Lee Brigg Infant and Nursery School

Maths Calculation Policy

Rationale

This policy sets out the key calculation methods that will be taught in mathematics at Lee Brigg Infant and Nursery School. This policy has been created to meet the expectations of the National Curriculum and Early Years Learning and Development Requirements, but most importantly the learning needs of our children. The methods chosen match the National Curriculum but have also been specifically selected after consideration of our children's learning styles and in consultation with the feeder Junior School.

By adopting a common calculation policy children will be taught in a consistent, progressive and continuous way. Children's understanding of the subject will develop as they move through the school and teaching time will be spent promoting effective and efficient methods of calculation.

Our curriculum for mathematics aims to ensure that all pupils:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Key Elements

Age Expectations:

This policy has been organised by year group, considering the National Curriculum expectations. The Curriculum focuses on skills and mastery and is **not** about moving children on to the next method as soon as they can do the one before. Children will work with more complex and richer problems which will support their 'mastering' of maths. Our approach to the curriculum in mathematics is based upon a language rich, active learning experience. We believe that children learn best if they are exposed to new concepts with hands on practise and immersion in new technical vocabulary. Our children are taught mathematical knowledge through the support of **concrete** resources and **pictorial** representations, before moving on to a more **abstract** approach. We ensure that they have a firm grasp of the four key calculations, (addition, subtraction, division and multiplication), so that by year 2 children are confident with abstract learning and problem solving.

Teaching of Mathematics:

Children are introduced to the processes of calculation through **concrete, pictorial** and **mental** activities. As teachers model efficient strategies, children will begin to understand the underlying ideas and develop ways of recording to support their thinking and calculation methods. Over time children learn how to **use models and images,** such as empty number lines, to **support their mental and informal written methods of calculation**. As children's mental methods are strengthened and refined, so too will their informal written methods. These methods will become more efficient and succinct and lead to efficient written methods that can be used more generally. It is important that any type of calculation is given a real life context or a 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 will be a priority within the teaching of calculations.

Children will be continually reminded of the wide variety of mathematical language that relate to each topic. **Maths vocabulary** will be clearly displayed in every classroom and referred to frequently.

Children will be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved.
They will do this by asking themselves:
Can I do this in my head?
Can I do this in my head using drawings or jottings?
Do I need to use a pencil and paper procedure?
Do I need to use apparatus?

Discussion will also play a key part in mathematics sessions. Children will be encouraged to talk about the processes they have used to reach their answers. They will be encouraged to show their working out and will be taught how to record their work methodically and systematically.

Where possible mathematics will be used in other Curriculum areas to enrich the Curriculum provision and develop cross-curricular links.

Developing Understanding of Addition		
EYFS	**YEAR 1**	**YEAR 2**
Number Have a deep understanding of number to 10, including the composition of each number; - Subitise (recognise quantities without counting) up to 5; Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Verbally count beyond 20, recognising the pattern of the counting system; Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	Read, write and interpret mathematical statements involving **addition (+)**, subtraction (-) and equals (=) signs. Represent and use **number bonds** and related subtraction facts within 20. **Add** and subtract **one-digit and two-digit numbers to 20**, including zero Solve **one-step problems that involve addition** and subtraction, using concrete objects and pictorial representations, and missing number problems.	Solve problems with **addition** and subtraction: - using concrete objects and pictorial representations (numbers, quantities and measures) - applying their increasing knowledge of **mental and written methods** Recall and use **addition** and subtraction **facts to 20 fluently**, and derive and use related **facts up to 100** **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** **- adding three one-digit numbers** Show that **addition of two numbers can be done in any order (commutative)** and subtraction of one number from another cannot. Recognise and use the **inverse relationship between addition and subtraction** and use this to **check calculations** and **solve** missing number problems
Children will: - Sing and respond to nursery rhymes and counting songs – counting on and back - Through play and using visual prompts around the classroom children will become confident in counting forwards and backwards - Take part in practical activities discussing and using objects and modelling with a variety of counting objects.	Children will: - Know by heart number bonds to 10 - Know how to work systematically and spot patterns to derive number bonds to 20 - Know how to work systematically and spot patterns to derive number bonds for any number within 20	Children will: - Know by heart number bonds to and within 5, 10, 20 and 100. - Recall number facts e.g. If we know 4 + 5 = 9 We also know: **5 + 4 = 9** **14 + 5 = 19** **5 + 14 = 19 etc**

- Use one to one correspondence using moveable objects e.g.
Real life apparatus (money)
Objects
Multilink

- Count sets of objects in play and learn to recognise them

-Practise writing numbers to 10. Teachers will emphasise the order in which a number is written (tens then ones)

-Begin to add using fingers, numicon and objects

- Begin to add using objects by counting on in ones.

- *Begin to use number lines (with the numbers on) to add by counting in ones. Starting with the greatest number and counting on the smaller number **(Only those groups of children who are fluent with addition using objects or numicon)***

-Begin to record additions using the written method to 10

-Know by heart number bonds to 5
-Subitise to 5

- Use a variety of practical apparatus to represent a calculation: **fingers, numicon, real life apparatus, objects, dienes, multilink**

$?+6=10$
$10-?=6$ $2+8$ $4+6$

- Use mental methods to work out an addition

- Know to start with the biggest value in their head and count on when adding

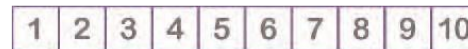- Recall number facts e.g. If we know $4 + 5 = 9$
We also know:
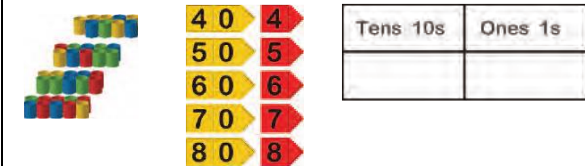**$5 + 4 = 9$**
$14 + 5 = 19$
$5 + 14 = 19$ etc

- Use number lines and number tracks (with the numbers on) to add by counting in ones. Starting with the greatest number and counting on the smaller number (counting more)
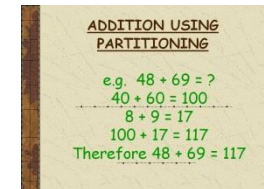
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

- Use mental methods to work out a calculation

- Use the partitioning method to add tens and ones:

- Grouping into tens and ones

40 4
50 5
60 6
70 7
80 8

Tens 10s	Ones 1s

- Written method

ADDITION USING PARTITIONING

e.g. $48 + 69 = ?$
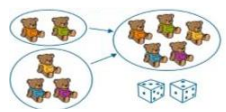$40 + 60 = 100$
$8 + 9 = 17$
$100 + 17 = 117$
Therefore $48 + 69 = 117$

- Use expanded addition (column addition). This method is to be used **once children are secure** with previous written method and place value

38
+ 26
64
1

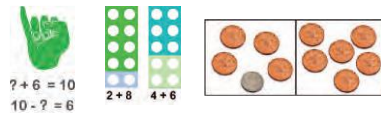| Developing Understanding of Subtraction		
EYFS	**YEAR 1**	**YEAR 2**
Number Have a deep understanding of number to 10, including the composition of each number; - Subitise (recognise quantities without counting) up to 5; Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Verbally count beyond 20, recognising the pattern of the counting system; Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	Read, write and interpret mathematical statements involving addition (+), **subtraction (-)** and equals (=) signs. Represent and use number bonds and **related subtraction facts** within 20. Add and **subtract one-digit and two-digit numbers to 20**, including zero Solve **one-step problems that involve** addition and **subtraction**, using concrete objects and pictorial representations, and missing number problems.	Solve problems with addition and **subtraction**: - using concrete objects and pictorial representations (numbers, quantities and measures) - applying their increasing knowledge of **mental and written methods** Recall and use addition and **subtraction facts to 20 fluently**, and derive and use related **facts up to 100** 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** **- adding three one-digit numbers** Show that addition of two numbers can be done in any order (commutative) and **subtraction of one number from another cannot.** Recognise and use the **inverse relationship between addition and subtraction** and use this to **check calculations** and **solve** missing number problems
Children will: - Sing and respond to nursery rhymes and counting songs that count back - Through play, objects, fingers and visual prompts around the classroom children will become confident in counting backwards	Children will: - Know by heart number facts to 20 - Use a variety of practical apparatus to represent a calculation as 'taking away' and as 'finding the difference': **fingers, numicon, real life apparatus, objects, dienes, multilink**	Children will: - Know by heart number facts to 20 -Use number facts to 20 to derive number facts to 100 - Use mental methods to work out a subtraction

- Respond to questions such as 'How many left?' and practise removing **objects** from a group

-Begin to understand subtractions by counting back on a number line (***Only those groups of children who are fluent with subtraction using objects)***

-Begin to record subtractions using the written method to 10 (as a group / class first)

-Know number bonds to 5 – including subtraction facts

$? + 6 = 10$
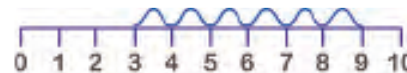$10 - ? = 6$

$2 + 8$ $4 + 6$

- Use mental methods to work out a subtraction

- Know to start with the biggest value in their head and count back when subtracting

- Use number lines and number tracks (with the numbers on) to subtract by counting back in ones. Starting with the greatest number and counting back the smaller number.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

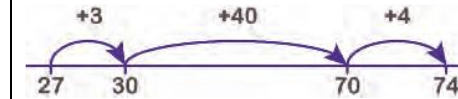0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

- Explore counting back to the second number to find the 'difference between' – emphasise the need to keep track of the number of jumps from 9 to 6, i.e 8, 7, 6 = 3 jumps so $9 – 6 = 3$

0 1 2 3 4 5 6 7 8 9 10

Subtraction on a number line:
74 – 27=

+3   +40   +4

27 30   70 74

- Put the smallest value at the beginning of the number line (underneath)
- Put the largest value at the end of the number line (underneath)
- Jump in ones until you reach a number in the 10x table
- Jump in tens and ones until you reach the target number
- Finally add up the jumps to find the answer

- Count up to find the difference, 'Mollie has 20p, she spends 11p, what will her change be?' Model counting up from 11p to 20p to find the difference

0 1 2 3 4 5 6 7 8 9 10

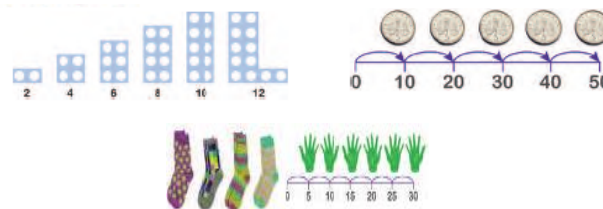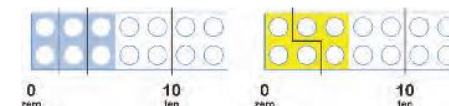| Developing Understanding of Multiplication		
EYFS	**YEAR 1**	**YEAR 2**
Number Have a deep understanding of number to 10, including the composition of each number; - Subitise (recognise quantities without counting) up to 5; Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	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.	**Recall** and use **multiplication** and division **facts for the 2, 3, 5 and 10 multiplication tables**, including recognising odd and even numbers. **Calculate mathematical statements for multiplication** and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that **multiplication of two numbers can be done in any order (commutative)** and division of one number by another cannot. **Solve problems involving multiplication** and division, using **materials, arrays, repeated addition, mental methods, and multiplication** and division **facts,** including problems in contexts.
Children will: - In the context of play, and through adult directed learning, children will be encouraged to **count groups** and say one number for each group and then number each group - Group by moving objects into smaller groups or by gathering objects and counting in twos -Children will be encouraged to use specific language 'make four **groups of** two'. - Be encouraged to share equally and fairly in the context of everyday life in the classroom - Start to double using apparatus / objects and fingers	Children will: - Use visual models to support counting on and back in twos, fives and tens from any starting point - Count in multiples of twos, fives and tens and begin to recall the times table facts	Children will: - Count in multiples of twos, threes, fives and tens and begin to recall the times table facts - Be encouraged to use known facts such as doubles and halves to support calculations Double 4 How many legs will 3 teddies have? - Represent multiplication as a repeated addition

- Be encouraged to use known facts such as doubles and halves to support calculations

Double 4

How many legs will 3 teddies have?

- Represent multiplication as a repeated addition

0 zero   10 ten

2 + 2 + 2 = 6

- Use arrays to read and interpret repeated addition and the inverse relationship between multiplication and division
3 x 5 =
5 x 3 =

- Use mental methods to work out a multiplication.

2 + 2 + 2 = 6   3 + 3 = 6

- Use arrays to read and interpret repeated addition, to show commutative relationships and the inverse relationship between multiplication and division
3 x 5 =
5 x 3 =

- Use mental methods to work out a multiplication

Developing Understanding of Division		
EYFS	**YEAR 1**	**YEAR 2**
Number Have a deep understanding of number to 10, including the composition of each number; - Subitise (recognise quantities without counting) up to 5; Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. Verbally count beyond 20, recognising the pattern of the counting system; Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.	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.	**Recall** and use multiplication and **division facts for the 2, 5 and 10 multiplication tables**, including recognising odd and even numbers. **Calculate mathematical statements for** multiplication and **division** within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. **Solve problems involving** multiplication and **division**, using **materials,** arrays, repeated addition**, mental methods,** and multiplication and **division facts,** including problems in contexts.
Children will: - In the context of play, and through adult directed learning, children will be encouraged to count groups and say one number for each group and then number each group - Group by moving objects into smaller groups or by gathering objects and counting in twos - Be encouraged to share equally and fairly in the context of everyday life in the classroom - Start to half using practical objects -Children will be encouraged to use specific language **'half' 'share' 'equally'**.	Children will: - Use practical apparatus to share equally between a given number $15 \div 3 =$ - Use practical apparatus to group equally e.g. 24 into equal groups of 2's (links to arrays) How many groups of 2 in 10? (helps with 'chunking' later on) - Recall related multiplication and division facts and explore inverse relationships	Children will: - Use practical apparatus to share/group equally - Use mental methods to work out a division. $10 \div 2 =$ How many times does 2 go into 10? - Recall related multiplication and division facts and explore inverse relationships $2 \times 4 = 8$ $4 \times 2 = 8$ $8 \div 2 = 4$ $8 \div 4 = 2$

		I know double 2 is 4, I know half of 4 is 2