Langley Mill C of E (Controlled) Infant School and Nursery

Calculations Policy

This policy has been impact assessed in the light of all other school policies including the Equality Policy.

Written / Reviewed by	Date	Approved by GB	Minute Number	Next Review Date
C. Jones in consultation with J. Evans, L. Perrett and L. Thorpe (Cluster Schools)	July 2014	17/3/15	GB/2015/17	July 2016
Reviewed by C. Jones after working with J. Evans	July 2016			July 2018

Policy Statement:

The following calculation policy has been devised to meet the requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school and with their transition to KS2. Please note that early learning in number and calculation in Reception follows the Development Matters EYFS document, and this calculation policy is designed to build progressively from the content and methods established in the Early Years Foundation Stage.

Age / stage expectations:
The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught according to the stage that they are currently working at,** being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on. Year 3 expectations have been included to ease transition to Junior schools.

Key Skills and vocabulary:

<u>Year 1 Key skills and vocabulary:</u>
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line
Key skills for addition at Y1:

- Read and write numbers to 100 in numerals, incl. 1—20 in words
- Recall bonds to 10 and 20, and addition facts within 20
- Count to and across 100
- Count in multiples of 1 2, 5 and 10
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

<u>Year 2 Key skills and vocabulary:</u>
Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary
Key skills for addition at Y2:

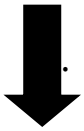
- Add a 2-digit number and ones (e.g. 27 + 6)
- Add a 2-digit number and tens (e.g. 23 + 40)
- Add pairs of 2-digit numbers (e.g. 35 + 47)
- Add three single-digit numbers (e.g. 5 + 9 + 7)
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 (30 + 70 etc.)
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using ‹ › and = signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.

Providing a context for calculation:
It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Choosing a calculation method:
Children need to be taught and encouraged to use the following process in deciding what approach they will need to take to a calculation, to ensure they select the most appropriate method for the numbers involved:

Can I do it in my head using a mental strategy?

Could I use some jottings to help me?



Should I use a written method to work it out?

Addition +

Year 1

End of year objective: ***Add one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).***

+ = signs and missing numbers:
Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

2 = 1+ 1
2 + 3 = 4 + 1
3 = 3
2 + 2 + 2 = 4 + 2

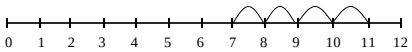
Missing numbers need to be placed in all possible places. We ensure the children get use to seeing different shaped boxes to display where numbers are placed.

3 + 4 = □	□ = 3 + 4
3 + □ = 7	7 = □ + 4
□ + 4 = 7	7 = 3 + □
□ + ∇ = 7	7 = □ + ∇

Resources:
Children should have access to a wide range of counting equipment, everyday objects, as well as number tracks and numbered number lines, 100 squares, Numicon, Dienes rods and Base 10.

Number lines:
Children will become familiar with drawing jumps on numbered number lines to support understanding of the mental method and creating their own jumps using rulers, fingers, pens, bodies etc.

7 + 4



Recording numbers sentences:
Children shall be taught that with small numbers all numbers sentences shall be recorded as:

7 + 4 = 11

Year 2

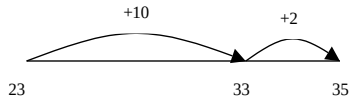
End of year objective: ***Add numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers; three one-digit numbers.***

+ = signs and missing numbers:
Children will continue using a range of equations as in Year 1 but with appropriate, larger numbers.
We will extend this to 14 + 5 = 10 + □ and 32 + □ + □ = 100 35 = 1 + □ + 5

Partition into tens and ones and recombine:
12 + 23 = 35 12 + 23

10 + 20 = 30 or ↓
2 + 3 =5 30 + 5 = 35
30 + 5 = 35

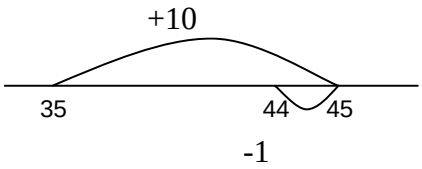
Count on in tens and ones:
23 + 12 = 23 + 10 + 2
= 33 + 2
= 35



More able children will use number line method and middle ability children or less by using a hundred square.

Partitioning and bridging through 10:
It has been jointly agreed by all cluster schools that this is very confusing for the children and will not be taught.
We will add 9 or 11 by adding 10 and adjusting by 1 e.g. Add 9 by adding 10 and adjusting by 1.
A hundred square will be used to add 10 and moving back or forward 1.

More able will use a number line
35 + 9 = 44



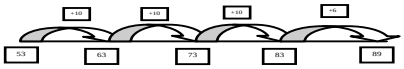
Exchange:
When the units total more than 10, children should be encouraged to exchange 10 units/ones for 1 ten. This is the start of children understanding 'carrying' in vertical addition. For example, when calculating 35 + 27, they can represent the amounts by making another ten
5 + 7 = 12
30 + 20 = 50
50 + 12 = 62

Year 3

End of Year Objective: ***Add numbers with up to three digits, using formal written method of columnar addition.***

+ = signs and missing numbers:
Children will continue to use a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

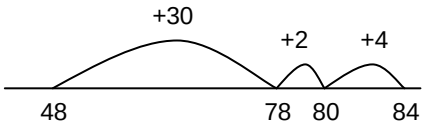
Partition into tens and ones:
Children will partition both numbers and recombine, as in Year 2
Children will count on by partitioning the second number only e.g.
36 + 53 = 53 + 30 + 6
= 83 + 6
= 89



Add a near multiple of 10 to a two-digit number:

Children will be given opportunities to secure mental methods by using a number line to model the method. Children will continue as in Year 2 but with appropriate numbers
e.g. 35 + 19 is the same as 35 + 20 – 1.

Children need to be secure adding multiples of 10 to any two-digit number including those that are not multiples of 10.
48 + 36 = 84



Pencil and paper procedures:

More able year 2 children will also use a number line

Vertical expansion:

```
  53
+ 42
   5
  90
  95
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Subtraction -

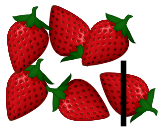
Year 1

End of year objective: ***Subtract one-digit and two-digit numbers to 20, including zero (using concrete objects and pictorial representations).***

- = signs and missing numbers

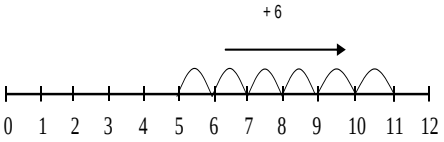
7 - 3 = □	□ = 7 - 3
7 - □ = 4	4 = □ - 3
□ - 3 = 4	4 = 7 - □
□ - ∇ = 4	4 = □ - ∇

Children will be able to understand subtraction as 'take away'



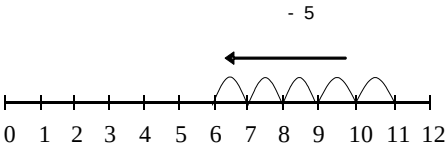
Children will find a 'difference' by counting up;

I have saved 5p. The socks that I want to buy cost 11p. How much more do I need in order to buy the socks?



Children will use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number.

I have 11 toy cars. There are 5 cars too many to fit in the garage. How many cars fit in the garage?

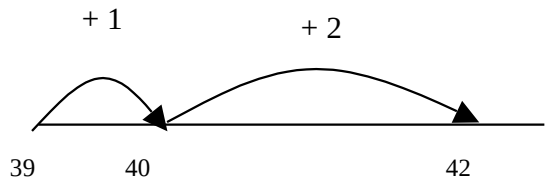


Year 2

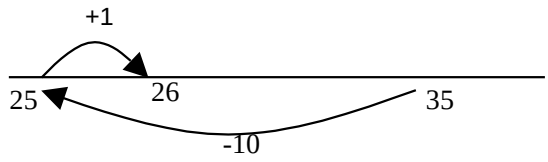
End of year objective: ***Subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones; a two-digit number and tens; two two-digit numbers.***

- = signs and missing numbers:
This will extend to 14 + 5 = 20 - □

Find a small and large difference by counting up:
42 – 39 = 3



Subtract 9 or 11:
Children will begin to add/subtract 19 or 21 using a hundred square or number line to add 10 and then adjust.
35 – 9 = 26



Use known number facts and place value to subtract: (partition second number only)
37 – 12 = 37 – 10 – 2
= 27 – 2
= 25

-2 -10

Resources:
Children will use practical equipment to partition in preparation for exchange.

Year 3

End of year objective: ***Subtract numbers with up to three digits, using formal written method of columnar subtraction.***

- = signs and missing numbers:
Children will continue using a range of equations as in Year 1 and 2 but with appropriate numbers.

Find a small and large difference by counting up:
Children will continue as in Year 2 but with appropriate numbers e.g. 102 – 97 = 5

Subtract mentally a 'near multiple of 10' to or from a two-digit number:
Children will use a hundred square to help.
Children will continue as in Year 2 but with appropriate numbers e.g. 78 – 49 is the same as 78 – 50 + 1

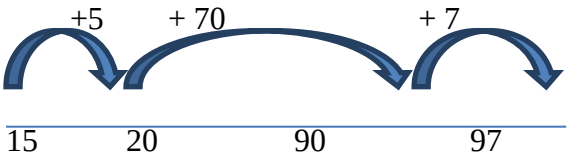
Use known number facts and place value to subtract
Children will continue as in Year 2 but with appropriate numbers e.g.

97 – 15 = 82

Number lines:

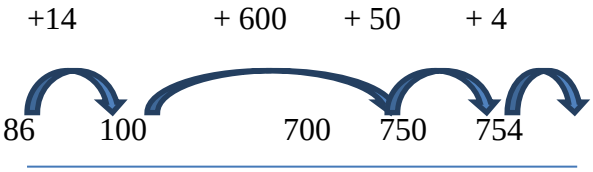
When using number lines we always talk about counting on to find the difference.

97 – 15 = 82



We always count on to the next multiple of ten, then count on in tens, then count the additional units.

754 – 86 = 668



Children will then move onto the decomposition method.

658 – 345

	H	T	U
	6	5	8
-	3	4	5
	3	1	3

754 – 286

	H	T	U
	7	5	4
-	2	8	6
	4	6	8

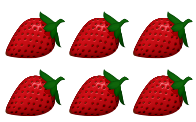
We talk about stealing a ten and giving it to the units because 50 and 4 is the same as 40 and 14, so we haven't changed the number 754.

Multiplication x

Year 1

End of Year Objective: ***Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.***

Multiplication is related to doubling and counting groups of the same size:



Looking at columns
2 + 2 + 2
3 groups of 2

Looking at rows
3 + 3
2 groups of 3

Counting using a variety of practical resources:

Counting in 2s e.g. counting socks, shoes, animal's legs…
Counting in 5s e.g. counting fingers, fingers in gloves, toes…
Counting in 10s e.g. fingers, toes…

Pictures / marks:

There are 3 sweets in one bag.
How many sweets are there in 5 bags?

Year 2

End of Year Objective: ***Calculate mathematical statements for multiplication (using repeated addition) and write them using the multiplication (x) and equals (=) signs.***

x = signs and missing numbers:

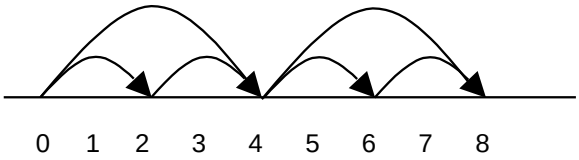
7 x 2 = □	□ = 2 x 7
7 x □ = 14	14 = □ x 7
□ x 2 = 14	14 = 2 x □
□ x ∇ = 14	14 = □ x ∇

Arrays and repeated addition:

● ● ● ● 4 x 2 or 4 + 4
● ● ● ●

2 x 4 or 2 + 2 + 2 + 2

4 x 2 is written when using multiplied
2 x 4 when saying lots of or groups of



Partition:
Children need to be secure with partitioning numbers into 10s and 1s and partitioning in different ways: 6 = 5 + 1 so e.g. Double 6 is the same as double five add double one.

Double 15

10 + 5

20 + 10 = 30

Year 3

End of Year Objective: ***Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, progressing to formal written methods.***

x = signs and missing numbers:
Children will continue using a range of equations as in Year 2 but with appropriate numbers.

Arrays and repeated addition:
Children will continue to understand multiplication as repeated addition and continue to use arrays (as in Year 2).

Partition to double larger 2 digit numbers:

35 x 2 = 70 or double 35

30 + 5 = 35
60 + 10 = 70

Children will use known facts and place value to carry out simple multiplications

Use the same method as above (partitioning), e.g.

32 x 3 = 96
30 x 3 = 90
2 x 3 = 6
90 + 6 = 96

Division ÷

Year 1

End of Year Objective: ***Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.***

Sharing:

Children will requires secure counting skills
Children will develop the importance of one-to-one correspondence

Sharing – 6 sweets are shared between 2 people. How many do they have each?

Children will have opportunities for practical activities involving sharing, distributing cards when playing a game, putting objects onto plates, into cups, hoops etc.

Grouping:

Children will sort objects into 2s / 3s/ 4s etc
How many pairs of socks are there?

There are 12 crocus bulbs. Plant 3 in each pot. How many pots are there?
Jo has 12 Lego wheels. How many cars can she make?

Introduce actions for sharing and grouping:
Children will have opportunities for sharing e.g. giving out 1 at a time
Children will have opportunities for grouping e.g. taking groups of each number

Year 2

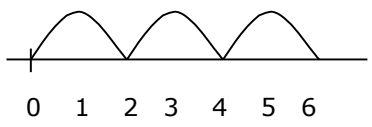
End of Year Objective: ***Calculate mathematical statements for division within the multiplication tables and write them using the division (÷) and equals (=) signs.***

÷ = signs and missing numbers:

6 ÷ 2 = □	□ = 6 ÷ 2
6 ÷ □ = 3	3 = 6 ÷ □
□ ÷ 2 = 3	3 = □ ÷ 2
□ ÷ ∇ = 3	3 = □ ÷ ∇

Grouping and sharing:
Children will count up to 100 objects by grouping them and counting in tens, fives or twos.
Children will find one half, one quarter and three quarters of shapes and sets of objects
6 ÷ 2 can be modelled as:
There are 6 strawberries.
How many people can have 2 each?
Share 6 strawberries between 2 people. How many each?

6 ÷ 2 can be modelled as:



Practical grouping e.g. in PE:
12 children get into teams of 4 to play a game. How many teams are there?
12 children share themselves into 4 teams. How many children in each team?

Recording:
To start to use ÷ = and r (for remainder)

Year 3

End of Year Objective: ***Write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers divided by one-digit numbers, progressing to formal written methods.***

Sharing and grouping:
We teach the children to understand division as sharing and grouping. We start by using practical equipment and drawing pictures.

If 6 sweets are shared between 3 children how many will they each get?

1 2 3

This extends onto a number line.

6 ÷ 3 =

2 groups

0 1 2 3 4 5 6

How many 3's make 18?

0 3 6 9 12 15 18 There are 6 3's in 18

Remainders

16 ÷ 3 = 5r1

0 3 6 9 12 15 16

Grouping with remainders:

Initially, children will continue to use division by grouping (including those with remainders), where appropriate linked to the multiplication tables that they know (2, 3, 4, 5, 8 and 10), e.g.

43 ÷ 8 =

43 ÷ 8 = 5 remainder 3