

Lee Brigg Infant & Nursery School



Maths Calculation Policy

September 2015

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 2014 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.

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

The national 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 2014 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 'mastering' of key concepts, understanding and skills.

Teaching of Mathematics:

Children are introduced to the processes of calculation through **practical, oral** 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 taught and expected to use a wide variety of mathematical terms that relate to each topic. **Mathematical 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. This is purposeful as it helps children to understand how to select the most appropriate method for the size of 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 method?

Discussion will also play a key part in the teaching and learning of mathematics at Lee Brigg. 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.

Wherever possible and relevant, mathematics will be used in other curriculum areas to enrich the provision and develop learning links across the curriculum.

Reviewed: September 2015

Maths Co-ordinator: Miss L Kilkenny

Developing Understanding of Addition

EYFS	YEAR 1	YEAR 2
<p>Numbers: Children <u>count</u> reliably with numbers from 1 to 20, place them in order and say which number is <u>one more</u> or one less than a given number. Using quantities and objects, they <u>add</u> and subtract two single-digit numbers and <u>count on</u> or back to find the answer. They solve problems, including doubling, halving and sharing.</p>	<p>Read, write and interpret mathematical statements involving <u>addition (+)</u>, subtraction (-) and equals (=) signs. Represent and use <u>number bonds</u> and related subtraction facts within 20. Add and subtract <u>one-digit and two-digit numbers to 20</u>, including zero. Solve <u>one-step problems that involve addition</u> and subtraction, using concrete objects and pictorial representations, and missing number problems.</p>	<p>Solve problems with <u>addition</u> and subtraction:</p> <ul style="list-style-type: none"> - using concrete objects and pictorial representations (numbers, quantities and measures) - applying their increasing knowledge of <u>mental and written methods</u> <p>Recall and use <u>addition</u> and subtraction <u>facts to 20 fluently</u>, and derive and use related <u>facts up to 100</u>. Add and subtract numbers using concrete objects, pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers <p>Show that <u>addition of two numbers can be done in any order (commutative)</u> and subtraction of one number from another cannot. Recognise and use the <u>inverse relationship between addition and subtraction</u> and use this to <u>check calculations</u> and <u>solve</u> missing number problems</p>
<p>Children will:</p> <ul style="list-style-type: none"> - Sing and respond to nursery rhymes and counting songs - Through play and using visual prompts around the classroom children will become confident in counting forwards - Take part in practical activities discussing and using objects and modelling with equipment - Begin to use one to one correspondence using moveable objects - Count sets of objects in play and learn to recognise them 	<p>Children will:</p> <ul style="list-style-type: none"> - Know by heart number bonds to 5, 10 and 20 - Use a variety of practical apparatus to represent a calculation: - Counters/tens frames - Fingers - Numicon 	<p>Children will:</p> <ul style="list-style-type: none"> - Know by heart number bonds to 5, 10, 20 and 100. - Recall number facts e.g. If we know $4 + 5 = 9$ <p>We also know:</p> <p>$5 + 4 = 9$ $14 + 5 = 19$ $5 + 14 = 19$ etc</p> <ul style="list-style-type: none"> - Use number lines (with the numbers on) to add by counting in ones. Starting with the greatest



- Real life apparatus
- Objects



- Recall number facts e.g. If we know $4 + 5 = 9$

We also know:

$$5 + 4 = 9$$

$$14 + 5 = 19$$

$$5 + 14 = 19 \text{ etc}$$

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



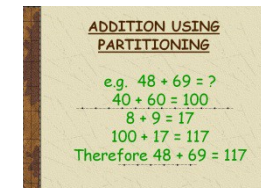
number and counting on the smaller number

- Use the partitioning method to add tens and units:

- Grouping into tens and ones



- Written method









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

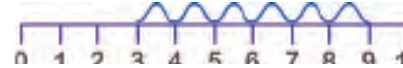
$$\begin{array}{r} 38 \\ + 26 \\ \hline 64 \end{array}$$

Developing Understanding of Subtraction

EYFS	YEAR 1	YEAR 2
<p>Numbers: Children <u>count</u> reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and <u>count on</u> or <u>back</u> to find the answer. They solve problems, including doubling, halving and sharing.</p>	<p>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</p> <p>Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems.</p>	<p>Solve problems with addition and subtraction:</p> <ul style="list-style-type: none"> - using concrete objects and pictorial representations (numbers, quantities and measures) - applying their increasing knowledge of mental and written methods <p>Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100</p> <p>Add and subtract numbers using concrete objects,</p>

		<p>pictorial representations, and mentally, including:</p> <ul style="list-style-type: none"> - a two-digit number and ones - a two-digit number and tens - two two-digit numbers - adding three one-digit numbers <p>Show that addition of two numbers can be done in any order (commutative) and <u>subtraction of one number from another cannot</u>. Recognise and use the <u>inverse relationship between addition and subtraction</u> and use this to <u>check calculations</u> and <u>solve</u> missing number problems</p>
<p>Children will:</p> <ul style="list-style-type: none"> - Sing and respond to nursery rhymes and counting songs that count back - Work with numicon tiles. By placing tiles on top of one another, children recognise the difference in their values - Through play and using visual prompts around the classroom children will become confident in counting backwards - Respond to questions such as 'How many left?' and practise removing objects from a group 	<p>Children will:</p> <ul style="list-style-type: none"> - 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': - Counters/tens frames  - Fingers  - Numicon  - Real life apparatus  - Objects  - Use number lines (with the numbers on) to subtract by counting back in ones and by 'finding the difference' 	<p>Children will:</p> <ul style="list-style-type: none"> - Know by heart number facts to 100 - Use empty number lines to subtract by counting back in ones and by 'finding the difference' between two larger numbers <p>Subtraction on a number line: $74 - 27 =$</p>  <ul style="list-style-type: none"> - Put the smallest number at the beginning of the number line (underneath) - Put the largest number 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

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



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



Developing Understanding of Multiplication

EYFS	YEAR 1	YEAR 2
<p>Numbers: Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.</p>	<p>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.</p>	<p>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 (\times), division (\div) 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.</p>
<p>Children will:</p> <ul style="list-style-type: none"> - 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 	<p>Children will:</p> <ul style="list-style-type: none"> - Use visual models to support counting on and back in twos, fives and tens from any starting point <div style="text-align: center;"> </div> <p>- Count in multiples of twos, fives and tens and</p>	<p>Children will:</p> <ul style="list-style-type: none"> - Count in multiples of twos, 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 <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Double 4</p> </div> <div style="text-align: center;"> </div> </div>

- Start to double using numicon shapes and create repeating patterns

begin to recall the times table facts

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



Double 4



- Represent multiplication as a repeated addition



$$2 + 2 + 2 = 6 \quad 3 + 3 = 6$$

- Use and draw arrays to illustrate repeated addition and the inverse relationship between multiplication and division

$$3 \times 5 =$$

$$5 \times 3 =$$



- Represent multiplication as a repeated addition



$$2 + 2 + 2 = 6 \quad 3 + 3 = 6$$

- Use arrays to illustrate repeated addition and the inverse relationship between multiplication and division

$$3 \times 5 =$$

$$5 \times 3 =$$



- Use knowledge of grouping to record multiplication on a number line

$$5 \times 2 =$$



5 jumps of 2 on a number line

- Use the grid method for multiplication once times table knowledge is secure.



The method relies on the numbers being partitioned then multiplied together. The answers in the grid are then added together to find the total.

Developing Understanding of Division

EYFS

YEAR 1

YEAR 2

Numbers: Children count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They **solve problems**, including doubling, **halving and sharing**.

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 (\times), division (\div) 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 numicon shapes and create repeating patterns

Children will:

- Use practical apparatus to share equally between a given number



- Use knowledge of step counting to record division as grouping on a number line

$$15 \div 3 = 5$$



- Recall related multiplication and division facts and explore inverse relationships

Children will:

- Use practical apparatus to share equally between a given number



- Use knowledge of times tables to record division on a number line

$$15 \div 3 = 5 \text{ (Count in 3s to reach 15)}$$



- 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,
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		I know half of 4 is 2
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