Calculation Policy

Corporation Road Community Primary School
Calculation Policy

• This policy contains the key <u>mental and written calculation methods</u> that are to be taught throughout the school. It has been implemented to ensure <u>consistency</u> and <u>progression</u> throughout the school.

• Mental calculation skills are essential to written calculation methods and <u>must</u> be taught explicitly.

• Written recordings – 'jottings' - both help children to clarify their thinking and support and extend the development of more fluent and sophisticated mental strategies. Such 'jottings' must be modelled and taught.

• Although each method will be taught in the year group specified, children should not be discouraged from using previously taught methods with which they are secure, while the new concepts are becoming embedded.

• The long-term aim is for children to be able to select an efficient method of their choice that is appropriate for a given task. They should do this by always asking themselves:
- ✓ **Can I do this mentally? Which mental method is most efficient for this calculation?**
- ✓ **Can I do this mentally, if I use drawings or jottings?'**
- ✓ **Do I need to use a written method?'**
- ✓ **What is the most efficient written method?**
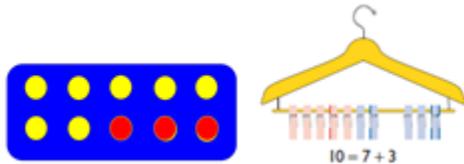
Addition: Year 1

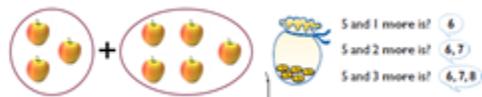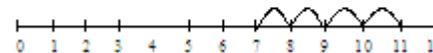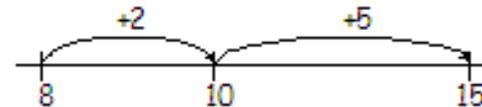| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. Children should memorise and reason with number bonds for numbers to 20, experiencing the = sign in different positions. Children have opportunities to explore partitioning numbers in different ways. e.g. 7 = 6 + 1, 7 = 5 + 2, 7 = 4 + 3 = **As a school, priority must be given to mental strategies for bridging tens for example 7+5 becomes 7+3+2.** They should see addition and subtraction as related operations. E.g. 7 + 3 = 10 is related to 10 – 3 = 7, understanding of which could be supported by an image like this. 10 = 7 + 3 Use Numicon and Dienes to model partitioning teen numbers into tens and ones and develop understanding of place value. Children should begin to understand addition as combining groups and counting on. 5 and 1 more is? 6 5 and 2 more is? 6, 7 5 and 3 more is? 6, 7, 8	*Add and subtract one-digit and two-digit numbers to 20, including zero.* **Counting and combing sets of objects** Combining two sets of objects which will progress onto adding on to a set. **Graded Number Lines** Number tracks are a useful starting point. 7+ 4 Before progressing onto more complex use of number lines, pupils must be able to draw their own for use with counting in ones. **Number Lines including use of number bonds** Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. 8 + 7 = 15 If pupils have mastered this extend to bridging larger multiples of 10 (e.g. 19 + 7).

Addition: Year 2

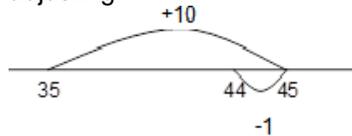| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; and adding three one-digit numbers.*

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<tr><td>

Children should memorise and reason with number bonds for numbers to 20, experiencing the = sign in different positions.

Number bonds should be extended to multiples of 10 (e.g. 40+60=100)

Children have opportunities to explore partitioning numbers in different ways. e.g. 7 = 6 + 1, 7 = 5 + 2, 7 = 4 + 3 =

As a school, priority must be given to mental strategies for bridging tens for example 7+5 becomes 7+3+2.

Number lines should continue to be an important image to support mathematical thinking, for example to model how to add 9 by adding 10 and adjusting.

Children should practise addition to 20 to become increasingly fluent. They should use the facts they know to derive others, e.g using 7 + 3 = 10 to find 17 + 3= 20, 70 + 30 = 100
They should use concrete objects such as bead strings and number lines to explore missing numbers 45 +   = 50.

As well as number lines, 100 squares could be used to explore patterns in calculations such as 74 +11, 77 + 9 encouraging children to think about 'What do you notice?' where partitioning or adjusting is used.
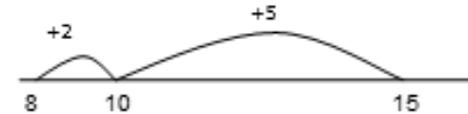
Children should learn to check their calculations, by using the inverse. They should continue to see addition as both combining groups and counting on.

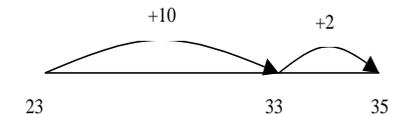</td><td>

Number Lines including use of number bonds
Continue to ensure pupils are proficient with using number lines to bridge tens, e.g. 8+7=15
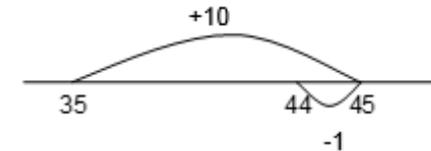

Number Lines including use of partition
Counting on in tens and ones, for example
23 + 12 = 23 + 10 + 2
= 33 + 2
= 35
Extend to adding 9 or 11 through adjusting, for example 35 + 9 = 44

Towards expanded written method

In this example 47 + 25 becomes:
=40 + 7 + 20 + 5
=(40 + 20) + (7 + 5)
This is the point where exchanging ten ones for a ten is first used to calculate. This must be done physically (i.e. using Diennes).

Expanded Written Method

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Addition: Year 3

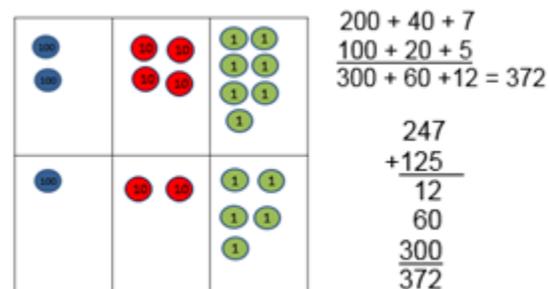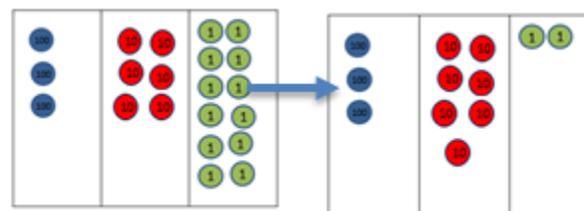| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. • The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged. This will help to develop children's understanding of working mentally. • Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24. • They should be encouraged to choose the mental strategies which are most efficient for the numbers involved: ✓ Add the nearest multiple of 10, then adjust such as 63 + 29 is the same as 63 + 30 − 1 ✓ counting on by partitioning the second number only such as 72 + 31 = 72 + 30 + 1 = 102 + 1 = 10 ✓ add and subtract mentally a one-digit number from a 3-digit number ✓ add and subtract mentally a 2-digit number from a 3-digit number ✓ add and subtract mentally a 3-digit number from a 3-digit number • Ensure pupils can add using the following mental strategies: ✓ -number bonds (e.g. 7+5 becomes 7+3+2) ✓ -place value & known number facts (e.g. 370+290 via 37+29) ✓ -place value columns, for example 389+30 by using the tens column) ✓ -near doubles (e.g. 9+8 then 37+36) ✓ -near tens (e.g. 34+19) ✓ partitioning (e.g. 74 + 67 becomes (70+60)+(4+ 7)	*Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.* **Expanded Column Method (3-digit)** Introduce expanded column addition modelled with place value counters (Dienes could be used for those who need a less abstract representation) **Numbers in calculation can be colour coded to match diagrams.** Leading to children understanding the exchange between tens and ones. It is important to note that these diagrams are not static and are processes you physically model (moving the dots).

Addition: Year 4

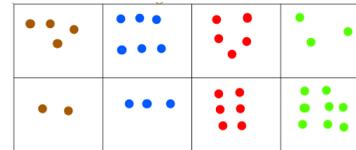| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Add and subtract numbers with up to four digits, using formal written methods of columnar addition and subtraction.*

Mental Strategies

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

- The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.

- Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24.

- Ensure pupils can add using the following mental strategies:
  - ✓ -number bonds (e.g. 7+5 becomes 7+3+2)
  - ✓ -place value & known number facts (e.g. 370+290 via 37+29)
  - ✓ -place value columns, for example 3689+300 by using the hundreds column)
  - ✓ -near doubles (e.g. 37+36)
  - ✓ -near tens (e.g. 34+19)
  - ✓ -partitioning (e.g. 74 + 67 becomes (70+60)+(4+7)

Written Methods

Add and subtract numbers with up to four digits, using formal written methods of columnar addition and subtraction.

Expanded Column Method (4-digit)

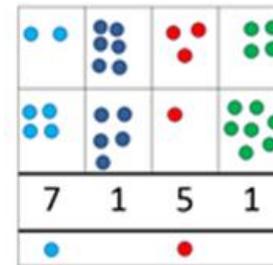4653 + 2368

$$4000 + 600 + 50 + 3$$
$$+ 2000 + 300 + 60 + 8$$
$$6000 + 900 + 110 + 11 \quad = 7021$$

Vertical Method (4-digit)

```
  2634
+ 4517
    11
    40
  1100
+ 6000
  7151
```

This is a useful step between expanded and standard.

Standard Written Method

2634
+4517
7151

Addition: Year 5

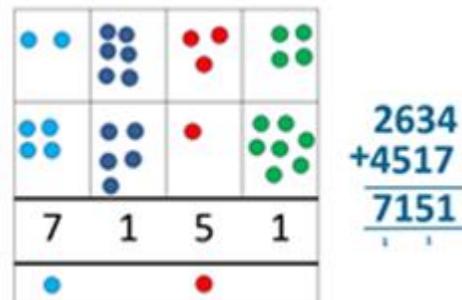| Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.
 	
• Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24.
 	
• Ensure pupils can add using the following mental strategies:
  ✓ -number bonds (e.g. 70+50 becomes 70+30+20)
  ✓ -place value & known number facts (e.g. 3700+2900 via 37+29)
  ✓ -place value columns, for example 3689+300 by using the hundreds column)
  ✓ -near doubles (e.g. 370+360)
  ✓ -near tens, whole numbers, etc (e.g. 34+19 or 7.6+3.9)
  ✓ -partitioning (e.g. 374 + 267 becomes (300+200)+(70+60)+(4+7)
	Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).
	
	Standard Written Method
	
	As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm.
	
	Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers.
	
	172.83
	+ 54.68
	227.51
	  1 1 1
	
	This same modelling process (dots as above) can be used to demonstrate exchanging of tenths for a whole number, etc.

Addition: Year 6

Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.*

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Consolidate previous years.

- Children should experiment with order of operations, investigating the effect of positioning the brackets in different places, e.g. 20 – 5 x 3 = 5; (20 – 5) x 3 = 45

- Add or subtract pairs of decimals with units, tenths or hundredths, e.g. 0.7 + 3.38

- Find doubles of decimals each with units and tenths, e.g. 1.6 + 1.6

- Add near doubles of decimals, e.g. 2.5 + 2.6

- Add a decimal with units and tenths, that is nearly a whole number, e.g. 4.3 + 2.9

- Ensure pupils can add using the following mental strategies:
  - ✓ -number bonds (e.g. 0.7+0.5 becomes 0.7+0.3+0.2)
  - ✓ -place value & known number facts (e.g. 3.7+2.9 via 37+29)
  - ✓ -place value columns, for example 36.89+0.3 by using the tenths column)
  - ✓ -near doubles (e.g. 3.7+3.6)
  - ✓ -near tens, whole numbers, etc (e.g. 34+19 or 7.6+3.9)
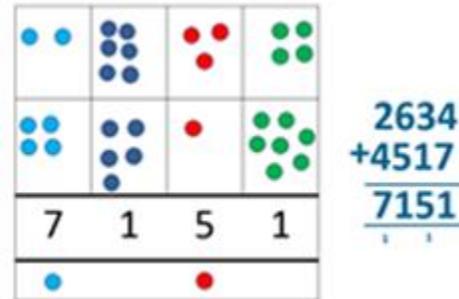 - ✓ -partitioning (e.g. 7.4 + 6.7 becomes (7+6)+(0.4+0.7)

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Standard Written Method

As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured.

Continue calculating with decimals, including those with different numbers of decimal places.

It is important to note that these diagrams are not static and are processes you physically model (moving the dots).

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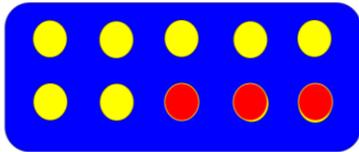</table>

Subtraction: Year 1

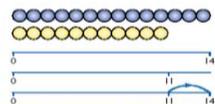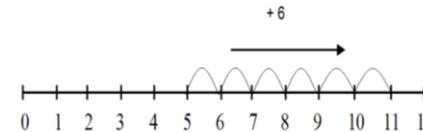| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10. Children should memorise and reason with number bonds for numbers to 20, experiencing the = sign in different positions. They should see addition and subtraction as related operations. E.g. 7 + 3 = 10 is related to 10 – 3 = 7, understanding of which could be supported by an image like this. Use bundles of straws and Dienes to model partitioning teen numbers into tens and ones. Children should begin to understand subtraction as both taking away and finding the difference between, and should find small differences by counting on. Subtraction as "taking away" Subtraction as "the difference between"	*Add and subtract one-digit and two-digit numbers to 20, including zero.* **Understand subtraction as take-away, using concrete objects and pictorial representations** 6-1= 19-5= Counting back can be used initially to make the link to taking away, before linking this to the difference and counting on with a graded numberline. **Understand subtraction as finding the difference** 11-5= If appropriate, progress from using number lines with every number shown to number lines with significant numbers shown. **Number Lines and Counting on** It is useful to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference (37-25) by **counting on**

Subtraction: Year 2

Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

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; and adding three one-digit numbers.

Number lines should continue to be an important image to support thinking, for example to model how to subtract 9 by adjusting.

Number Lines and Counting on
It is useful to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference (37-25) by **counting on**.
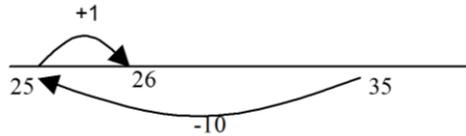
Children should practise subtraction to 20 to become increasingly fluent. They should use the facts they know to derive others, e.g using 10 - 7 = 3 and 7 = 10 - 3 to calculate 100 - 70 = 30 and 70 = 100 - 30.

Number Lines and Counting back
It is useful to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference (37-25) by **counting back**.

As well as number lines, 100 squares could be used to model calculations such as 74 – 11, 77 – 9 or 36 – 14, where partitioning or adjusting are used.

Children should learn to check their calculations, including by adding to check.

They should continue to see subtraction as both take away and finding the difference, and should find a small difference by counting up.

They should use Dienes to model partitioning into tens and ones and learn to partition numbers in different ways e.g. 23 = 20 + 3 = 10 + 13.

Towards written methods
Recording addition and subtraction in expanded columns can support understanding of the quantity aspect of place value and prepare for efficient written methods with larger numbers. The numbers may be represented with Dienes apparatus. E.g. 75 – 42
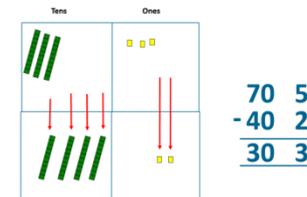
It is important to note that these diagrams are not static and are processes you physically model (moving the dots).

Expanded Method – no exchanging

47-32

$$40 + 7$$
$$- 30 + 2$$
$$10 + 5 = 15$$

Subtraction: Year 3

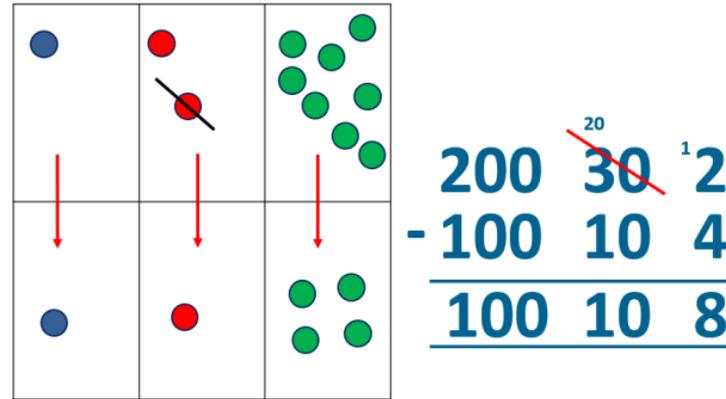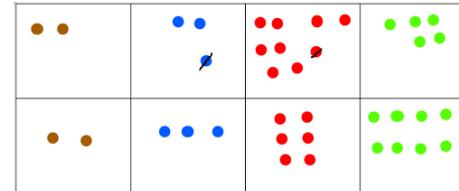| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. • The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged. This will help to develop children's understanding of working mentally. • Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24. • Ensure pupils can add using the following mental strategies: ✓ number bonds (e.g. 37-18 becomes 37-7-11). ✓ place value columns, for example 368-50 by using the tens column). ✓ near tens (e.g. 34-19). ✓ counting on when units to be taken is larger, for example 64-37. ✓ partition when unit to be taken is smaller, for example 59-32.	*Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.* **Expanded Column Method (3-digit)** It is important to note that these diagrams are not static and are processes you physically model (moving the dots).

Subtraction: Year 4

Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.
 	
• The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.
 	
• Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24.
 	
• Ensure pupils can add using the following mental strategies:
  ✓ number bonds (e.g. 37-18 becomes 37-7-11).
  ✓ place value & known number facts (e.g. 370-290 via 37-29).
  ✓ place value columns, for example 3689-300 by using the hundreds column).
  ✓ near tens (e.g. 34-19).
  ✓ counting on when units to be taken is larger, for example 64-37.
  ✓ partition when unit to be taken is smaller, for example 59-32.
	Add and subtract numbers with up to four digits, using formal written methods of columnar addition and subtraction.

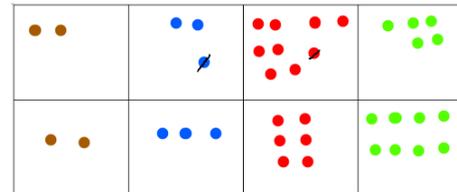**Expanded Column Method with decomposition (4-digit)**

$4653 - 2368$

$$4000 - \overset{500}{\cancel{600}} - \overset{^{1}40}{\cancel{50}} - {}^{1}3$$
$$+\ 2000\ -\ 300\ -\ 60\ -\ 8$$
$$2000 + 200 + 80 + 5 \quad = 2285$$

Standard Written Method

$$\begin{array}{r} {}^{5}4\overset{14}{\cancel{6}}\overset{1}{5}3 \\ -2368 \\ \hline 2285 \end{array}$$

Subtraction: Year 5

Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.
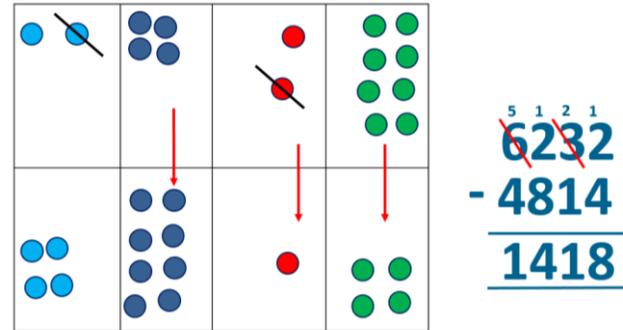
- The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.

- Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24.

- Ensure pupils can add using the following mental strategies:
  - ✓ number bonds (e.g. 37-18 becomes 37-7-11).
  - ✓ place value & known number facts (e.g. 370-290 via 37-29).
  - ✓ place value columns, for example 3689-300 by using the hundreds column).
  - ✓ near tens (e.g. 34-19).
  - ✓ counting on when units to be taken is larger, for example 64-37.
  - ✓ partition when unit to be taken is smaller, for example 59-32.

Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).

Standard Column Method with decomposition

When understanding of the expanded method is secure, children will move on to the formal method of decomposition, which can be initially modelled with place value counters.

Progress to calculating with decimals, including those with different numbers of decimal places. **Again this same modelling process, using coloured dots to explain exchanging, can be used for decimals.**

It is important to note that these diagrams are not static and are processes you physically model (moving the dots).

Subtraction: Year 6

Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.*

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Consolidate previous years.

- The number line should continue to be used as an important image to support thinking, and the use of informal jottings should be encouraged where appropriate.

- Children should continue to partition numbers in different ways, for example 34 could be 30+4 or 20+14 or 10+24.

- Ensure pupils can add using the following mental strategies:
  - ✓ number bonds (e.g. 37-18 becomes 37-7-11).
  - ✓ place value & known number facts (e.g. 370-290 via 37-29).
  - ✓ place value columns, for example 3689-300 by using the hundreds column).
  - ✓ near tens (e.g. 34-19).
  - ✓ counting on when units to be taken is larger, for example 64-37.
  - ✓ partition when unit to be taken is smaller, for example 59-32.

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Standard Written Method

As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with decomposition to be secured.

```
  5 1 2 1
  6232
- 4814
  ────
  1418
```

Teachers may also choose to introduce children to other efficient written layouts which help develop conceptual understanding. For example:

```
  326
 -148
 ────
   -2
  -20
  200
  ───
  178
```

Continue calculating with decimals, including those with different numbers of decimal places

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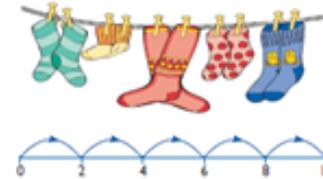# Multiplication: Year 1

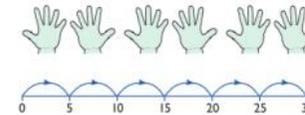| Multiplication Facts & Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. • Count in multiples of twos, fives and tens. • Children should memorise and reason with numbers in 2, 5 and 10 times tables. • Odd and even to 20; they should see ways to represent odd and even numbers. This will help them to understand the pattern in numbers • Children should begin to understand multiplication as scaling in terms of double and half. (e.g. that tower of cubes is double the height of the other tower). • Double all numbers to 10	*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*

Concrete Objects

$2 + 2 + 2 + 2 + 2 = 10$
$2 \times 5 = 10$
2 multiplied by 5
5 pairs
5 hops of 2

$5 + 5 + 5 + 5 + 5 + 5 = 30$
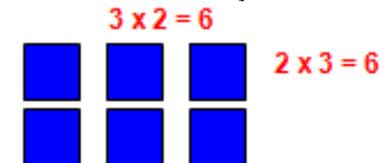$5 \times 6 = 30$
5 multiplied by 6
6 groups of 5
6 hops of 5

Counting in 'lots of'

6 lots of 4 = 24

Arrays

Use arrays to understand multiplication can be done in any order (commutative)

$3 \times 2 = 6$

$2 \times 3 = 6$

Multiplication: Year 2

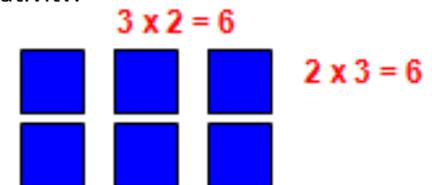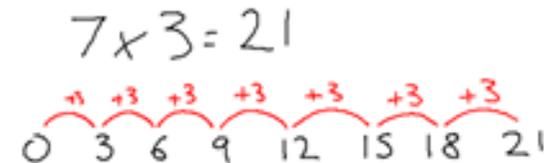| Multiplication Facts & Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot*
• Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers	*Solve problems involving multiplication using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.*
• Use a clock face to support understanding of counting in 5s. • Use money to support counting in 2s, 5s, 10s, 20s, 50s • Double all numbers to 20 • Double all multiples of 10 to 50 • Double any multiple of 5 up to 50 (using partition) • Odd and even numbers to 100	**Arrays** Including teaching of law of commutativity. 3 x 2 = 6 2 x 3 = 6
	Repeated Addition / Number Lines 3 times 5 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x 3 Repeated addition can be shown easily on a number line: This then moves on to a number line. This method then moves onto using a number line. $7 \times 3 = 21$ +3 +3 +3 +3 +3 +3 +3 0 3 6 9 12 15 18 21
	Towards a written method 43 x 6 = (40 x 6) + (3 x 6) = 240 + 18 =258

Multiplication: Year 3

Multiplication Facts & Mental Strategies	Written Methods

Multiplication Facts & Mental Strategies

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables

- Double multiples of 10 and 5 up to 100

- Children should continue to count regularly, on and back, now including multiples of 4, 8, 50, and 100, and steps of 1/10.

- Double 2-digit numbers using partitioning and recombining.

- Multiply one-digit or two-digit numbers by 10 or 100, e.g. 7 × 100, 46 × 10, 54 x 100

- Recognise that when multiplying by 10 or 100 the digits move one or two places to the left and zero is used as a place holder
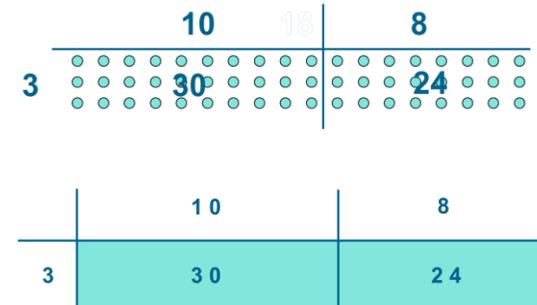
Written Methods

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

Towards a written method

43 x 6
= (40 x 6) + (3 x 6)
= 240 + 18
=258

Visual Grid Method

Grid Method

Multiplication: Year 4
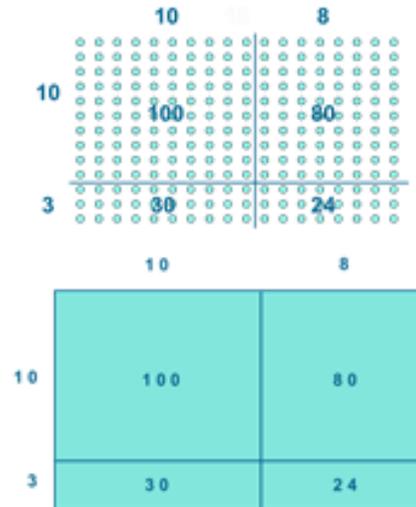
Multiplication Facts & Mental Strategies

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

- 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: multiplying by 0 and 1; dividing by 1; multiplying together three numbers

- Use knowledge of place value and multiplication facts to multiply: TU x U e.g. 70 x 8 becomes (7x8) x 10

- Use knowledge of partitioning to multiply TU x U: 49 x 6 becomes (40 x 6) + (9 x 6)

- Use place value and multiplication facts to double / halve any even number to 1000

- Ensure pupils can halve even numbers that start with an odd digit: for example 30,50,70,90 and then 300, 500, 700, 900; 30 becomes 10 and 20 which are then halved and answers combined; 700 becomes 100 and 600 which are then halved and answers combined.

Written Methods

Multiply two-digit and three-digit numbers by a one-digit number using formal written layout

Visual Grid Method

Grid Method

Expanded Short Multiplication

Multiplication: Year 5

Multiplication Facts & Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

- Know all square number multiplication and division facts up to 12 x 12
- Multiply by 4 via doubling and doubling again. Extend to multiplying by 8.
- Double 3-digit numbers using partitioning.
- Multiply multiples of 10 using place value
- 40 x 30 becomes 4x3 made 100 times larger
- Multiply whole numbers and those including decimals by 10, 100 and 1000 using place value.

Y4

- *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: multiplying by 0 and 1; dividing by 1; multiplying together three numbers*
- *Use knowledge of place value and multiplication facts to multiply:*
- *TU x U e.g. 70 x 8 becomes (7x8) x 10*
- *Use knowledge of partitioning to multiply TU x U*
- *49 x 6 becomes (40 x 6) + (9 x 6)*
- *Use place value and multiplication facts to double / halve any even number to 1000*
- *Ensure pupils can halve even numbers that start with an odd digit, for example 30,50,70,90 and then 300, 500, 700, 900*
- *30 becomes 10 and 20 which are then halved and answers combined.*
- *700 becomes 100 and 600 which are then halved and answers combined.*

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

Expanded Short Multiplication

Short Multiplication

Long Multiplication

Multiplication: Year 6

Multiplication Facts & Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. **Consolidate previous years, especially Years 4 and 5 (below).**	*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

Multiplication Facts & Mental Strategies

- Know all square number multiplication and division facts up to 12 x 12
- Multiply by 4 via doubling and doubling again. Extend to multiplying by 8.
- Double 3-digit numbers using partitioning- extend to numbers including tenths and hundredths.
- Multiply multiples of 10 using place value – extend to hundredths and thousands: 400 x 300 becomes 4x3 made 10,000 times larger
- Multiply whole numbers and those including decimals by 10, 100 and 1000 using place value.

Y4
- 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: multiplying by 0 and 1; dividing by 1; multiplying together three numbers

- Use knowledge of place value and multiplication facts to multiply: TU x U e.g. 70 x 8 becomes (7x8) x 10

- Use knowledge of partitioning to multiply TU x U: 49 x 6 becomes (40 x 6) + (9 x 6)

- Use place value and multiplication facts to double / halve any even number to 1000

- Ensure pupils can halve even numbers that start with an odd digit, for example 30,50,70,90 and then 300, 500, 700, 900; 30 becomes 10 and 20 which are then halved and combined; 700 becomes 100 and 600 which are then halved and answers combined.

Written Methods

Short Multiplication

```
    2  7  4  1
 ×           6
 ----------------
 1  6  4  4  6
       4  2
```

Long Multiplication

```
       1   2
    1  2  4
 ×     2  6
 ----------------
    7  4  4
 2  4  8  0
 ----------------
 3  2  2  4
    1   1
```

Division: Year 1

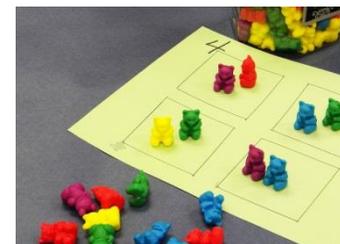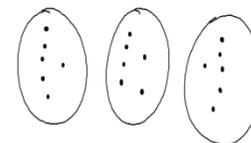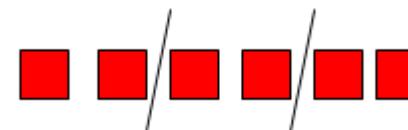| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. Children should experience regular counting on and back from different numbers in 1s and in multiples of 2, 5 and 10. They should begin to recognise the number of groups counted to support understanding of relationship between multiplication and division. Children should begin to understand division as both sharing and grouping. Sharing – 6 sweets are shared between 2 people. How many do they have each? Grouping- How many 2's are in 6? They should use objects to group and share amounts to develop understanding of division in a practical sense. E.g. using Numicon to find out how many 5's are in 30? How many pairs of gloves if you have 12 gloves? Children should begin to explore finding simple fractions including **halves and quarters** of objects, numbers and quantities. E.g.*16 children went to the park at the weekend. Half that number went swimming. How many children went swimming?*	*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.* **Grouping Objects** Physically grouping / sharing objects and individuals between a given number of groups (see below). **Pencil and paper grouping** Grouping actual objects will then progress into sharing using pencil and paper by drawing groups (e.g. circles) and sharing out an amount. **Grouping objects in a line** This is an essential step in the progression from grouping to use of a number line in Year 2. In this example 6 ÷ 2 = 3
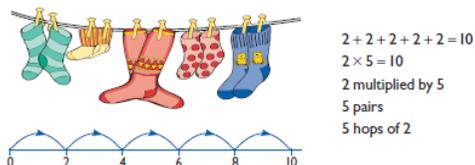
Division: Year 2

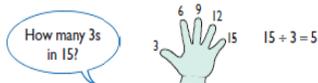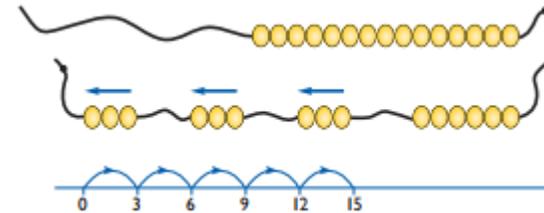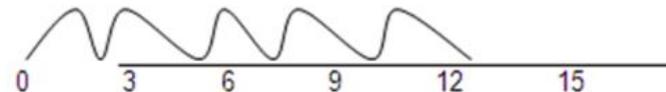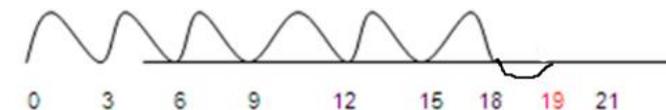| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. Children should count regularly, on and back, in steps of 2, 3, 5 and 10. Children who are able to count in twos, threes, fives and tens can use this knowledge to work out other facts such as 2 × 6, 5 × 4, 10 × 9. Show the children how to hold out their fingers and count, touching each finger in turn. So for 2 × 6 (six twos), hold up 6 fingers: Touching the fingers in turn is a means of keeping track of how far the children have gone in creating a sequence of numbers. The physical action can later be visualised without any actual movement. This can then be used to support finding out 'How many 3's are in 18?' and children count along fingers in 3's therefore making link between multiplication and division. Children should continue to develop understanding of division as sharing **and** grouping. Children should be given opportunities to find a half, a quarter and a third of shapes, objects, numbers and quantities. Finding a fraction of a number of objects to be related to sharing. They will explore visually and understand how some fractions are equivalent – e.g. two quarters is the same as one half.	*Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.* **Grouping use resources** Group from zero in jumps of the divisor to find our 'how many groups of 3 are there in 15?'. 15 ÷ 3 = 5 **Number Lines** Initially grouping should be done using a marked number line, before moving onto using an unmarked number line. E.g. 15 ÷ 3 = 5 Remainders with division Using a number line to find equal groups and what is left over 19 ÷ 3 = 6 r1

Division: Year 3

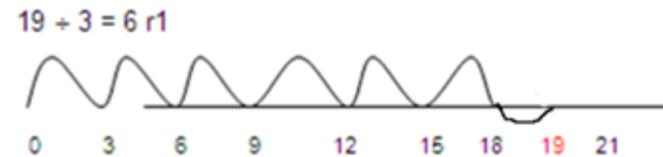| Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. • Division facts for 2, 10, 5, 3, 4 and 8 times tables. • Halve any multiple of 10 up to 200. • Halve even numbers to 100 using partition. • Recognise that when dividing by 10 or 100 the digits move one or two places to the left and zero is used as a place holder. • Ensure children can have multiples of 10 that start with an odd number (e.g. 30, 50, 70, 90) by taking 10 off then halving both before recombining.	*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.*

Number Lines

Continue with use of number lines until competent, including with remainders.

$19 \div 3 = 6 \, r1$

Chunking

$$72 \div 5 =$$

How many lots of five are there in 72?
What do I know from my 5 times table?
I know 10 lots of 5 are 50, so I can take off 10 lots of 5:

```
    72
  - 50     (10 x 5)
    22
```

How many lots of 5 are there in 22?
I know 4 lots of 5 are 20, so I can take off 4 lots of 5.

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

The answer is 14 remainder 2

$72 \div 5 = 14 \, r \, 2$

Division: Year 4

Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.	*Divide numbers up to 3 digits by a one-digit number using the formal written method of chunking (NOT NC).*

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Mental Strategies

Children should experience regular counting on and back from different numbers in multiples of 6, 7, 9, 25 and 1000.

Children should learn division facts up to $144 \div 12$

- Halve even numbers to 100

- Ensure children can have multiples of 100 that start with an odd number (e.g. 300, 500, 700, 900) by taking 100 off then halving both before recombining.

- Divide numbers to 1000 by 10 and then 100 (whole-number answers), e.g. $120 \div 10$, $600 \div 100$, $850 \div 10$

- Divide using place value, for example $420 \div 6 = 70$

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Written Methods

Chunking

$256 \div 7 =$

How many sevens are there in 256?

If 10 lots of 7 are 70, what's the biggest chunk (lot) of 7, I can get from 256?

30 lots of 7 = 210, so I can take off 30 lots of 7
How many sevens are there in 46?
6 x 7 = 42, take off 6 lots of 7

```
    256
-   210      (30 x 7)
    ____
     46
-    42      (6 x 7)
    ____
      4
                =36
```

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Division: Year 5

Mental Strategies	Written Methods
Please ensure pupils are shown how to use jottings as part of their mental calculation strategies. • Divide by 4 or 8 via repeated halving. • Halve 3-digits numbers using partitioning, including multiples of 10 and 1000 that start with odd numbers (e.g. 30 and 300). • Divide by 10, 100 or 1000 using place value. • Divide a multiple of 10 by a single-digit number using place value (whole number answers) e.g. 80 ÷ 4, 270 ÷ 3. • Use understanding that when a number is multiplied or divided by 10 or 100, its digits move one or two places to the left or the right relative to the decimal point, and zero.	*Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context*

Written Methods

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context

Chunking

Use of place value facts and aim to do in as few steps as possible.

$$7 \overline{)\ 5659}$$
$$-5600 \quad (800 \times 7)$$
$$\overline{59}$$
$$56 \quad (8 \times 7)$$
$$\overline{3}$$

Answer = 808 remanider 3

Short Division

8 6 r 2

5 | 4 3 ³2

691 r1

5 | 3⁴456

Division: Year 6

Mental Strategies	Written Methods

Please ensure pupils are shown how to use jottings as part of their mental calculation strategies.

- Division facts to 144 ÷ 12.

- Square roots to 144.

- Divide a 2-digit number by a 1-digit number mentally, for example 68 ÷ 4 becomes 40 ÷ 4 and 28 ÷ 4 thus giving an answer of 17.

- Divide by 25 and 50, e.g. 350 ÷ 25 using known facts.

- Halve numbers including tenths (e.g. 7.4 or 8.5).

- Divide by 10, 100 or 1000 using place value.

- Divide larger multiples of 10 using place value (e.g. 4200 ÷ 6)

- Ensure pupils can halve 'odd tenths', for example half of 0.7 or 4.9 by taking one tenth of and halving both before recombining.

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.

Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.

Use written division methods in cases where the answer has up to two decimal places

Chunking

For dividing by 2-digit numbers.

```
13 | 1 9 3 7
  -  1 3 0 0   (100 × 13)
        6 3 7
  -     5 2 0   (40 × 13)
        1 1 7
  -     1 1 7   (9 × 13)
            0
                  = 149
```

Short Division

For dividing by 1-digit numbers.

$$6\overline{)2532} = 422$$

Short division is also the best method for dividing numbers with decimals.

$$4\overline{)6.300} = 1.575$$

It is also useful to find answers less than one (i.e. when the dividend is smaller than the divisor).

$$8\overline{)5.000} = 0.625$$