

Fairisle Infant and Nursery School



CALCULATIONS POLICY

Date policy reviewed: January 2018

To be reviewed again: January 2020

Ratified by the Governing Body:

Signature: *Stephan 17.1.18*

Fairisle Infant and Nursery School

Calculations Policy

UN Convention on the Rights of the Child:

Article 28 - You have the right to a good quality education.

Article 13 - You have the right to find out things and share what you think with others, by talking, drawing, and writing or in any other way unless it harms or offends other people.

Article 29 - Your education should help you use and develop your talents and abilities

This policy outlines both the mental and written methods that should be taught from Year R – Year 2. The policy has been written according to the National Curriculum 2014 and the written calculations for all four operations are as outlined on the appendices of the Programme of Study.

The document builds on the interconnectedness of mathematics and outlines the progression for addition, subtraction, multiplication and division. It is our intention that addition and subtraction should be taught at the same time to ensure children are able to see the clear links between the operations and the inverse nature of them along with multiplication and division.

Children should secure mental strategies. They are taught the strategy of counting forwards and backwards in ones and tens first and then ‘Special Strategies’ are introduced.

Children are taught to look carefully at the calculation and decide, which strategy they should use. Children should explain and reason as to why they have chosen a strategy and whether it is the most efficient.

The formal written methods should be introduced with caution. Calculations that require a written method should be presented to the children and models and images, such as dienes apparatus, place value counters, etc. should be used to ensure children have a conceptual understanding of the written method and that it is not a process that the children use for every type of calculation regardless of whether it can be completed mentally or mentally with jotting i.e. the number line.

Aims

- Having a coherent, progressive policy which is understood throughout the school and by parents / carers.
- Recording methods for addition, subtraction, multiplication and division are consistent throughout the school.
- Interpreting and using the signs and symbols involved.
- Ensuring recorded mathematics is well presented to avoid inaccuracies.

- Early practical, oral and mental work must lay the foundations by providing children with a good understanding of:
 - How the four operations build on efficient counting strategies
 - Place value
 - Number facts

Parents/Carers and Governors



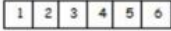
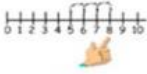
This policy will be shared with parents and governors through homework and guidance notes, and it will also be included in transition meetings and discussed at parents' evenings where appropriate.

DEVELOPING UNDERSTANDING OF ADDITION AND SUBTRACTION



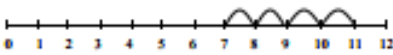

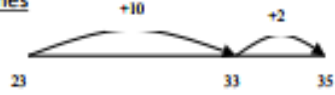
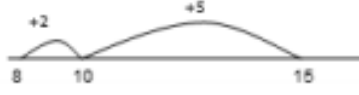

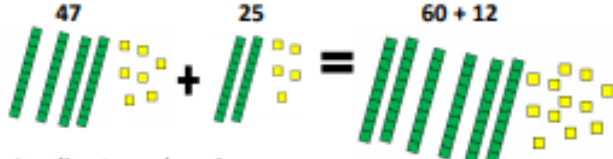

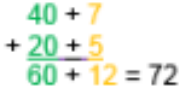
Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

Addition

EYFS



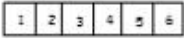

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
<p>If available, Numicon shapes are introduced straight away and can be used to:</p> <ul style="list-style-type: none"> • identify 1 more/less • combine pieces to add. • find number bonds. • add without counting. <p>Children can record this by printing or drawing around Numicon pieces.</p> <p>Children begin to combine groups of objects using concrete apparatus</p> <p></p> <p>Construct number sentences verbally or using cards to go with practical activities.</p> <p>Children are encouraged to read number sentences aloud in different ways "Three add two equals 5" "5 is equal to three and two"</p> <p>Children make a record in pictures, words or symbols of addition activities already carried out.</p> <p>Solve simple problems using fingers  $5 + 1 = 6$</p> <p>Number tracks can be introduced to count up on and to find one more: </p> <p>What is 1 more than 4? 1 more than 13?</p> <p>Number lines can then be used alongside number tracks and practical apparatus to solve addition calculations and word problems. $5 + 3 = 8$ </p> <p>Children will need opportunities to look at and talk about different models and images as they move between representations.</p>	<p>Games and songs can be a useful way to begin using vocabulary involved in addition e.g. Alice the Camel</p> <p>add</p> <p>more</p> <p>and</p> <p>make</p> <p>sum</p> <p>total</p> <p>altogether</p> <p>score</p> <p>double</p> <p>one more, two more, ten more...</p> <p>how many more to make...?</p> <p>how many more is... than...?</p>

KS1

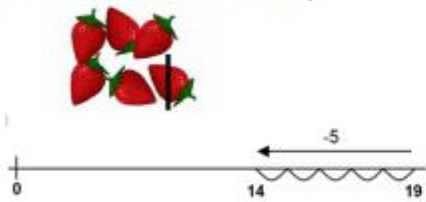
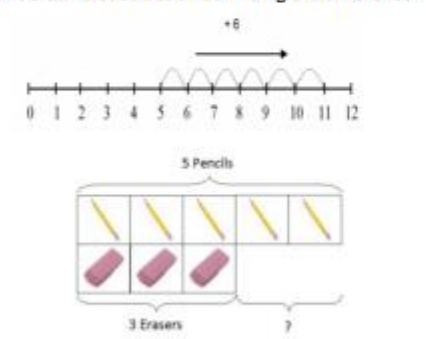
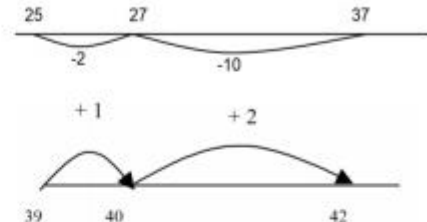
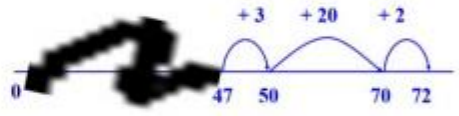
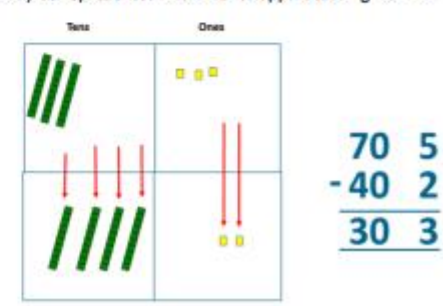
<h2 style="text-align: center;">Addition - Year 1</h2>	<h2 style="text-align: center;">Addition - Year 2</h2>
<p><u>+ = signs and missing numbers</u> Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'. $2 = 1 + 1$ $2 + 3 = 4 + 1$</p> <p>Missing numbers need to be placed in all possible places. $3 + 4 = \square$ $\square = 3 + 4$ $3 + \square = 7$ $7 = \square + 4$</p> <p><u>Counting and Combining sets of Objects</u> Combining two sets of objects (aggregation) which will progress onto adding on to a set (augmentation)</p>  <p><u>Understanding of counting on with a number track.</u></p>  <p><u>Understanding of counting on with a number line (supported by models and images).</u></p> <p>7 + 4 and 4 + 7 (switch it)</p>   <p>Using Numicon number lines.</p>	<p>Missing number problems e.g $14 + 5 = 10 + \square$ $32 + \square + \square = 100$ $35 = 1 + \square + 5$</p> <p>It is valuable to use a range of representations (also see Y1). Continue to use numberlines to develop understanding of: <u>Counting on in tens and ones</u> $23 + 12 = 23 + 10 + 2$ $= 33 + 2$ $= 35$</p>  <p><u>Partitioning and bridging through 10.</u> The steps in addition often bridge through a multiple of 10 e.g. Children should be able to partition the 7 to relate adding the 2 and then the 5. $8 + 7 = 15$</p>  <p><u>Adding 9 or 11 by adding 10 and adjusting by 1</u> e.g. Add 9 by adding 10 and adjusting by 1 $35 + 9 = 44$</p>  <p><u>Towards a Written Method</u> <u>Partitioning in different ways and recombine</u> $47 + 25$</p>  <p>Leading to exchanging: 72</p>  <p><u>Expanded written method</u></p> $\begin{array}{r} 40 + 7 + 20 + 5 = \\ 40 + 20 + 7 + 5 = \\ 60 + 12 = 72 \end{array}$ 

Subtraction

EYFS

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
<p>Children begin with mostly pictorial representations</p> <p>  </p> <p>Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left.</p> <p>Concrete apparatus models the subtraction of 2 objects from a set of 5.</p> <p>Construct number sentences verbally or using cards to go with practical activities.</p> <p>Children are encouraged to read number sentences aloud in different ways "five subtract one leaves four" "four is equal to five subtract one"</p> <p>Children make a record in pictures, words or symbols of subtraction activities already carried out.</p> <p>Solve simple problems using fingers</p> <p>  </p> <p>Number tracks can be introduced to count back and to find one less:</p> <p>  </p> <p>What is 1 less than 9? 1 less than 20?</p> <p>Number lines can then be used alongside number tracks and practical apparatus to solve subtraction calculations and word problems. Children count back under the number line.</p> <p>  </p> <p>Children will need opportunities to look at and talk about different models and images as they move between representations.</p>	<p>Games and songs can be a useful way to begin using vocabulary involved in subtraction e.g. Five little men in a flying saucer</p> <p>take (away)</p> <p>leave</p> <p>how many are left/left over?</p> <p>how many have gone?</p> <p>one less, two less... ten less...</p> <p>how many fewer is... than...?</p> <p>difference between</p> <p>is the same as</p>

KS1




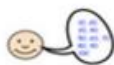
Subtraction - Year 1	Subtraction - Year 2
<p>Missing number problems e.g. $7 \blacksquare - 9 = \blacksquare$; $20 - \blacksquare = 9$; $15 - 9 = \blacksquare$; $\blacksquare - \blacksquare = 11$; $16 - 0 = \blacksquare$</p> <p>Use concrete objects and pictorial representations. If appropriate, progress from using number lines with every number shown to number lines with significant numbers shown.</p> <p>Understand subtraction as take-away:</p>  <p>Understand subtraction as finding the difference:</p>  <p>The above model would be introduced with concrete objects which children can move (including cards with pictures) before progressing to pictorial representation.</p> <p>The use of other images is also valuable for modelling subtraction e.g. Numicon, bundles of straws, Dienes apparatus, multi-link cubes, bead strings</p>	<p>Missing number problems e.g. $52 - 8 = \blacksquare$; $\blacksquare - 20 = 25$; $22 = \blacksquare - 21$; $6 + \blacksquare + 3 = 11$</p> <p>It is valuable to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference. E.g.</p>  <p>The link between the two may be supported by an image like this, with 47 being taken away from 72, leaving the difference, which is 25.</p>  <p>The bar model should continue to be used, as well as images in the context of measures.</p> <p>Towards written methods</p> <p>Recording addition and subtraction in expanded columns can support understanding of the quantity aspect of place value and prepare for efficient written methods with larger numbers. The numbers may be represented with Dienes apparatus. E.g. $75 - 42$</p> 

DEVELOPING UNDERSTANDING OF MULTIPLICATION AND DIVISION

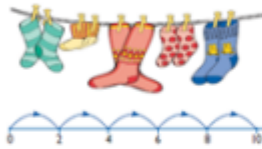
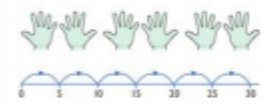
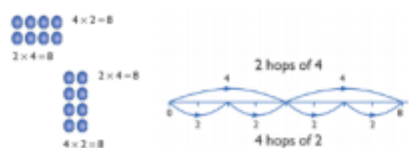
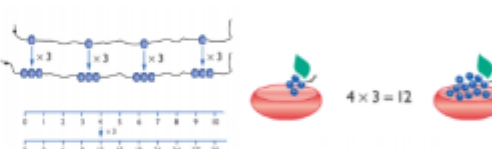

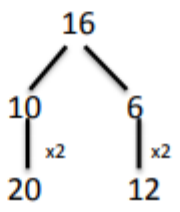
Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

Multiplication

EYFS



GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
<p>The link between addition and multiplication can be introduced through doubling.</p> <p>If available, Numicon is used to visualise the repeated adding of the same number. These can then be drawn around or printed as a way of recording.</p> <p>Children begin with mostly pictorial representations:</p>  <p>How many groups of 2 are there?</p> <p>Real life contexts and use of practical equipment to <u>count in repeated groups of the same size</u>:</p>  <p>How many wheels are there altogether?</p>  <p>How much money do I have?</p> <p>Count in twos; fives; tens both aloud and with  objects</p> <p>Children are <u>given multiplication problems set in a real life context</u>. Children are encouraged to visualise the problem.</p> <p>How many fingers on two hands? How many sides on three triangles? How many legs on four ducks?</p> <p>Children are encouraged to read number sentences aloud in different ways "five times two makes ten" "ten is equal to five multiplied by two"</p>	<p>lots of</p> <p>groups of</p> <p>times</p> <p>multiply</p> <p>multiplied by</p> <p>multiple of</p> <p>once, twice, three times... ten times...</p> <p>...times as (big, long, wide... and so on)</p> <p>repeated addition</p> <p>double</p>

KS1

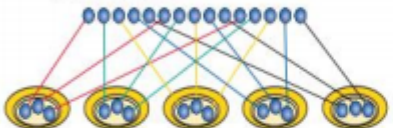

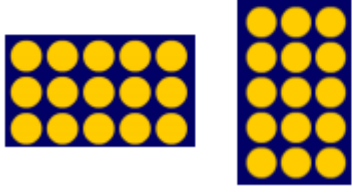
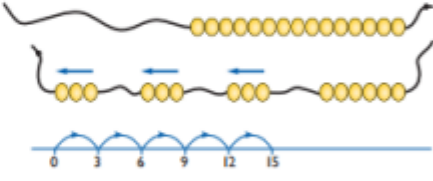
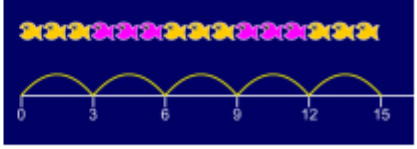
<p>Multiplication - Year 1</p>	<p>Multiplication - Year 2</p>
<p>Understand multiplication is related to doubling and combing groups of the same size (repeated addition)</p> <p>Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings</p>  <p> $2 + 2 + 2 + 2 + 2 = 10$ $2 \times 5 = 10$ 2 multiplied by 5 5 pairs 5 hops of 2 </p>  <p> $5 + 5 + 5 + 5 + 5 = 30$ $5 \times 6 = 30$ 5 multiplied by 6 6 groups of 5 6 hops of 5 </p> <p>Problem solving with concrete objects (including money and measures)</p> <p>Use cuisenaire and bar method to develop the vocabulary relating to 'times' – Pick up five, 4 times</p> <p>Use arrays to understand multiplication can be done in any order (commutative)</p> 	<p>Expressing multiplication as a number sentence using x</p> <p>Using understanding of the inverse and practical resources to solve missing number problems.</p> <p> $7 \times 2 = \square$ $\square = 2 \times 7$ $7 \times \square = 14$ $14 = \square \times 7$ $\square \times 2 = 14$ $14 = 2 \times \square$ $\square \times \square = 14$ $14 = \square \times \square$ </p> <p>Develop understanding of multiplication using array and number lines (see Year 1). Include multiplications not in the 2, 5 or 10 times tables.</p> <p>Begin to develop understanding of multiplication as scaling (3 times bigger/taller)</p>  <p> $4 \times 3 = 12$ </p> <p>Doubling numbers up to 10 + 10 Link with understanding scaling Using known doubles to work out double 2d numbers (double 15 = double 10 + double 5)</p>  <p>double 4 is 8 $4 \times 2 = 8$ </p> <p>Towards written methods</p> <p>Use jottings to develop an understanding of doubling two digit numbers.</p> 

Division

EYFS

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
<p>The ELG states that children solve problems, including doubling, halving and sharing.</p> <p>Children need to see and hear representations of division as both grouping and sharing.</p> <p>Division can be introduced through halving.</p> <p>Children begin with mostly pictorial representations linked to real life contexts:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Grouping model Mum has 6 socks. She grouped them into pairs – how many pairs did she make?</p> </div> <div style="text-align: center;">  <p>Sharing model I have 10 sweets. I want to share them with my friend. How many will we have each?</p> </div> </div> <p>Children have a go at recording the calculation that has been carried out.</p>	<p>halve</p> <p>share, share equally</p> <p>one each, two each, three each...</p> <p>group in pairs, threes...</p> <p>tens</p> <p>equal groups of</p> <p>divide</p> <p>divided by</p> <p>divided into</p> <p>left, left over</p>

KS1

Division - Year 1	Division - Year 2
<p>Children must have secure counting skills- being able to confidently count in 2s, 5s and 10s. Children should be given opportunities to reason about what they notice in number patterns.</p> <p>Group AND share small quantities- understanding the difference between the two concepts. Sharing Develops importance of one-to-one correspondence.</p> <p>$15 \div 5 = 3$ 15 shared between 5</p>  <p>Children should be taught to share using concrete apparatus.</p> <p>Grouping Children should apply their counting skills to develop some understanding of grouping.</p> <p>How many 3s in 15?  $15 \div 3 = 5$</p> <p>Use of arrays as a pictorial representation for division. $15 \div 3 = 5$ There are 5 groups of 3. $15 \div 5 = 3$ There are 3 groups of 5.</p>  <p>Children should be able to find $\frac{1}{2}$ and $\frac{1}{4}$ of simple fractions of objects, numbers and quantities.</p>	<p>\div signs and missing numbers</p> <p>$6 \div 2 = \square$ $\square = 6 \div 2$ $6 \div \square = 3$ $3 = 6 \div \square$ $\square \div 2 = 3$ $3 = \square \div 2$ $\square \div \nabla = 3$ $3 = \square \div \nabla$</p> <p>Know and understand sharing and grouping- introducing children to the \div sign.</p> <p>Children should continue to use grouping and sharing for division using practical apparatus, arrays and pictorial representations.</p> <p>Grouping using a numberline</p> <p>Group from zero in jumps of the divisor to find our 'how many groups of 3 are there in 15?'</p> <p>$15 \div 3 = 5$</p>   <p>Continue work on arrays. Support children to understand how multiplication and division are inverse. Look at an array – what do you see?</p>

This calculations policy was originally developed based on the resources produced by the NCETM (National Centre for Excellence in the Teaching of Mathematics).

Progression within in each area of calculation follows the programme of study in the 2014 National Curriculum.

This Calculation policy is used in conjunction with the objectives from the New Maths Programme of Study and the Maths vocabulary glossary:-

<https://www.ncetm.org.uk/resources/42990#glossary>

ICT

The provision for the use of ICT in Maths is developing and all teachers work to maximise the use of resources in their teaching. Children are given the opportunity to practise mental maths strategies and opportunity to create graphs and tables for statistics.

Next review: January 2020