit plus 1 digit

$7 + 5 = 12$

Begin to use the + and = signs to calculations in a number sentence.

2 digit plus 1 digit

$18 + 5 = 23$

Addition: Year 2

Year 2 PoS Statutory Requirements :
✓ recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100.
✓ add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers
- adding three one-digit numbers.
✓ Solve problems with addition and subtraction, including those involving numbers, quantities and measures
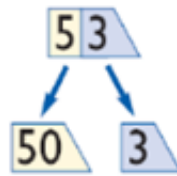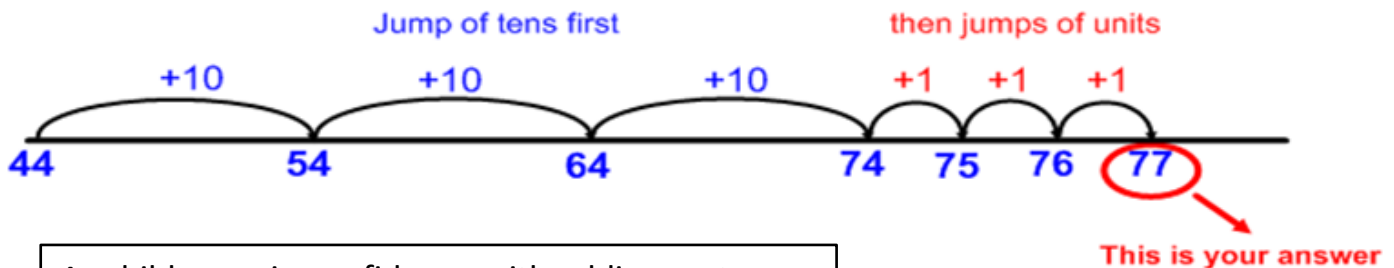
Partition two 2-digit numbers using a variety of models and images.

Use partitioning in order to add two 2-digit numbers (use a numbered number line to begin with and progress to empty number line).

As children gain confidence with adding on tens and ones, they should be taught to combine the jumps on an empty number line.

Addition: Year 3

Year 3 Key statutory requirements :
- Find 10 or 100 more or less than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

42 + 31 = 73

$$40 + 2$$
$$\underline{30 + 1}$$
$$\underline{70 + 3}$$

Place value resources should be used to support the conceptual understanding of expanded column addition.

47 + 36 = 83

$$40 + 7$$
$$\underline{30 + 6}$$
$$\underline{80 + 3}$$
$$10$$
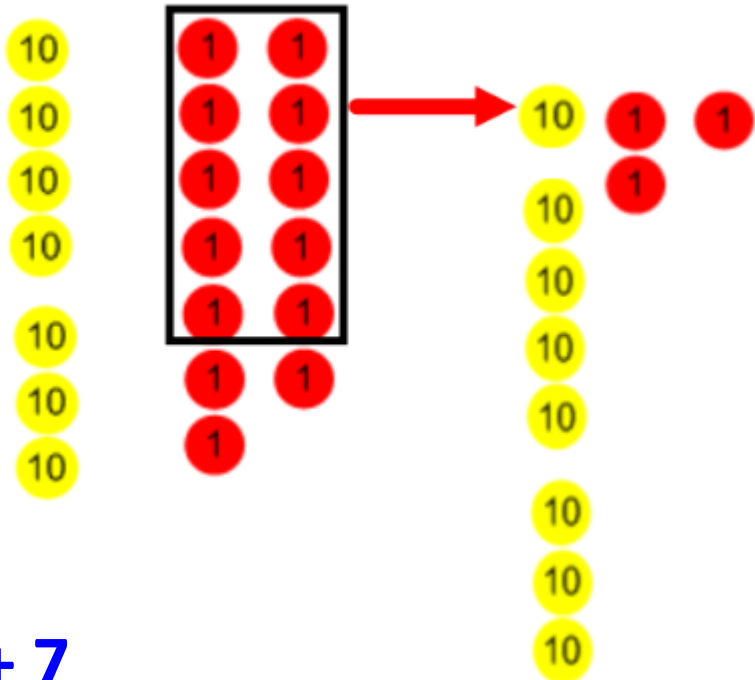
367 + 185 = 552

$$300 \ + \ 60 \ + 7$$
$$\underline{100 \ + \ 80 \ + 5}$$
$$\underline{500 \ + \ 50 \ + 2}$$
$$100 \qquad 10$$

Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added

Addition: Year 4

Year 4 Key statutory requirements :
- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

Build on learning from Year 3 and model how expanded method links to compact column addition method.

$$40 + 7$$
$$\underline{30 + 6}$$
$$\underline{80 + 3}$$
$$10$$

$$47$$
$$\underline{+36}$$
$$\underline{83}$$
$$1$$

$$300 + 60 + 7$$
$$\underline{100 + 80 + 5}$$
$$\underline{500 + 50 + 2}$$
$$100 \quad 10$$

$$367$$
$$\underline{+185}$$
$$\underline{552}$$
$$11$$

Note: The carried ten or carried hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added

By the summer term of year 4, pupils should be adding numbers up to 4 digits using compact column addition method.

$$5\ 2\ 7\ 1$$
$$+2\ 3\ 5\ 7$$
$$\underline{}$$
$$7\ 6\ 2\ 8$$
$$1$$

Addition: Year 5 & 6

By the end of Year 5 Pos Requirements :
- add and subtract whole numbers with more than 4 digits using formal written methods of columnar addition.
- add and subtract numbers mentally, with increasingly large numbers.
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving numbers up to three decimal places

In year 6 pupils are expected to solve more complex addition and subtraction problems

In year 5 and 6 pupils should be adding numbers using compact column addition method. **Note:** The carried ten, hundred, thousand is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **bottom** of the column in which it is to be added

```
   4 6 8 9 2
+  3 2 7 5 8
-----------
   7 9 6 5 0
   1 1 1
```

12.5 + 23.7   34.5 + 27.43

```
   12.5
+  23.7
-------
   36.2
      1
```

```
   34.50
+  27.43
-------
   61.93
       1
```

When adding decimals, it is essential that the decimal point does not move and kept in line. Where necessary, a zero should be added as a place holder.

Subtraction

Being the inverse of addition, many of the supporting images, apparatus, understanding of number and place value are the same.

Models and Images
100 square
Number lines
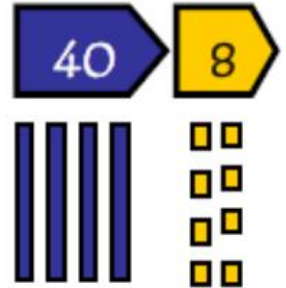Blank number lines
Counting apparatus
Counting stick
Bead strings
Place value dice
Place value cards
Place value counters

subtract

count on   count back

fewer   less

take away   minus

difference

Subtraction: Reception

Early learning goal statutory requirement:
- ✓ Say which number is one more or one less than a given number.
- ✓ Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.

1	2	3	4	5	6
					7
13	12	11	10	9	8
14					
15	16	17	18	19	20

Say which number is one less than a given number using a number line or number track to 20.
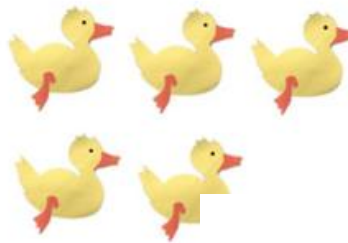
5 little ducks went swimming one day...

Begin to count backwards in familiar contexts such as number rhymes or stories.

10 Green Bottles sitting on the wall ...

Three teddies take away two teddies leaves one teddy

Begin to relate subtraction to 'taking away' using concrete objects and role play.

If I take away four shells there are six left

Count backwards along a number line to 'take away'

0 1 2 3 4 5 6 7 8 9 10

Subtraction: Year 1

Year 1 statutory requirement:
- say which number is one more or one less than a given number.
- represent and use number bonds and related subtraction facts within 20
- read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
- add and subtract one-digit and two-digit numbers to 20, including zero.

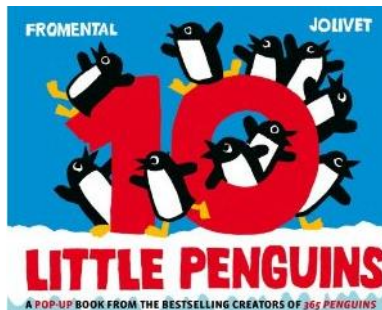
Use number bonds and related subtraction facts within 20.

$16 - \boxed{} = 10$

$20 - \boxed{} = 15$

FROMENTAL   JOLIVET

LITTLE PENGUINS

A POP-UP BOOK FROM THE BESTSELLING CREATORS OF *365 PENGUINS*

Count on in ones to and across 100 and find one less than a given number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Understand subtraction as take away. Use practical resources, pictorial representations, role play, stories and rhymes.

- 5

- 2
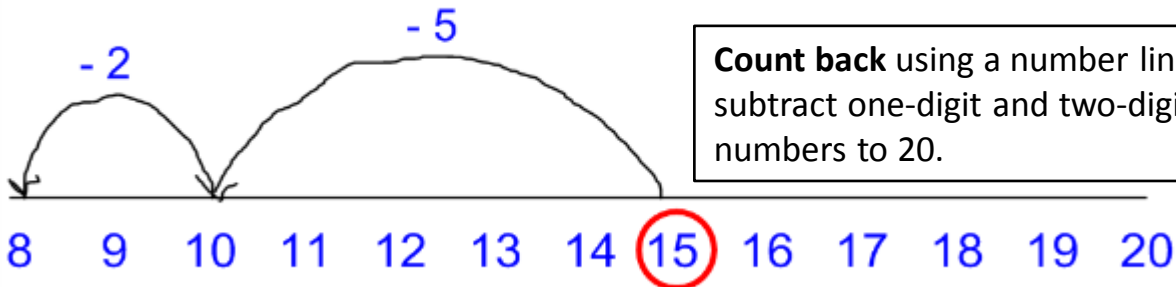
Count back using a number line to subtract one-digit and two-digit numbers to 20.

8   9   10   11   12   13   14   (15)   16   17   18   19   20
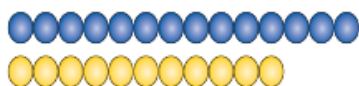
The difference between 11 and 14 is 3.

$14 - 11 = 3$

$11 + \square = 14$

Counting on should only be used when the language used is 'find the difference', 'difference between' and 'distance between'.

0   14

0   11

0   11   14
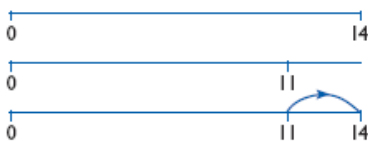
Subtraction: Year 2

Year 2 statutory requirement:
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts to 100.
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and ones
  - a two-digit number and tens
  - two two-digit numbers
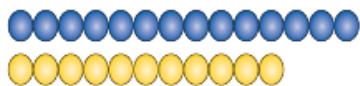 - adding three one-digit numbers.

Recall and use addition and subtraction facts to 20 fluently and derive facts to 100.
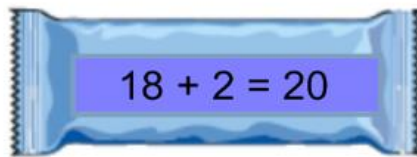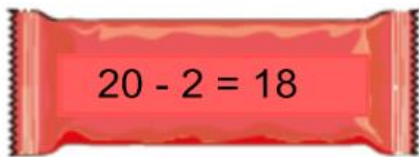
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

$20 - 2 = 18$

$18 + 2 = 20$

Use partitioning in order to subtract two 2-digit numbers (use a numbered number line to begin with and progress to empty number line).

$36 - 12 = 24$
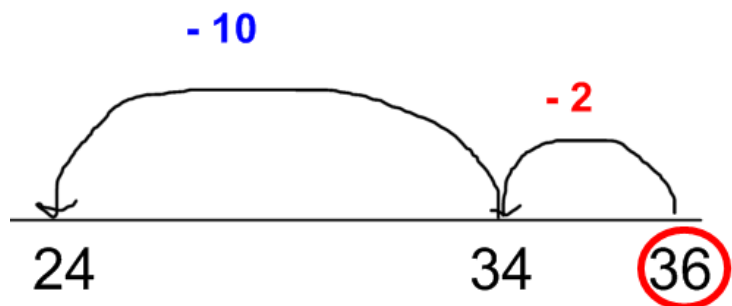
10   2

- 10

- 2

24   34   36

The difference between 11 and 14 is 3.

$14 - 11 = 3$

$11 + \square = 14$

0   14

0   11

0   11   14

Counting on should only be used when the language used is 'find the difference', 'difference between' and 'distance between'.
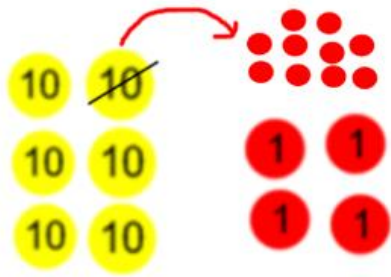
Subtraction: Year 3

Year 3 statutory requirement:
- Find 10 or 100 more or less than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.
- Add and subtract numbers mentally, including:
  - A three-digit number and ones
  - A three-digit number and tens
  - A three-digit number and hundreds.

74 - 27 = 47

$$
\begin{array}{r}
60 \quad\ 14 \\
\cancel{70}\ \&\ \cancel{4} \\
-\ 20\ \&\ 7 \\
\hline
40\ \&\ 7
\end{array}
$$

Place value resources should be used to support the conceptual understanding of expanded column addition. In this example to subtract 7 units we need to **exchange** a ten for ten units.

537 – 254 = 283

$$
\begin{array}{r}
400 \quad 130 \\
\cancel{500}\ \&\ \cancel{30}\ \&\ 7 \\
-\ 200\ \&\ 50\ \&\ 4 \\
\hline
200 \quad 80 \quad 3
\end{array}
$$

Subtraction: Year 4

Year 4 statutory requirement:
- find 1000 more or less than a given number.
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, ones).
- add and subtract numbers with **up to four digits**, using formal written methods of columnar addition and subtraction where appropriate.
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

74 - 27 = 47

Build on learning from Year 3 and model how expanded method links to compact column subtraction method.

```
      60    14
      7̶0̶ &  4̶
  -   20 &  7
  ─────────────
      40 &  7
  ─────────────
```

```
      6
      7¹4
  -   2 7
  ────────
      4 7
  ────────
```

537 − 254 = 243

```
      400   130
      5̶0̶0̶ & 3̶0̶ & 7
  -   200 & 50 & 4
  ──────────────────
      200   80    3
  ──────────────────
```

```
      4
      5¹3̶7
  -   2 5 4
  ──────────
      2 8 3
  ──────────
```

Subtraction: Year 5 & 6

By the end of Year 5 Pos Requirements :
- add and subtract whole numbers with more than 4 digits using formal written methods of columnar addition.
- add and subtract numbers mentally, with increasingly large numbers.
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving numbers up to three decimal places

In year 6 pupils are expected to solve more complex addition and subtraction problems

In year 5 and 6 pupils should be subtracting numbers using compact column subtraction method.

$$
\begin{array}{r}
7\,8\,4\,2 \\
-\ 1\,8\,2\,9 \\
\hline
6\,0\,1\,3
\end{array}
$$

$$
\begin{array}{r}
5.37 \\
-\ 2.54 \\
\hline
2.83
\end{array}
$$

When subtracting decimals, it is essential that the decimal point does not move and kept in line. Where necessary, a zero should be added as a place holder.

Multiplication

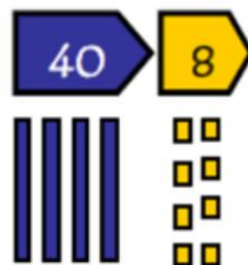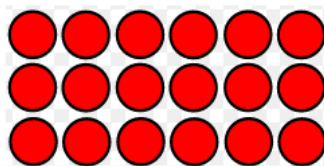## Models and Images

Arrays
Multiplication squares
100 square
ITP- Grouping
Number lines
Blank number lines
Counting stick
Place value apparatus

2 x 3 = 6

4 x 3 = 12

6 x 2 = 12

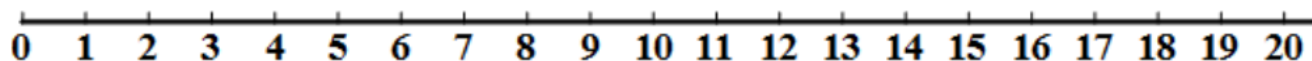2 x 4 = 8

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

multiplication   product
once, twice, three times
double   groups of
repeated addition   lots of
array, row, column   multiply
times   multiple

Multiplication: Reception

Early learning goal statutory requirement:
✓They solve problems, including doubling, halving and sharing.
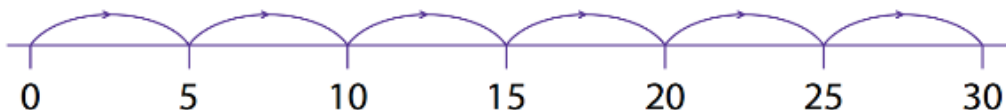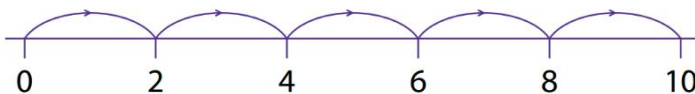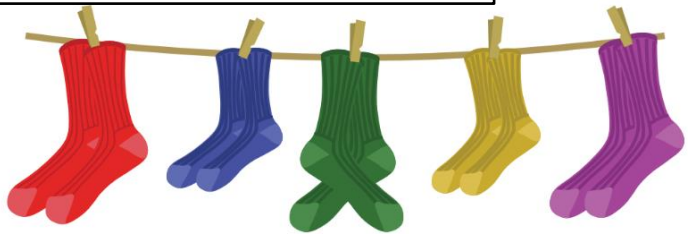
Begin to double numbers to 10.

1 + 1 = 2   2 + 2 = 4   3 + 3 = 6   4 + 4 = 8

Begin to count in twos, fives and tens using practical resources, role play, stories and songs.

0   2   4   6   8   10

0   5   10   15   20   25   30

Multiplication: Year 1

Year 1statutory requirement:
✓solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.

Count in twos, fives and tens using practical resources, role play, stories and songs.
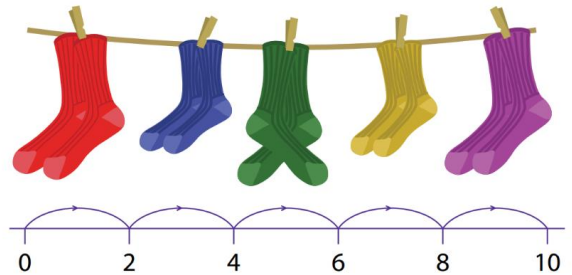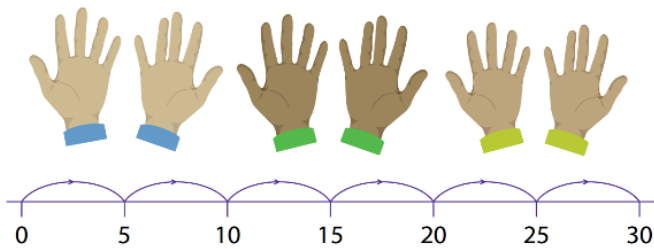
$2 + 2 + 2 + 2$

Understand multiplication as repeated addition – use concrete objects to support understanding.

5 + 5 + 5
or
3 x 5

Use pictorial representations

3 x 5

3 groups of 5

5

3 {
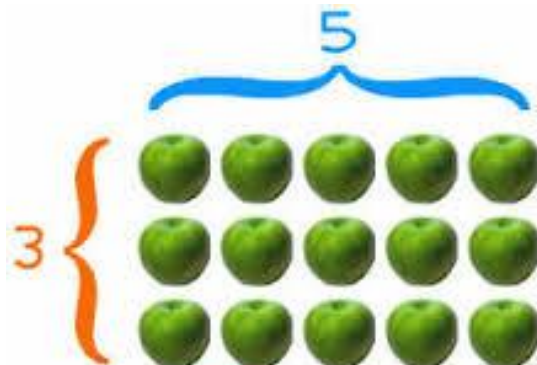
15 apples

Use arrays

Multiplication: Year 2

Year 2 statutory requirement:
✓ recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
✓ calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
✓ show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot
✓ solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

Further develop understanding multiplication as repeated addition

Recall multiplication and division facts for 2, 5, 10

5 + 5 + 5
or
5 x 3

3 x 5
3 groups of 5

Use arrays

15 apples

Model and bridge link from repeated addition to solving multiplication problems using a number line.

9 groups of 2 = 18
9 jumps of 2 = 18
9 x 2 = 18
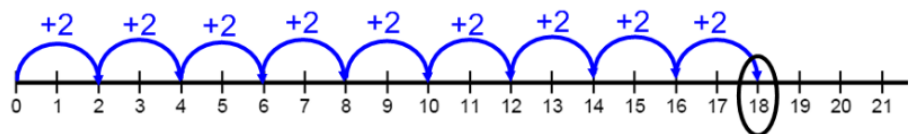
Multiplication: Year 3
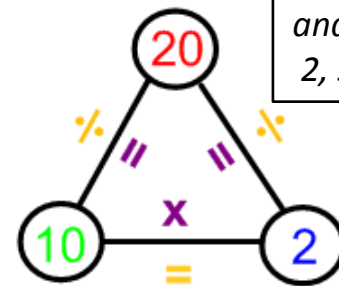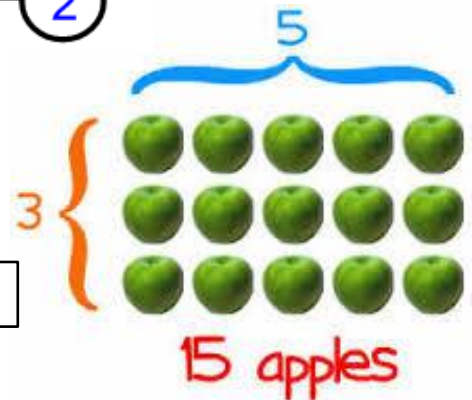
Year 3 statutory requirement:
✓ recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
✓ write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
✓ solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

x	3	4	8
5			
6			
4			

x	4	?	?
?	8	6	10
6	24	18	30
?	32	24	40

Develop recall of multiplication facts (this should always be done alongside the inverse of the corresponding division facts).

This expanded short multiplication method is very powerful in developing conceptual understanding of the compact method introduced in Year 4.

$$36 \times 4$$

4 x 10 = 40

4 x 2 = 8

40 + 8 = 4 8

10 & 2
x   4
─────
        8
      40
─────
      48

30 & 6
    x 4
─────
      24
+ 120
─────
    144
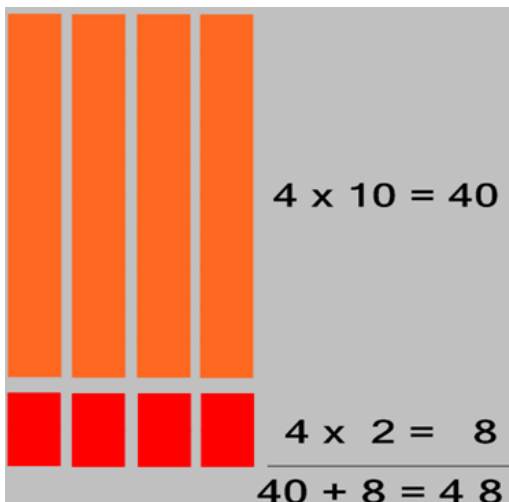
Multiplication: Year 4

Year 4 statutory requirement:
- ✓ recall multiplication and division facts for multiplication tables up to 12 × 12
- ✓ use place value, known and derived facts to multiply and divide mentally, including: multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- ✓ solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

×	3	4	8
5			
6			
4			

×	4	?	?
?	8	6	10
6	24	18	30
?	32	24	40

Develop recall of multiplication facts (this should always be done alongside the inverse of the corresponding division facts).

Continue to model expanded short multiplication method alongside compact short multiplication.

36 x 4

$$30 \ \& \ 6$$
$$\times 4$$
$$\overline{24}$$
$$+ \ 120$$
$$\overline{144}$$

$$\overset{2}{3}6$$
$$\times 4$$
$$\overline{144}$$

Multiplication: Year 5

In year 5 children are to multiply numbers up to 4 digits by **one digit** using compact short multiplication.

$$643 \times 8$$

$$\begin{array}{r} {\scriptstyle 3\ 2} \\ 643 \\ \times\ 8 \\ \hline 5144 \\ \hline \end{array}$$
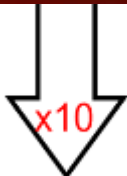
In year 5 children are to multiply numbers up to 4 digits by **two digit** using long multiplication.

$$643 \times 54$$

$$\begin{array}{r} {\scriptstyle 2\ 1} \\ {\scriptstyle 1\ 1} \\ 643 \\ \times\ 54 \\ \hline {\scriptstyle 1} \\ 2572 \\ +32150 \\ \hline 34722 \\ \hline \end{array}$$

To multiply or divide by 10, 100, 1000 children should be shown that the digit moves a column (s) to the left (x) or right (÷). The value of the digit is increasing by 10 times.

Multiplication: Year 6

Year 6 statutory requirement:
✓ multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
✓ multiply one-digit numbers with up to two decimal places by whole numbers

In year 6 children are to multiply multi-digit numbers by **one digit** using compact short multiplication.

643 x 8

$$\begin{array}{r} {}^{3\ 2}643 \\ \times\ 8 \\ \hline 5144 \end{array}$$

In year 6 children are to multiply multi-digit numbers by a **two digit** whole number using long multiplication.

643 x 54

$$\begin{array}{r} {}^{2\ 1}_{1\ 1}643 \\ \times\ 54 \\ \hline {}^{1}2572 \\ +32150 \\ \hline 34722 \end{array}$$

Use compact short multiplication to multiply decimal number by whole number.

$$\begin{array}{r} {}^{2\ 3}7.68 \\ \times\ \ \ 4 \\ \hline 30.72 \end{array}$$

Division

Models and Images
Arrays
Multiplication squares
100 square
ITP- Grouping
Number lines
Blank number lines
Counting stick
Place value apparatus

40 > 8 >

1	2	3	4	5	6	7	8	9	10
2	4	6	8	10	12	14	16	18	20
3	6	9	12	15	18	21	24	27	30
4	8	12	16	20	24	28	32	36	40
5	10	15	20	25	30	35	40	45	50
6	12	18	24	30	36	42	48	54	60
7	14	21	28	35	42	49	56	63	70
8	16	24	32	40	48	56	64	72	80
9	18	27	36	45	54	63	72	81	90
10	20	30	40	50	60	70	80	90	100

$18 \div 3 = 6$
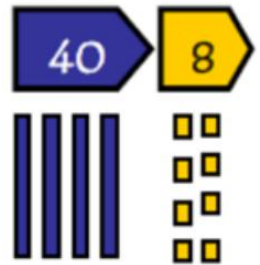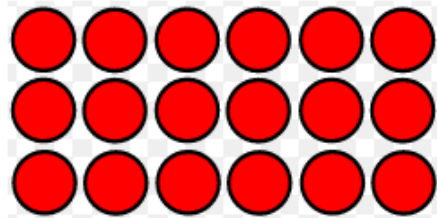
divided by
group
into groups of
into lots of
halve
divisible
remainder
half
factor

Division: Reception

Early learning goal statutory requirement:
✓They solve problems, including doubling, halving and sharing.

Begin to halve numbers to 20.
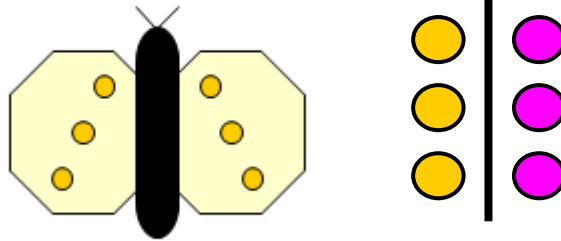
Begin to share quantities using practical resources, role play, stories and songs.

Role play example:
It is the end of the party and the final two teddies are waiting for their party bags. Provide empty party bags and a small collection of items such as gifts, balloons and cake. Ask the children to share the objects between the two bags.

Division: Year 1

Understand division as **sharing** using concrete resources.

$12 \div 2$ $12 \div 3$ $12 \div 4$

Pictorial representation of sharing **12 gold coins** between 2, 3 and 4 pirates!

Begin to understand division as **grouping** using concrete resources.

12 into groups of 2

$12 \div 2 = 6$

Division: Year 2

Year 2 statutory requirement:
- ✓ Recall and use division facts for 2, 5 and 10 multiplication tables.
- ✓ Calculate mathematical statements for multiplication and division within the multiplication tables and write then using the multiplication (x), division ( ) and equals (=) signs.
- ✓ Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.
- ✓ *Find 1/3; 1/4; 2/4; ¾ of a length, shape, set of objects or quantity*

Further develop understanding of division as **grouping** using concrete resources.

18 into groups of 3
$18 \div 3 = 6$
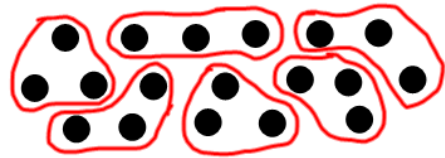
$18 \div 3 = 6$

Model division as grouping on a number line (ITP 'Grouping')

18 into groups of 3 = 6 groups
18 into jumps of 3 = 6 jumps
$18 \div 3 = 6$
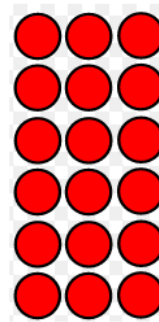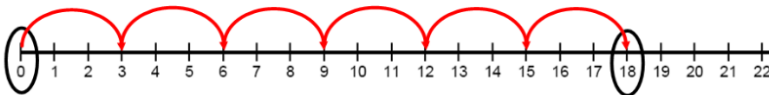
Reinforce division as grouping through the use of arrays

Children use numbered number lines divide using grouping.

28 children into groups of 5
How many children left without a group?
$28 \div 5 = 5 \text{ r } 3$
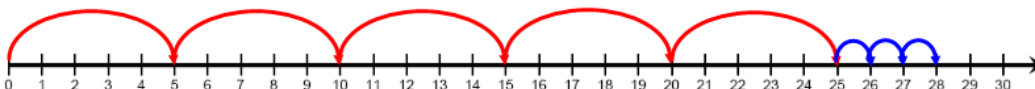
Division: Year 3

Year 3 statutory requirement:
✓recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables
✓write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods
✓ solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

How many threes divide into 80 so that the answer is a multiple of 10?

3 x 10 = 30
3 x **20** = 60
3 x 30 = 90

20 + 7 = 27

    21
3 | 80 + 1

- 60

20 * Carry over

Leading to short division

    2 7
3 | 8²1

Division: Year 4

Year 4 statutory requirement s for MULTIPLICATION **. However, we will teach DIVISION in year 4!!**
✓ recall multiplication and division facts for multiplication tables up to 12 × 12
✓ multiply two-digit and three-digit numbers by a one-digit number using formal written layout *(Therefore, we will teach children to divide a two-digit and three digit by a one-digit number using formal written layout)*

Continue to model expanded short division method but show link to compact short division.

Example 1:

81 ÷ 3

How many threes divide into 80 so that the answer is a multiple of 10?

3 x 10 = 30
3 x **20** = 60
3 x 30 = 90

20 + 7 = 27

$$3\overline{)80 + 1}$$ 21

- 60
_____
20   * Carry over

Leading to short division

27
$$3\overline{)8^21}$$

Division: Year 4

Year 4 statutory requirement s for MULTIPLICATION **. However, we will teach DIVISION in year 4!!**
✓ recall multiplication and division facts for multiplication tables up to 12 × 12
✓ multiply two-digit and three-digit numbers by a one-digit number using formal written layout *(Therefore, we will teach children to divide a two-digit and three digit by a one-digit number using formal written layout)*

Continue to model expanded short division method but show link to compact short division.

Example 2:
429 ÷ 3

How many threes divide into 400 so that the answer is a multiple of 100?

How many threes divide into 120 so that the answer is a multiple of 10?

3 x **100** = 300
3 x 200 = 600
3 x 300 = 900

3 x 10 = 30
3 x 20 = 60
3 x 30 = 90
3 x **40** = 120
3 x 50 = 150

100   40   3

120

3 | 400 + 20 + 9   = 143

- 300

100 * Carry over

Leading to short division ➡

1 4 3

3 | 4¹2 9

Division: Year 4

Year 4 statutory requirement s for MULTIPLICATION . **However, we will teach DIVISION in year 4!!**
✓ recall multiplication and division facts for multiplication tables up to 12 × 12
✓ multiply two-digit and three-digit numbers by a one-digit number using formal written layout *(Therefore, we will teach children to divide a two-digit and three digit by a one-digit number using formal written layout)*

Continue to model expanded short division method but show link to compact short division.

Example 3:
292 ÷ 3

$3 \times \underline{100} = 300$
$3 \times 200 = 600$
$3 \times 300 = 900$

$3 \times 10 = 30$
$3 \times 20 = 60$
$3 \times 30 = 90$
$3 \times \underline{40} = 120$
$3 \times 50 = 150$

How many threes divide into 200 so that the answer is a multiple of 100?

How many threes divide into 290 so that the answer is a multiple of 10?

$$0 \quad 90 \quad 7 \text{ r } 1$$

$$3 \overline{\left| 200 + \overset{290}{90} + \overset{22}{2} \right.} = 97r1$$
$$- 270$$
$$20 \text{ * Carry over}$$

Leading to short division →

$$9 \ 7 \ \text{r } 1$$
$$3 \overline{| 2^2 9^2 2}$$

Division: Year 5

Children to use compact short division.

$$218 \div 8 =$$

$$\begin{array}{r} 2\ 7\ \text{r}\ 2 \\ 8\ \overline{\smash{)}\,2^{2}1^{5}8} \end{array}$$

Extend to expressing results in different ways according to the context, including with remainders as fractions, as decimals or by rounding. For example:

- Whole number remainder = 27 r 2
- Fraction remainder = $27\frac{2}{8} = 27\frac{1}{4}$
- Decimal remainder = $27\frac{1}{4} = 27\frac{25}{100} = 27.25$

Division: Year 6

Year 6 statutory requirement:
✓ divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context

Continue to use compact short division to divide numbers up to 4 digits by a 1-digit whole number.

$218 \div 8 =$

$$\begin{array}{r} 2\ 7\ r\ 2 \\ 8\overline{)2^{2}1^{5}8} \end{array}$$

- Whole number remainder $= 27\ r\ 2$
- Fraction remainder $= 27\frac{2}{8} = 27\frac{1}{4}$
- Decimal remainder $= 27\frac{1}{4} = 27\frac{25}{100} = 27.25$

Use long division to divide numbers up to 4 digits by a 2-digit whole number.

$$\begin{array}{r} 0\ \ 2\ \ 4\ r1\ \ 2 \\ 24\overline{)5\ \ 8\ \ 8} \\ -\ 4\ \ 8 \\ \hline 1\ \ 0\ \ 8 \\ -\ \ \ \ 9\ \ 6 \\ \hline 1\ \ 2 \end{array}$$

Mental Calculation
Year 1

Addition
Number bonds ('story of' 5, 6, 7, 8, 9 and 10)
Count on in ones from a given 2-digit number
Add two single-digit numbers
Add three single-digit numbers spotting doubles or pairs to 10
Count on in tens from any given 2-digit number
Add 10 to any given 2-digit number
Use number facts to add single-digit numbers to two-digit numbers, e.g. use 4 + 3 to work out 24 + 3, 34 + 3…
Add by putting the larger number first

Subtraction
Number bonds ('story of' 5, 6, 7, 8, 9 and 10)
Count back in ones from a given 2-digit number
Subtract one single-digit number from another
Count back in tens from any given 2-digit number
Subtract 10 from any given 2-digit number
Use number facts to subtract single-digit numbers from two-digit numbers, e.g. use 7 – 2 to work out 27 – 2, 37 – 2…

Multiplication
Begin to count in 2s, 5s and 10s
Begin to say what three 5s are by counting in 5s or what four 2s are by counting in 2s, etc.
Double numbers to 10

Division
Begin to count in 2s, 5s and 10s
Find half of even numbers to 12 and know it is hard to halve odd numbers
Find half of even numbers by sharing
Begin to use visual and concrete arrays or 'sets of' to find how many sets of a small number make a larger number

Mental Calculation
Year 2

Addition

Number bonds – knowing all the pairs of numbers which make all the numbers to 12, and pairs with a total of 20

Count on in ones and tens from any given 2-digit number

Add two or three single-digit numbers

Add a single-digit number to any 2-digit number using number facts, including bridging multiples of 10. (E.g. 45 + 4, 38 + 7)

Add 10 and small multiples of 10 to any given 2-digit number

Add any pair of 2-digit numbers

Subtraction

Number bonds – knowing all the pairs of numbers which make all the numbers to 12

Count back in ones and tens from any given 2-digit number

Subtract a single-digit number from any 2-digit number using number facts, including bridging multiples of 10, e.g. 56 – 3, 53 – 5.

Subtract 10 and small multiples of 10 from any given 2-digit number

Subtract any pair of 2-digit numbers by counting back in tens and ones or by counting up.

Mental Calculation
Year 2

Multiplication

Count in 2s, 5s and 10s
Begin to count in 3s.
Begin to understand that multiplication is repeated addition and to use arrays (E.g. 3 x 4 is three rows of 4 dots)
Begin to learn the 2x, 3x, 5x and 10x tables, seeing these as 'lots of', e.g. 5 lots of 2, 6 lots of 2, 7 lots of 2, etc.
Double numbers up to 20
Begin to double multiples of 5 to 100
Begin to double two-digit numbers less than 50 with 1s digits of 1, 2, 3 4 or 5

Division

Count in 2s, 5s and 10s
Begin to count in 3s
Using fingers, say where a given number is in the 2s, 5s or 10s count. (E.g. 8 is the fourth number when I count in twos.)
Relate division to grouping. (E.g. how many groups of five in fifteen?)
Halve numbers to 20
Begin to halve numbers to 40 and multiples of 10 to 100
Find ½, $^1/_3$, ¼ and ¾ of a quantity of objects and of amounts (whole number answers)

Mental Calculation
Year 3

Addition

Know pairs with each total to 20
Know pairs of multiples of 10 with a total of 100
Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning
Add multiples and near multiples of 10 and 100
Perform place value additions without a struggle. (E.g. 300 + 8 + 50 = 358)
Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number. (E.g. 104 + 56 is 160 since 104+50=154 and 6+4=10 and 676 + 8 is 684 since 8=4+4 and 76+4+4=84)
Add pairs of 'friendly' 3-digit numbers, e.g. 320 + 450
Begin to add amounts of money using partitioning.

Subtraction

Know pairs with each total to 20
Know pairs of multiples of 10 with a total of 100
Add any two 2-digit numbers by counting on in 10s and 1s or by using partitioning
Add multiples and near multiples of 10 and 100
Perform place value additions without a struggle. (E.g. 300 + 8 + 50 = 358)
Use place value and number facts to add a 1-digit or 2-digit number to a 3-digit number. (E.g. 104 + 56 is 160 since 104+50=154 and 6+4=10 and 676 + 8 is 684 since 8=4+4 and 76+4+4=84)
Add pairs of 'friendly' 3-digit numbers, e.g. 320 + 450
Begin to add amounts of money using partitioning.

Mental Calculation Year 3

Multiplication

Know by heart all the multiplication facts in the 2x, 3x, 4x, 5x, 8x and 10x tables
Multiply whole numbers by 10 and 100
Recognise that multiplication is commutative
Use place value and number facts in mental multiplication. (E.g. 30 x 5 is 15 x 10)
Partition teen numbers to multiply by a single-digit number. (E.g. 3 x 14 as 3 x 10 and 3 x 4)
Double numbers up to 50

Division

Know by heart all the division facts derived from the 2x, 3x, 4x, 5x, 8x and 10x tables.
Divide whole numbers by 10 or 100 to give whole number answers
Recognise that division is not commutative.
Use place value and number facts in mental division. (E.g. 84 ÷ 4 is half of 42)
Divide larger numbers mentally by subtracting the tenth multiple, including those with remainders. (E.g. 57 ÷ 3 is 10 + 9 as 10x3=30 and 9x3=27)
Halve even numbers to 100, halve odd numbers to 20

Mental Calculation
Year 4

Addition

Add any two 2-digit numbers by partitioning or counting on

Know by heart/quickly derive number bonds to 100 and to £1

Add to the next hundred, pound and whole number. (E.g. 234 + 66 = 300, 3.4 + 0.6 = 4)

Perform place value additions without a struggle. (E.g. 300 + 8 + 50 + 4000 = 4358)

Add multiples and near multiples of 10, 100 and 1000.

Add £1, 10p, 1p to amounts of money

Use place value and number facts to add 1-, 2-, 3-and 4-digit numbers where a mental calculation is appropriate'. (E.g. 4004 + 156 by knowing that 6+4=10 and that 4004+150= 4154 so total is 4160)

Subtraction

Subtract any two 2-digit numbers

Know by heart/quickly derive number bonds to 100

Perform place value subtractions without a struggle. (E.g. 4736 – 706 = 4030, etc.)

Subtract multiples and near multiples of 10, 100 and 100

Subtract by counting up. (E.g. 503 – 368 is done by adding: 368 +2 +30 +100 +3 so we added 135)

Subtract, when appropriate, by counting back or taking away, using place value and number facts.

Subtract £1, 10p, 1p from amounts of money

Find change from £10, £20 and £50.

Mental Calculation
Year 4

Multiplication

Know by heart all the multiplication facts up to 12 x 12.
Recognise factors up to 12 of two-digit numbers.
Multiply whole numbers and one-place decimals by 10, 100, 1000
Multiply multiples of 10, 100, 1000 by single digit numbers. (E.g. 300 x 6 or 4000 x 8)
Use understanding of place value and number facts in mental multiplication. (E.g. 36 x 5 is half of 36 x 10 and 50 x 60 = 3000)
Partition 2-digit numbers to multiply by a single-digit number mentally. (E.g. 4 x 24 as 4 x 20 and 4 x 4)
Multiply near multiples using rounding. (E.g. 33 x 19 as 33 x 20 – 33)
Find doubles to double 100 and beyond using partitioning
Begin to double amounts of money. (E.g. £35.60 doubled = £71.20.)

Division

Know by heart all the division facts up to 144 ÷ 12.
Divide whole numbers by 10, 100 to give whole number answers or answers with one decimal place
Divide multiples of 100 by 1-digit numbers using division facts. (E.g. 3200 ÷ 8 = 400)
Use place value and number facts in mental division. (E.g. 245 ÷ 20 is double 245 ÷ 10)
Divide larger numbers mentally by subtracting the 10th or 20th multiple as appropriate. (E.g. 156 ÷ 6 is 20 + 6 as 20x6=120 and 6x6=36)
Find halves of even numbers to 200 and beyond using partitioning
Begin to halve amounts of money. (E.g. Half of £52.40 = £26.20)

Mental Calculation
Year 5

Addition

Know numbers bonds to 1 and to the next whole number

Add to the next 10 from a decimal number, *e.g. 13·6 + 6·4 = 20*

Add numbers with two significant digits only, using mental strategies. (E.g. 3.4 + 4.8 or 23,000 + 47,000)

Add one or two-digit multiples of 10, 100, 1000, 10,000 and 100,000. (E.g. 8000 + 7000 or 600,000 + 700,000)

Add near multiples of 10, 100, 1000, 10,000 and 100,000 to other numbers. (E.g. 82,472 + 30,004)

Add decimal numbers which are near multiples of 1 or 10, including money. *(E.g. 6·34 + 1·99 or £34·59 + £19·95)*

Use place value and number facts to add two or more friendly numbers including money and decimals. (E.g. 3 + 8 + 6 + 4 + 7, 0.6 + 0.7 + 0.4, or 2,056 + 44)

Subtraction

Subtract numbers with two significant digits only, using mental strategies. (E.g. 6.2 − 4.5 or 72,000 − 47,000)

Subtract one or two-digit multiples of 100, 1000, 10,000 and 100,000. (E.g. 8000 − 3000 or 600,000 − 200,000)

Subtract one or two digit near multiples of 100, 1000, 10,000 and 100,000 from other numbers. (E.g. 82,472 − 30,004)

Subtract decimal numbers which are near multiples of 1 or 10, including money. (E.g. 6·34 − 1·99 or £34·59 − £19·95)

Use counting up subtraction, with knowledge of number bonds to 10/100 or £1, as a strategy to perform mental subtraction. (E.g. £10 - £3.45 or 1000 − 782]

Recognise fraction complements to 1 and to the next whole number. (E.g. $1 \frac{2}{5} + \frac{3}{5} = 2$) $4 − 5$

Mental Calculation
Year 5

Multiplication

Know by heart all the multiplication facts up to 12 x 12.

Multiply whole numbers and one-and two-place decimals by 10, 100, 1000, 10,000

Use knowledge of factors and multiples in multiplication. (E.g. 43 x 6 is double 43 x 3, and 28 x 50 is ½ of 28 x 100 = 1400)

Use knowledge of place value and rounding in mental multiplication. (E.g. 67 x 199 as 67 x 200 – 67)

Use doubling and halving as a strategy in mental multiplication. (E.g. 58 x 5 = half of 58 x 10, and 34 x 4 is 34 doubled twice)

Partition 2-digit numbers, including decimals, to multiply by a single-digit number mentally. (E.g. 6 x 27 as 6 x 20 (120) plus 6 x 7 (42) making 162 or 6.3 x 7 as 6 x 7 plus 0.3 x 7)

Double amounts of money by partitioning. (E.g. £37.45 doubled = £37 doubled (£74) plus 45p doubled (90p) £74.90)

Division

Know by heart all the division facts up to 144 ÷ 12.

Divide whole numbers by 10, 100, 1000, 10,000 to give whole number answers or answers with 1, 2 or 3 decimal places

Use doubling and halving as mental division strategies. (E.g. 34 ÷ 5 is (34 ÷ 10) x 2)

Use knowledge of multiples and factors, also tests for divisibility ,in mental division. (E.g. 246 ÷ 6 is 123 ÷ 3 and we know that 525 divides by 25 and by 3)

Halve amounts of money by partitioning. (E.g. Half of £75.40 = half of £75 (37.50) plus half of 40p (20p) which is £37.70)

Divide larger numbers mentally by subtracting the 10th or 100th multiple as appropriate. (E.g. 96 ÷ 6 is 10 + 6, as 10 × 6 = 60 and 6 × 6 = 36; 312 ÷ 3 is 100 + 4 as 100 x 3 = 300 and 4 x 3 = 12)

Reduce fractions to their simplest form

Mental Calculation
Year 6

Addition

Know by heart number bonds to 100 and use these to derive related facts. (E.g. 3.46 + 0.54 = 4)

Derive quickly and without difficulty, number bonds to 1000

Add small and large whole numbers where the use of place value or number facts makes the calculation do-able 'in our heads'. (E.g. 34,000 + 8000.)

Add multiples of powers of ten and near multiples of the same. (E.g. 6345 + 199.)

Add negative numbers in a context such as temperature where the numbers make sense.

Add two 1-place decimal numbers or two 2-place decimal numbers less than 1 (E.g. 4.5 + 6.3 or 0.74 + 0.33)

Add positive numbers to negative numbers, e.g. calculate a rise in temperature, or continue a sequence beginning with a negative number

Subtraction

Use number bonds to 100 to perform mental subtraction of any pair of integers by complementary addition. (E.g. 1000 – 654 as 46 + 300 in our heads

Use number bonds to 1 and 10 to perform mental subtraction of any pair of one-place or two-place decimal numbers using complementary addition and including money. (E.g. 10 – 3.65 as 0.35 + 6, £50 – £34.29 as 71p + £15)

Use number facts and place value to perform mental subtraction of large numbers or decimal numbers with up to two places. (E.g. 467,900 – 3,005 or 4.63 – 1.02)

Subtract multiples of powers of ten and near multiples of the same.

Subtract negative numbers in a context such as temperature where the numbers make sense.

Mental Calculation
Year 6

Multiplication

Know by heart all the multiplication facts up to 12 x 12.
Multiply whole numbers and decimals with up to three places by 10, 100 or 1000, e.g. 234 x 1000 = 234,000 and 0.23 x 1000 = 230)
Identify common factors, common multiples and prime numbers and use factors in mental multiplication. (E.g. 326 x 6 is 652 x 3 which is 1956)
Use place value and number facts in mental multiplication. (E.g. 40,000 x 6 = 24,000 and 0.03 x 6 = 0.18)
Use doubling and halving as mental multiplication strategies, including to multiply by 2, 4, 8, 5, 20, 50 and 25 (E.g. 28 x 25 is ¼ of 28 x 100 = 700)
Use rounding in mental multiplication. (34 x 19 as (20 x 34) – 34)
Multiply one and two-place decimals by numbers up to and including 10 using place value and partitioning. (E.g. 3.6 x 4 is 12 + 2.4 or 2.53 x 3 is 6 + 1.5 + 0.09)
Double decimal numbers with up to 2 places using partitioning
e.g. 36·73 doubled is double 36 (72) plus double 0·73 (1·46)

Division

Know by heart all the division facts up to 144 ÷ 12.
Divide whole numbers by powers of 10 to give whole number answers or answers with up to three decimal places.
Identify common factors, common multiples and prime numbers and use factors in mental division. (E.g. 438 ÷ 6 is 219 ÷ 3 which is 73)
Use tests for divisibility to aid mental calculation.
Use doubling and halving as mental division strategies, e.g. to divide by 2, 4, 8, 5, 20 and 25. (E.g. 628 ÷ 8 is halved three times: 314, 157, 78.5)
Divide one and two place decimals by numbers up to and including 10 using place value. (E.g. 2.4 ÷ 6 = 0.4 or 0.65 ÷ 5 = 0.13, £6.33 ÷ 3 = £2.11)
Halve decimal numbers with up to 2 places using partitioning
e.g. Half of 36·86 is half of 36 (18) plus half of 0·86 (0·43)
Know and use equivalence between simple fractions, decimals and percentages, including in different contexts.
Recognise a given ratio and reduce a given ratio to its lowest terms.

Useful Websites

- www.mymaths.co.uk – teaching sequences

- www.conkermaths.com (being updated at the moment)

- www.sumdog.com – tailored games for children

- www.mathletics.co.uk

- www.bbc.co.uk/bitesize/

- www.educationquizzes.com/ks2/

- www.coolmath.com

- www.supermathsworld.com

Useful Apps

- **Mathmateer – 79p**
- **Tap Math – Mental maths**
- **Multiplication Genius X19**
- **Wipeout wall – number bonds**
- **Basic Maths – practice skills**
- **ClockMaster – learn to read clocks**
- **Glow Burst – 79p (place value / ordering)**
- **TribbsHD – All 4 operations mixed - 79p**
- **Number Link – Free (logic / reasoning)**
- **Fraction boats (fractions, decimals, percentages) – 79p**