KS1 Calculation Policy

At Kilburn Infant and Nursery School we strive to enable children to become confident in their understanding of Mathematics and to enjoy it. Methods of teaching and recording Mathematics have changed so much during the last 20 years and through this policy we hope to provide clarity on how we believe children will best understand the process of calculation in addition, subtraction, multiplication and division.

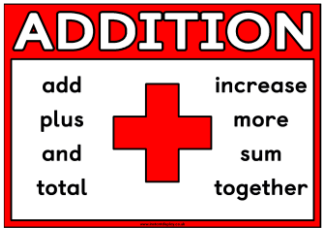
The vision of the policy is to ensure that there is a consistent approach to calculation across the year groups where the calculations being taught are built upon and developed year on year. We aim to ensure fluent understanding in each of the four calculation areas but also, just as importantly, the 'reasoning' and 'greater depth' understanding of the concepts we are teaching through a range of 'prove it, show me, convince me', problem solving and true or false type questions. This, therefore, enables our pupils to confidently use both written and mental calculation strategies in a range of contexts and ensure they leave Kilburn Infant and Nursery School with a secure understanding of the four operations.

The following calculation policy has been devised to meet 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. The policy also recognises the importance of not moving children onto the next stage of calculation until they are ready and confident to do so. Thus, ensuring they have a secure foundation of knowledge and skills which they can apply in a range of contexts.

Please note that early learning in number and calculation in Nursery and Reception follows the Development Matters EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

Addition

Vocabulary:



Mental skills:

Recognise the size, position and value of numbers
Count on in ones and tens
Know number bonds to 10 and 20
Use subitising skills for bigger numbers
Add multiples of 10 to any number
Add near multiples of 10 (with adjusting)
Partition and recombine numbers
Bridge through 10

Support Apparatus ideas

Place value equipment e.g.
Dienes blocks
Cuisenaire rods
Arrow cards
Number tracks
Number lines
Hundred squares
Counting stick
Bead strings
IWB images
Numeracy Strategy
Espresso
Interactive ICT games
Tablets
Numicon
Ten frames

Year 1

+ = signs and missing numbers

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

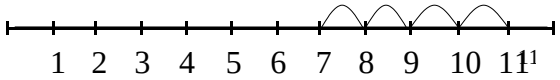
Promoting covering up of operations and numbers.

Number lines (numbered)

Using numbered number lines initially.

(Teacher model number lines and give children plenty of practise on their own lines)

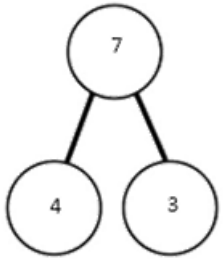
7 + 4 = 11



Number bonds to 10/20/100

5 + 5 = 10 15 + 5 = 20 70 + 30 = 100
6 + 4 = 10 16 + 4 = 20 90 + 10 = 100

Part-part-whole models



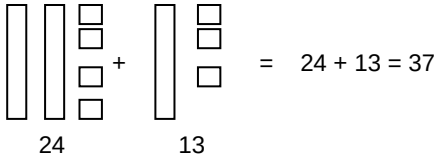
4 is a part
3 is a part
The whole is 7

Year 2

+ = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate, larger numbers.
Extend to
14 + 5 = 10 + □
and adding three numbers
32 + □ + □ = 100 35 = 1 + □ + 5

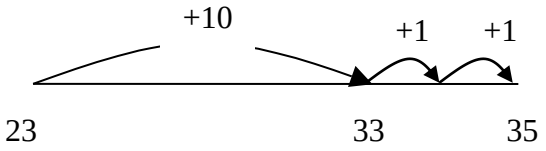
Visual representation of 10s and ones to support addition



Extend this to add 10s and units over the 10

Refine to partitioning the second number only:

23 + 12 = 23 + 10 +1 + 1
= 33 + 1 + 1
= 35



Partition into tens and ones and recombine

12 + 23
10 + 20 = 30
2 + 3 = 5
30 + 5 = 35

Addition problems

I have a 20p, a 20p, a 5p and a 1p, how much money have I got altogether?
At a rugby match one team scores 23 points and the other scores 15 points, how many points were scored altogether?

Mental method

Add 9 or 11 by adding 10 and adjusting by 1

35 + 9 = 44

Year 2 Greater Depth

+ = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate, larger numbers.

Reasoning & number problems

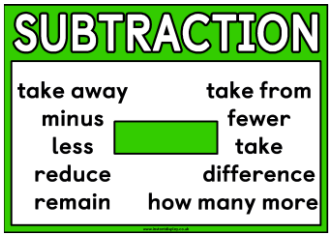
Use reasoning about numbers and relationships to solve more complex problems and explain their thinking e.g.

29 + 17 = 15 + 4 + □

Together Jack and Sam have £14. Jack has £2 more than Sam. How much money does Sam have?'

Subtraction

Vocabulary:



Mental skills:

Recognise the size, position and value of numbers
Count back in ones and tens
Know number facts for all numbers to 20
Subtract multiples of 10 from any number
Partition and recombine numbers (only partition the number to be subtracted
Bridge through 10

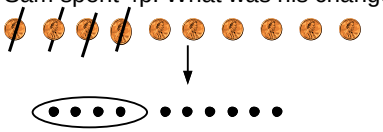
Support Apparatus Ideas:

Place value equipment e.g.
Dienes blocks
Cuisenaire rods
Arrow cards
Number tracks and number lines
Hundred squares
Counting stick
Bead strings
IWB images
Numeracy Strategy
Espresso
Interactive ICT games
Tablets
Numicon
Ten frames

Year 1

Pictures / marks

Sam spent 4p. What was his change from 10p?

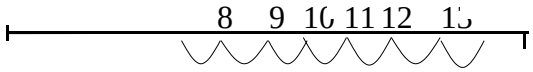


- = signs and missing numbers

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

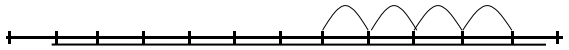
Visual / practical activities

Number lines



The difference between 7 and 11
(Counting on)
To reinforce concept.

Practical strategies essential to see 'difference'.



Recording by - drawing jumps on prepared lines
- constructing own lines

(Teachers model jottings appropriate for larger numbers)

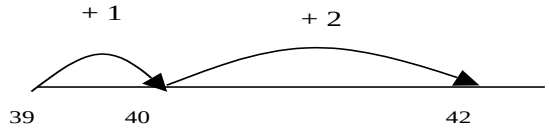
Number bonds to 10/20 (subtraction facts)

10 – 7 = 3 20 – 15 = 5
10 – 3 = 7 20 – 5 = 15

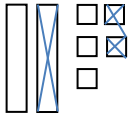
Year 2

- = signs and missing numbers

Continue using a range of equations as in Year 1 but with appropriate numbers.
Extend to 14 + 5 = 20 - □
Find a small difference by counting up
42 – 39 = 3



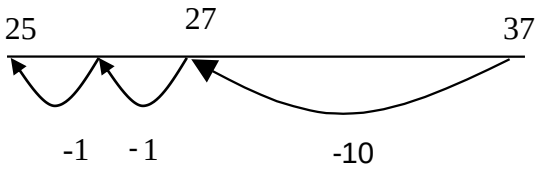
Visual representation of 10s and ones to support subtraction (including subtractions over the ten e.g. 32-16=)



25 – 12 = 13

Use known number facts and place value to subtract (partition second number only)

37 – 12 = 37 – 10 – 2
= 27 – 2
= 25

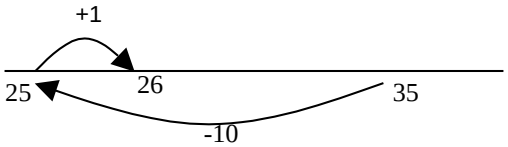


Subtraction problems

I have 50p and I spend 8p, how much have I got left?
A bus holds 78 people, if there are 43 people already on the bus, how many spaces are left?

Mental Method

Subtract 9 or 11. Begin to add/subtract 19 or 21
35 – 9 = 26



Year 2 Greater Depth

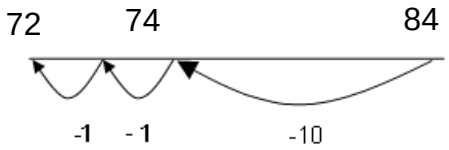
Find a small difference by counting up

Continue as in Year 2 but with appropriate, larger numbers e.g. 92 – 87 = 5

Use known number facts and place value to subtract

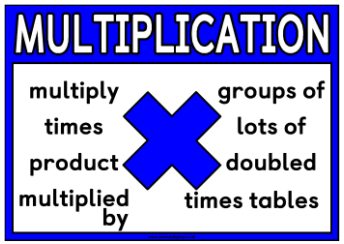
Continue as in Year 2 but with appropriate, larger numbers.

84 – 12 = 84 – 10 – 2
= 74 – 2
= 72



Multiplication

Vocabulary:



Mental skills:

Recognise the size and position of numbers
Count on in different steps 2s, 5s, 10s
Double numbers up to 10
Recognise multiplication as repeated 'lots of'
Quick recall of multiplication facts
Use known facts to derive associated facts
Understand the effect of multiplying by 10, 100 and 1000
Multiplying by multiples of 10

Support Apparatus Ideas:

Models, images and equipment
Place value equipment e.g.
Dienes blocks
Cuisenaire rods
Arrays
Number tracks and number lines
Hundred squares
Counting stick
Counting apparatus
IWB images and models
Numeracy Strategy
Espresso
Interactive ICT games
Tablets

Year 1

Counting in steps

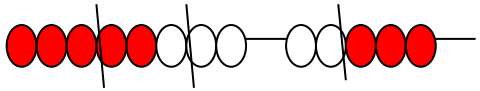
Count in steps of 2,5 and 10

Pictures and symbols

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

(Recording on a number line modelled by the teacher when solving problems)

Use of bead strings to model groups of.



Year 2

x = signs and missing numbers

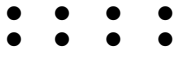
7 x 2 = □ □ = 2 x 7
7 x □ = 14 14 = □ x 7
□ x 2 = 14 14 = 2 x □
□ x ∇ = 14 14 = □ x ∇

Inverse of division

2 x 3 = 6 6 ÷ 2 = 3
3 x 2 = 6 6 ÷ 3 = 3

Arrays and repeated addition

Show and use lots of arrays- practical activities.

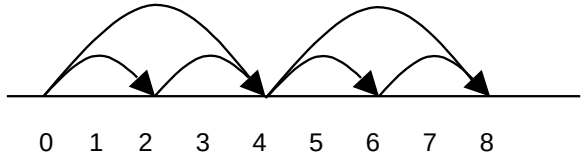


4 x 2 or 4 + 4

2 x 4

or repeated addition

2 + 2 + 2 + 2



Using fingers to count up in multiples of 2, 5, 10 to work out an answer.

3 x 2 =6

4 6

2

Hold up 3 fingers.
Count up in 2's
3 times etc.

Multiplication problems

I have six 5p's in my purse, how much money have I got?
There are 8 pairs of socks. How many socks are there?

Multiplication table

Show how to use a multiplication table

x	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
5	0	5	10	15	20	25	30	35	40	45	50
10	0	10	20	30	40	50	60	70	80	90	100

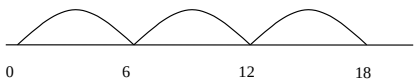
Year 2 Greater Depth

x = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate larger, numbers.

Number lines

6 x 3



Times tables

Quick recall of 2's, 5's and 10's times tables

Multi-step word problems

Solve unfamiliar word problems that involve more than one step (e.g. 'which has the most biscuits, 4 packets of biscuits with 5 in each packet or 3 packets of biscuits with 10 in each packet?').

Division

Year 1

Pictures / marks

12 children get into teams of 4 to play a game. How many teams are there?

Make sure problems given/discussed are always in context-real life situations.

Year 2

÷ = signs and missing numbers

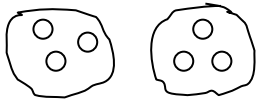
6 ÷ 2 = □ □ = 6 ÷ 2
6 ÷ □ = 3 3 = 6 ÷ □
□ ÷ 2 = 3 3 = □ ÷ 2
□ ÷ ∇ = 3 3 = □ ÷ ∇

Inverse of multiplication

6 ÷ 2 = 3 2 x 3 = 6
6 ÷ 3 = 3 3 x 2 = 6

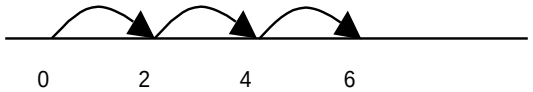
Understand division as sharing and grouping

Sharing – 6 sweets are shared between 2 people. How many do they have each
6 ÷ 2 can be modelled as:
Draw 2 circles and share out 6



Grouping – There are 6 sweets. How many people can have 2 each?
6 ÷ 2 can be modelled as:
Draw 6 dots (to represent sweets) and group into 2's

Then ask how many 2's make 6?)



Division problems: sharing and grouping

There are 18 petals on three flowers, how many petals are on each flower?
There are 15 children. How many children can sit around 5 tables?

Year 2 Greater Depth

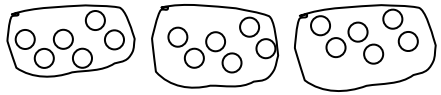
÷ = signs and missing numbers

Continue using a range of equations as in Year 2 but with appropriate larger, numbers.

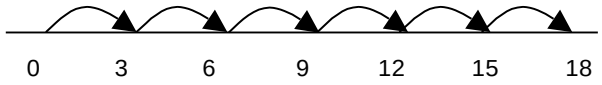
Understand division as sharing and grouping

18 ÷ 3 can be modelled as:

Sharing – 18 shared between 3



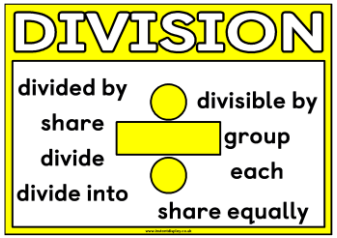
Grouping - How many 3's make 18?



Recall known facts

Recall and use known multiplication and division facts for 2, 5 and 10, and make deductions outside known multiplication facts.

Vocabulary:



Mental skills:

Recognize the size and position of numbers
Count on in different steps 2s, 5s, 10s
Halve numbers up to 20
Recognise division as repeated addition
Quick recall of division facts
Use known facts to derive associated facts
Divide by 10, 100 and 1000, understanding the effect
Divide by multiples of 10

Support Apparatus Ideas:

Place value equipment e.g.
Dienes blocks
Cuisenaire rods
Arrays
Number tracks and number lines
Hundred squares
Counting stick
Counting apparatus
IWB images and models
Numeracy Strategy
Espresso
Interactive ICT games
Tablets