Collingtree CEVA Primary School

Calculation Policy
Mrs Bedi

Methods the we use in school for the four operations: + - x ÷

- These methods are taught throughout school consistently.
- When one method is embedded they build upon it with the next method.
- The idea is that they work through each stage of methods to ensure they gain a solid understanding of number and the concept of the operation.

+ - x ÷

Addition

Stage 1

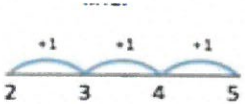
Children understand the concept of addition as the combining of 2 or more groups. Children can use the + and = symbols accurately. Calculations should be written on either side of the equals sign so that = is not just interpreted as the answer.

6 + 2 = 8 8 = 6 + 2

Children use ***Numicon*** and other visual representations to add 2 or more amounts.

Extending to counting up in ones on a number line.

Using ***Numicon*** to add



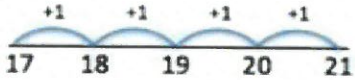
Extending on to using number bonds to count on in bigger jumps

Stage 2

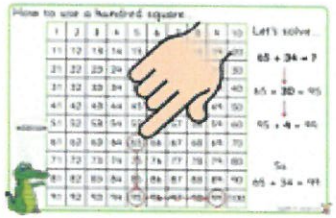
Add 2-digit numbers with units using known number bonds on a number line, eg 12 + 4 = (without bridging)

Adding 2-digit numbers with single units, bridging through multiples of 10, using a ***number line***.

17 + 4 = 21



Use ***100 square*** to begin to add 2-digit numbers by counting in tens and ones.



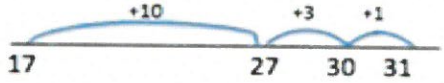
Moving on to less reliance on a 100 square.

RECOMMENDED BY END OF YEAR 1

Stage 3

The ***number line*** is extended to partitioning and adding tens then ones when faced with larger numbers.

17 + 14 = 31



Leading to simple column addition of 2-digit numbers with no carrying using Numicon.

Pupils must have a good understanding of place value and partitioning.

Partitioning numbers first	leading to
30 + 6	36
+ 10 + 2	+ 12
40 + 8 = 48	48

Extend to examples which involve 'carrying'

RECOMMENDED BY THE END OF YEAR 2

Stage 4

Column addition of 2, 3 and 4-digit numbers using expanded methods.

Partitioning numbers first	leading to	then introducing
600 + 40 + 3	643	600 + 40 + 3
+ 200 + 20 + 5	+ 225	+ 200 + 70 + 5
800 + 60 + 8 = 868	868	800 + 110 + 8 = 918

RECOMMENDED BY THE END OF YEAR 3

Stage 5

Short written methods using 'carrying'. The carrying digit goes underneath the answer.

Using 4-digit numbers	leading to decimals
7893	31.76
+ 5385	+ 18.07
13278	49.83
1 1	1

RECOMMENDED BY THE END OF YEAR 4

In years 5 and 6, pupils continue practicing formal written methods with increasingly large numbers, including decimal numbers in different contexts and ensuring understanding of place value.

Subtraction

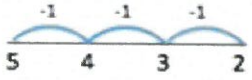
Stage 1

Children understand the concept of subtraction as the taking a number away from another. Children use the – and = symbols accurately. Calculations should be written on either side of the equals sign so that = is not just interpreted as the answer.

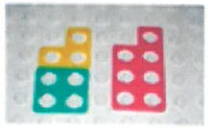
$6 - 2 = 4 \quad 4 = 6 - 2$

Children use ***Numicon*** and other visual representations to subtract numbers.

Extend to counting backwards in ones on a number line.

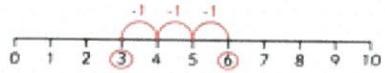


Using ***Numicon*** to subtract.



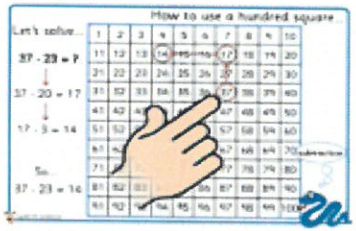
Stage 2

'Find the difference' by counting back on a number line.



$6 - 3 = 3$

Use ***100 square*** to subtract two 2-digit numbers by counting back in tens and ones.



The number line is extended to partitioning and counting back in tens then ones when faced with larger numbers.

RECOMMENDED BY END OF YEAR 1

Stage 3

Moving on to simple column subtraction of 2 digit numbers with no carrying using practical equipment to support to start with.

Pupils must have a good understanding of place value and partitioning.

Partitioning numbers first

$30 + 6$
$-\ 10 + 2$
$20 + 4 = 24$

leading to

36
$-\ 12$
24

RECOMMENDED BY THE END OF YEAR 2

Stage 4

Column subtraction of 2, 3 and 4 digit numbers using exapnded methods and support with practical equipment as necessary,

Partitioning numbers first

$600 + 40 + 3$
$-200 + 20 + 1$
$400 + 20 + 2 = 422$

leading to

643
$-\ 221$
422

then introducing

$600 + 90 + 3$
$-200 + 70 + 5$
$400 + 10 + 8 = 418$

RECOMMENDED BY THE END OF YEAR 3

Stage 5

Short written methods using 'exchanging'

Using 4-digit numbers

7893
$-\ 5385$
2508

leading to decimals

36.76
$-\ 13.87$
22.89

RECOMMENDED BY THE END OF YEAR 4

In years 5 and 6, pupils continue practicing formal written methods with increasingly large numbers so they become fluent and precise.

Multiplication

Stage 1

Children begin to understand the concept of multiplication and recognise the 'x' symbol

Children use ***Numicon*** and other visual representations to show groupings of amounts

3 lots of 2 3 x 2 = 6

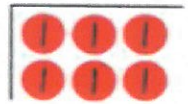
4 groups of 3 4 x 3 = 12

RECOMMENDED BY END OF YEAR 1

Stage 2

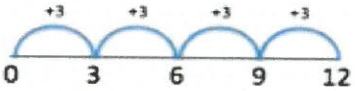
To describe multplication as an array and begin to recognise multiplication can be done in any order. Use the 'x' symbol with confidence.

Using an array using ***Place Value Counters***.



To use a ***number line*** to show multiplication as ***repeated addition***.

4 x 3 = 12 or 3 + 3 + 3 + 3 = 12



RECOMMENDED BY THE END OF YEAR 2

Stage 3

To use a formal written method 2-digit by 1-digit (support with equipment when needed) – by the end of year 3 and 3-digit by 1-digit by the end of year 4.

Short Multiplication

23 x 7
E = 20 x 10 = 200

$$\begin{array}{r} 23 \\ \times\ 7 \\ \hline 21 \\ +\ 140 \\ \hline 161 \end{array}$$

leading to

$$\begin{array}{r} 23 \\ \times\ 7 \\ \hline 161 \\ {\scriptstyle 2} \end{array}$$

Stage 4

To use formal written methods to multiply 4-digit numbers by 1 or 2-digit numbers, extending to long multiplication.

Long Multiplication

124 x 26
E = 100 x 30 = 3000

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 124 \\ \times\ 26 \\ \hline 744 \\ +\ 2480 \\ \hline 3224 \\ {\scriptstyle 1\ 1} \end{array}$$

Extend to 4-digit by 2-digit and include decimals.

CHILDREN SHOULD BE PRACTIING AND SECURING THESE FORMAL WRITTEN METHODS IN YEARS 5 AND 6.

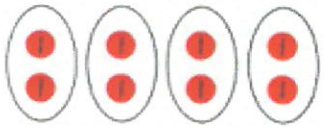
Division

Stage 1

Children begin to understand the concept of division as 'grouping' and recognise the '÷' symbol. Use a range of models and images to show 'sharing' an amount equally.

6 shared equally by 3 is 2 6 ÷ 3 = 2

Sharing by using practical equipment



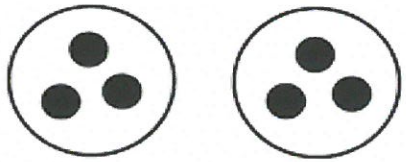
8 shared equally by 4 is 2 8 ÷ 4 = 2

RECOMMENDED BY END OF YEAR 1

Stage 2

To describe division as sharing an amount equally. To understand division within the multiplication tables U ÷ U and TU ÷ U.

To use the ÷ sign



6 ÷ 2 = 3

RECOMMENDED BY THE END OF YEAR 2

Stage 3

To use short division method to divide numbers, initially using equipment then move on to finding remainders.

leading to

$$\begin{array}{r} 1\ 2 \\ 3\overline{)\ 3\ 6} \end{array}$$

RECOMMENDED BY THE END OF YEAR 3

Stage 4

To use short division method to divide 3-digit numbers, including decimals.

411 ÷ 3

$$\begin{array}{r} 1\ 3\ 7 \\ 3\overline{)\ 4\ {}^{1}1\ {}^{2}1} \end{array}$$

541 ÷ 5

$$\begin{array}{r} 1\ 0\ 8\ r\ 1 \\ 5\overline{)\ 5\ 4\ {}^{4}1} \end{array}$$

RECOMMENDED BY THE END OF YEAR 4

Stage 5

To use long division method to divide 3 and 4 digit numbers by 2-digit numbers. Where appropriate answers should be calculated with decimal places.

8640 ÷ 15

$$\begin{array}{r} \quad 5\ 7\ 6 \\ 15\overline{)\ 8\ 6\ 4\ 0} \\ \underline{\ 7\ 5\ \ \ } \\ \quad 1\ 1\ 4 \\ \quad 1\ 0\ 5 \\ \quad\ \ \underline{\ \ \ \ } \\ \quad\ \ 9\ 0 \end{array}$$

RECOMMENDED BY THE END OF YEAR 5

In year 6, pupils continue practicing formal written methods with increasingly large numbers so they become fluent and precise. They are able to record remainders as decimals and fractions.