Collingwood Primary School Calculation Policy April 2020: Addition

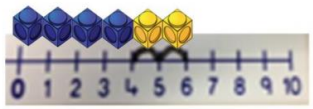
Key language: sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as'.

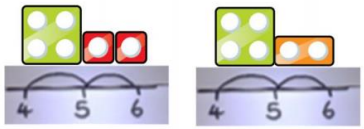
Stage 1

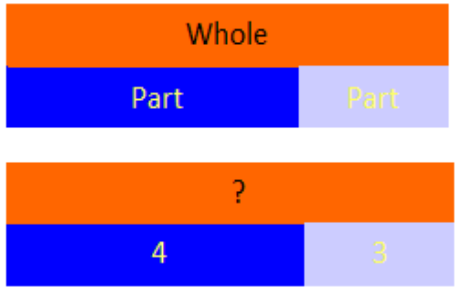
Children understand the concept of addition as combining two or more groups together. Children start to use + and = correctly. During this stage children will gain an understanding that = is not just interpreted as the answer. E.g. 5+2=7, 7=5+2

Children will use number lines, numicon and part whole models to aid addition. They will also begin to use simple bar models.

Counting on using number lines using cubes or Numicon.







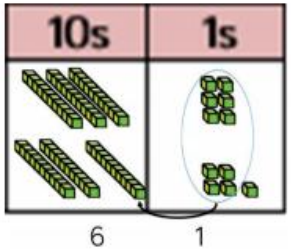
Stage 2

In this stage, children will add numbers together greater than 10. They will also begin to exchange when adding two 2-digit numbers together.

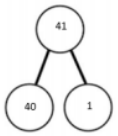
Children will primarily use dienes and numicon as well as 10 and 20 frames to aid addition. At this stage children will only be introduced to a more formal method of addition alongside a pictorial and practical method.

TO + TO using base 10. Continue to develop understanding of partitioning and place value.

36 + 25



41 + 8



25 + 47

20 + 5 40 + 7

20 + 40 = 60

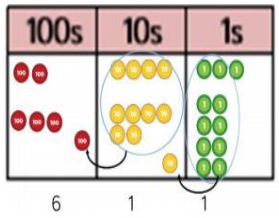
5+ 7 =12

60 + 12 = 72

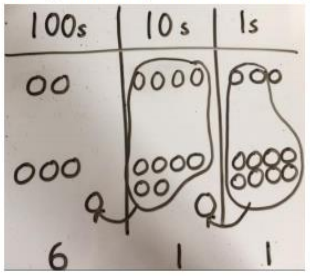
Stage 3

Children will progress from Dienes to place value counters, gaining a better understanding of number. Children will add together 3- and 4-digit numbers (including exchanges). Continue with column addition as a formal method. They will be introduced to adding decimals in the context of money. Children will use bar models more confidently to aid solving addition problems.

Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.



Chidren to represent the counters in a place value chart, circling when they make an exchange.



$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline \end{array}$$

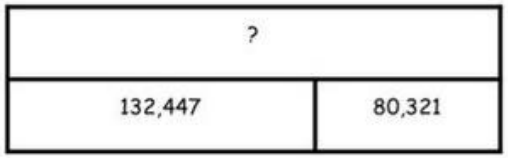
(1 1)

Stage 4

By this stage, children will have a far greater conceptual understanding and procedural fluency with formal methods. They will continue with column addition adding numbers greater than 4 digit and continue to add decimal numbers within a range of contexts. Place value counters will still be used to develop understanding alongside their formal written method. Children will be challenged with multi-step problems and expand their open investigations.

Calculate the missing values to complete the bar models. Then write the four number sentences which can be made from the bar models.

1.



$$\begin{array}{r} 4\square2849 \\ +\ 2\square240\square \\ \hline 70\square2\square4 \\ \hline \end{array}$$

Key methods: Column addition, partitioning

Collingwood Primary School Calculation Policy: Subtraction

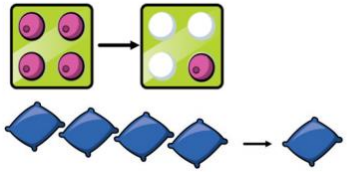
Key language: take away, less than, the difference, subtract, minus, fewer, decrease.

Stage 1

Children understand that subtraction is the concept of 'taking away' from one another. They will use the - and = sign precisely and understand that calculations can be written either sign of the equal sign e.g. 4-3 = 1, 1 = 4-3. Children will mainly use physical objects or counting back on a number line to solve a subtraction. They will also begin to use simple bar models.

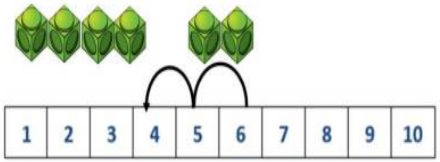
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).

4 – 3 = 1



Counting back (using number lines or number tracks) children start with 6 and count back 2.

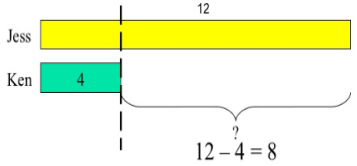
6 – 2 = 4

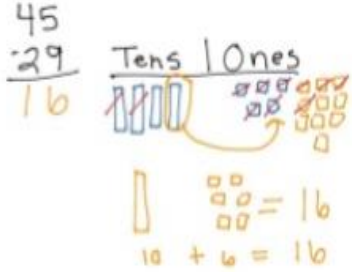


Stage 2

In this stage, children will develop an understanding that subtraction is finding the difference of two or more amounts. They will use dienes to physically take away amounts from both 1 and 2 digit numbers. When subtracting they will begin to exchange e.g. exchanging 1 ten for 10 ones.

Jess had 12 beads and Ken had 4.
How many more beads had Jess than Ken?





Children may draw base ten or PV counters

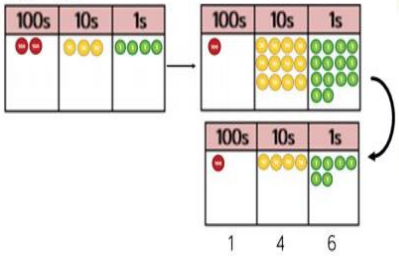
Children to show how they can make 10 by partitioning the subtrahend.

14 - 4 = 10
10 - 1 = 9

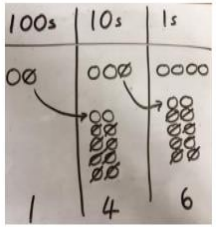
Stage 3

Children will progress from Dienes to place value counters, gaining a better understanding of number. Children will subtract 3 and 4 digit numbers (including exchanges). Continue with column subtraction as a formal method. They will be introduced to subtracting decimals in the context of money. Children will use bar models more confidently to aid solving subtraction problems.

Column method using place value counters.
234 – 88

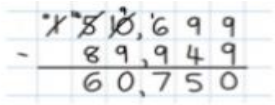


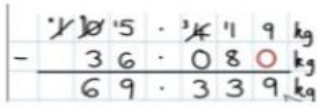
Represent the place value counters pictorially; remembering to show what has been exchang



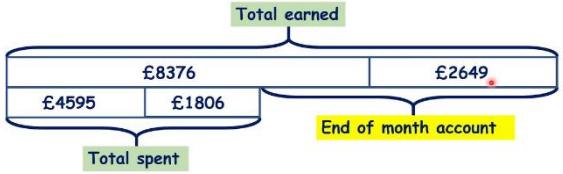
Stage 4

Children will have a far greater conceptual understanding and procedural fluency with formal methods. They will continue with column subtraction, subtracting numbers greater than 4 digit and decimal numbers with different numbers of place. Place value counters will still be used to develop understanding alongside their formal written method. Children will be challenged with multi-step problems and open investigations. Children will decide which method they are using and why. They will continue to subtract decimals in a range of contexts





Jocelyn has £8376 in her bank account. In the next month, she takes out £4595 for a new car and a further £1806. Her salary of £2649 is paid in. How much is in her account at the end of the month?



Key methods: Column subtraction, partitioning

Collingwood Primary School Calculation Policy: Multiplication

Key language: double, times, multiplied by, the product of, groups of, lots of, equal groups.

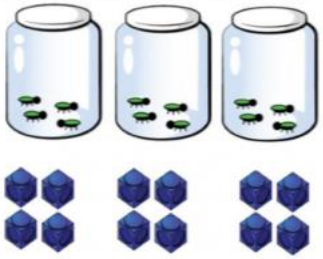
Stage 1

Children count in steps of 1,2,5,10 and 100s.
Children will see multiplication as repeated addition for the first time. They may use a number line to see this. They will begin to understand multiplication and use 'x' as groupings or lots of.

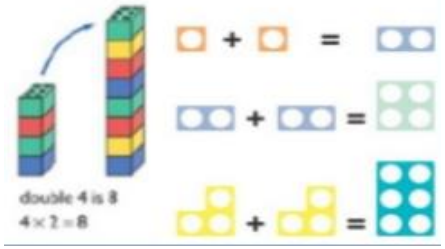
$3 \times 4 = 12$

$4 + 4 + 4 = 12$

There are 3 equal groups, with 4 in each group.

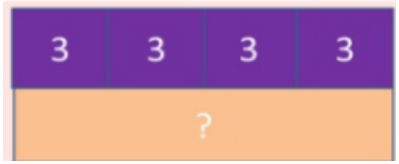


Use practical activities using manipulatives including cubes and Numicon to demonstrate doubling

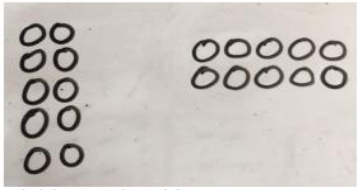


Stage 2

Children rapidly recall facts for the 2x,5x,10x. They will begin to count in steps of 3. Children will learn about commutative law. E.g. 2x5=10, 5x2=10. Recognise that doubling is the same as multiplying by 2. Counting in multiples using cubes, Numicon and other objects in the classroom.
Children begin to use simple bar models to represent multiplication as 'steps of'.



Children to represent the arrays pictorially.



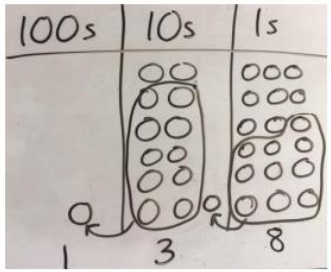
Children to be able to use an array to write a range of calculations e.g.

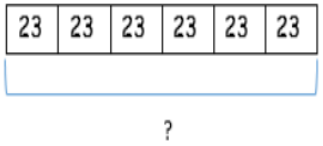
$10 = 2 \times 5$
$5 \times 2 = 10$
$2 + 2 + 2 + 2 + 2 = 10$
$10 = 5 + 5$

Stage 3

By the end of this stage, children recall all times tables.
Children will further their learning by multiplying 2 then 3-digit numbers by 1-digit numbers. Children will begin this stage by using place value counters through the 'grid method' and progress to a formal written method.

Formal column method with place value counters.
6 x 23
Children to represent the counters/base 10, pictorially e.g. the image below.





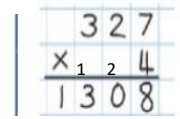
1

x	300	20	7
4	1200	80	28

2

327
x 4
28
80
1200
1308

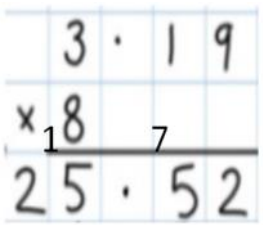
3



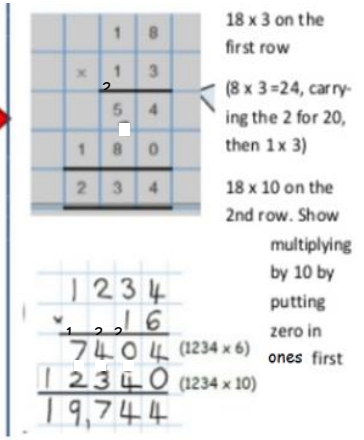
This will lead to a compact method.

Stage 4

Children consolidate and rapidly recall all times tables. They can now understand long multiplication when multiplying 2digit by 2digit. First demonstrate partition and grid method progressing to formal written methods. Continue to deepen understanding for up to 4d x 2d numbers and using decimals. These are to be used to solve multi-step problems in real life-contexts.



Continue to use bar modelling to support problem solving



18 x 3 on the first row

(8 x 3 =24, carrying the 2 for 20, then 1 x 3)

18 x 10 on the 2nd row. Show multiplying by 10 by putting zero in ones first

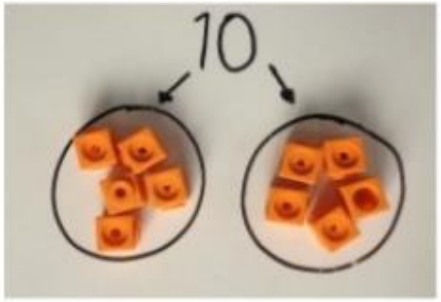
Key methods: Short multiplication, long multiplication

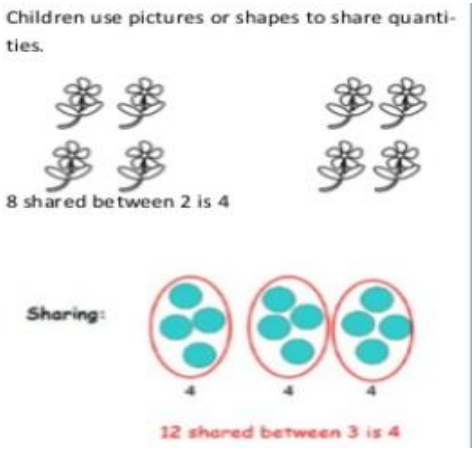
Collingwood Primary School Calculation Policy: Division

Key language: share, group, divide, divided by, half.

Stage 1

Children understand division as sharing objects into a group. They will begin to use the ÷ and = signs.

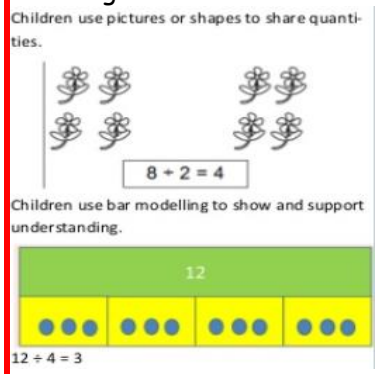


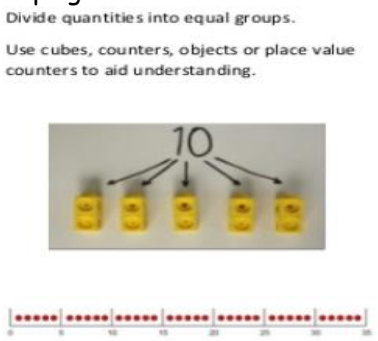


Stage 2

Division becomes grouping and sharing.

Sharing: Grouping:

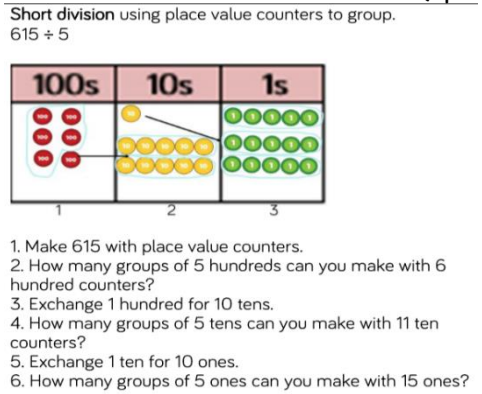


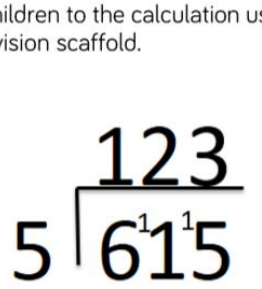


Children will be able to see division number statements from arrays. They will understand division as the inverse of multiplication. 5x2=10, 10÷2=5

Stage 3

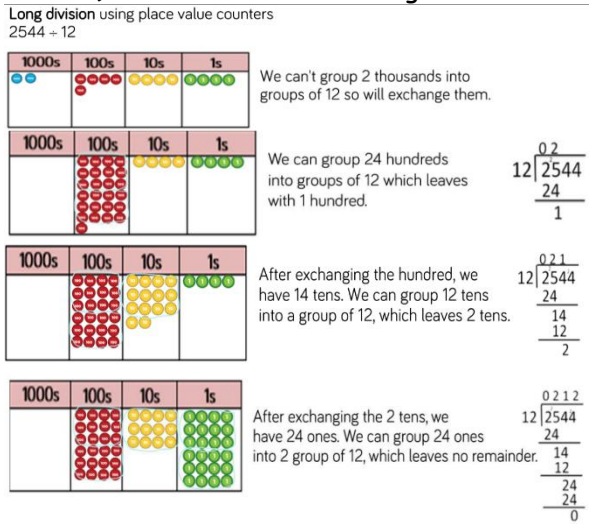
Division with a remainder initially pictorially with lollipop sticks moving to abstract. Children will 2d divided by 1d using place value counters progressing to more formal methods of short division (up to 3 digits by 1 digit- concrete and pictorial).

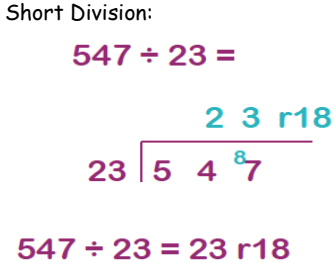




Stage 4

Short division (up to 4 digits by a 1-digit number including remainders) progressing to long division with place value counters (up to 4 digits by a 2-digit number). Children should exchange into the tenths and hundredths column too.





Key methods: sharing, grouping, long division, short division

Collingwood Primary School Calculation Policy: Foundation Stage

Key language: one more, one less, altogether, taking away, doubling, sharing

Addition

Children will engage in a wide variety of songs and rhymes, games, and activities. They will begin to relate addition to combining two groups of objects, first by counting all and then by counting on from the largest number. They begin to understand that a group of things changes in quantity when something is added.

They will find one more than a given number.

In practical activities and through discussion they will begin to use the vocabulary involved in addition.

'You have five apples and I have three apples. How many apples altogether?'

Subtraction

Children begin to understand that a group of things changes in quantity when something is taken away.

Children will engage in a variety of counting songs and rhymes and practical activities.

In practical activities and through discussion they will begin to use the vocabulary associated with subtraction.

They will find one less than a given number.

They will begin to relate subtraction to 'taking away' using objects to count 'how many are left' after some have been taken away.

6 – 2 = 4

'Take two apples away. How many are left?'

Children will begin to count back from a given number.

Multiplication

Children will engage in a wide variety of songs and rhymes, games and activities.

Inpracticalactivitiesandthroughdiscussiontheywillbegintosolveproblemsinvolvingdoubling.

'Three apples for you and three apples for me. How many apples altogether?'

Division

Children will engage in a wide variety of songs and rhymes, games and activities.

In practical activities and through discussion they will begin to solve problems involving halving and sharing.

Share the apples between two people.

'Half of the apples for you and half of the apples for me.'

Collingwood Primary School Calculation Policy: Bar Modelling