



Elmwood Infant School & Nursery

Mathematics Policy

Article 29 'Education must develop every child's personality, talents and abilities to the full'

DATE POLICY REVIEWED: Spring 2016

DATE OF NEXT REVIEW: Spring 2018

Definition

Mathematics is:

- an important tool which can be used to enable things to be done which might otherwise be impossible and should equip the children for real life situations;
- a way of teaching initiative, accuracy, systematic logical thinking and is a source of interest and fun;
- important in the communication and analysis of information and ideas;
- a tool to give the power to describe and explain, but also predict – to suggest possible answers to practical problems.

The 2014 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.

By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study

This policy should be read in conjunction with the following:

- Teaching and Learning Policy
- Assessment Policy
- Calculations Policy
- Home Learning Policy

School Aims

Our aims for the teaching and learning of mathematics are founded on a belief that ALL children will enjoy equality of access to the provision of a high quality curriculum that will:

- develop an inquiring and inquisitive mind;
- extend each child to his or her fullest potential, building on previous experiences and recognising individual capabilities;

- promote enjoyment and enthusiasm for learning through practical activities, exploration and discussion;
- promote confidence and competence with numbers and the number system;
- develop the ability to solve problems through decision making and reasoning in a range of contexts;
- enable children to calculate accurately and efficiently, both mentally and with a pencil and paper, drawing on a range of calculation strategies and understanding of the required operations;
- develop a practical understanding of the ways in which information is gathered and presented;
- enable the exploration of the features of shape and space, and develop measuring skills in a range of contexts;
- provide opportunities to apply mathematical learning in everyday situations and enable children to use and apply their knowledge in the world outside;
- support inclusion and ensure all pupils make good progress by using data to pinpoint underachievement;

The Role of the Maths Co-ordinator

The role of the mathematics coordinator is to:

- Ensure teachers are familiar with the Framework and to continue the successful implementation.
- Support colleagues in the development of weekly plans
- Lead by example in the way they teach in their own classrooms
- Improve teaching through shared or demonstration lessons
- Support the head teacher to assess, evaluate and monitor the mathematics curriculum through classroom observation, reviewing assessment data and speaking to colleagues and children.
- Support the head teacher in the target setting process
- Formulate and monitor the mathematics policy
- Ensure that there are sufficient mathematical resources.

Equality of Opportunity

We ensure that every pupil has the opportunity to experience success in learning and to achieve as high a standard as possible. In line with the RRaA we ensure we attend to equality issues and take appropriate opportunities to actively promote race equality. In line with the DDA we will adapt or modify our curriculum to ensure children with disabilities reach their full potential. We analyse data carefully to identify gaps between different groups of learners, for example, boys, girls, those with English as an additional language, disadvantaged pupils and children from minority ethnic groups. Actions will be put into place with the aim of narrowing any gaps of under achievement found between different groups of learners.

In all classes there are children of differing ability. We recognise this fact and provide suitably differentiated opportunities for all children by matching the challenge of the task to the ability of the child. We achieve this through a range of strategies-in some lessons through differentiated group work and in other lessons by organising the children to work in pairs on open-ended problems or games. We use teaching assistants to support some children and ensure that work is matched to the needs of individuals. We ensure that the curriculum is culturally relevant wherever possible and provide positive images. We include strategies to support EAL children in our short and long term planning.

Teaching and Learning of Mathematics

The school uses a variety of teaching and learning styles in mathematics lessons. Our principle aim is to develop children's knowledge, skills and understanding in mathematics. Pupils do this through a daily lesson in which we encourage children to ask as well as answer mathematical questions. In our day to day teaching we aim to:

- introduce a new topic with a real life problem;
- use models and images;
- promote speaking and listening;
- provide practical opportunities as much as possible;
- plan activities that help children consolidate prior learning and practice skills and routines;
- help children problem solve;
- undertake activities that help children commit to memory a range of mathematical facts that they can recall easily;
- provide activities that encourage investigation;
- use different groupings - class work, collaborative group work, paired work or individual work.

The use of practical apparatus to develop mathematical understanding is at the heart of mathematics teaching at Elmwood Infant School. Children should be allowed constant access to materials which will help them develop concepts and understanding of maths. Teaching staff have agreed that the Numicon philosophy, guidance and materials closely match the ideals of the school and these materials often form the basis of lessons which teach place value, calculation and number patterns, in the Early Years and KS1.

Children have the opportunity to use a wide range of resources such as number lines, number squares, digit cards and small apparatus to support their work. Children use ICT in mathematics lessons where it will enhance their learning, as in modelling ideas and methods. Wherever possible we encourage the children to use and apply their learning to everyday situations.

The use and application of Mathematics to investigate and solve problems is integrated with work on number, algebra, shape, space and handling data to help the children think mathematically. Cross-curricular links are made when appropriate.

The Early Years Foundation Stage

In the Early Years Foundation Stage (EYFS) the provision and experiences are organised to promote the development of mathematical language and understanding through, for example, stories, songs, rhymes, finger games, sand and water, construction on a large and small scale, imaginative play, outdoor play and playground games, cooking and shopping, two and three dimensional creative work with a range of materials and by observing numbers and patterns in the environment and daily routines.

Children are taught all Number and Shape, Space and Measures objectives outlined within the Early Years Framework. Children are then given opportunities to transfer adult taught skills during independent play throughout the classroom and outside area. This is supported by the three characteristics of effective learning:

- Playing and Exploring
- Active Learning
- Creating and Thinking Critically

Key Stage One

The principal focus of mathematics teaching in Key Stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the 4 operations, including with practical resources [for example, concrete objects and measuring tools].

Year 1:

Number and place value - Pupils should be taught to:

- count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens
- given a number, identify one more and one less
- identify and represent numbers using objects and pictorial representations including the number line, and use the
- language of: equal to, more than, less than (fewer), most, least
- read and write numbers from 1 to 20 in numerals and words.

Addition and subtraction - Pupils should be taught to:

- 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 such as $7 = ? - 9$.

Multiplication and division - Pupils should be taught to:

- 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.

Fractions - Pupils should be taught to:

- recognise, find and name a half as one of two equal parts of an object, shape or quantity
- recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Measurement - Pupils should be taught to:

- compare, describe and solve practical problems for:
- lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]
- mass/weight [for example, heavy/light, heavier than, lighter than]
- capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]
- time [for example, quicker, slower, earlier, later]
- measure and begin to record the following:
- lengths and heights
- mass/weight
- capacity and volume
- time (hours, minutes, seconds)
- recognise and know the value of different denominations of coins and notes
- sequence events in chronological order using language [for example, before and after, next, first, today,

- yesterday, tomorrow, morning, afternoon and evening]
- recognise and use language relating to dates, including days of the week, weeks, months and years
- tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.

Geometry - properties of shape - Pupils should be taught to:

- recognise and name common 2-D and 3-D shapes, including:
 - 2-D shapes [for example, rectangles (including squares), circles and triangles]
 - 3-D shapes [for example, cuboids (including cubes), pyramids and spheres].

Geometry position and direction - Pupils should be taught to:

- describe position, direction and movement, including whole, half, quarter and three-quarter turns.

Year 2:

Number - number and place value

- count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward
- recognise the place value of each digit in a two-digit number (10s, 1s)
- identify, represent and estimate numbers using different representations, including the number line
- compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs
- read and write numbers to at least 100 in numerals and in words
- use place value and number facts to solve problems

Number- addition and subtraction

- solve problems with addition and subtraction:
 - ✓ using concrete objects and pictorial representations, including those involving 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 1s
 - ✓ a two-digit number and 10s
 - ✓ 2 two-digit numbers
 - ✓ adding 3 one-digit numbers
- show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 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

Number- multiplication and division

- 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 2 numbers can be done in any order (commutative) and division of 1 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

Number- fractions

- recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- write simple fractions, for example $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$

Measurement

- choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels
- compare and order lengths, mass, volume/capacity and record the results using >, < and =
- recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value
- find different combinations of coins that equal the same amounts of money
- solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change
- compare and sequence intervals of time
- tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times
- know the number of minutes in an hour and the number of hours in a day

Geometry- Properties of shapes

- identify and describe the properties of 2-D shapes, including the number of sides, and line symmetry in a vertical line
- identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- compare and sort common 2-D and 3-D shapes and everyday objects

Geometry- position and direction

- order and arrange combinations of mathematical objects in patterns and sequences
- use mathematical vocabulary to describe position, direction and movement, including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)

Statistics

- interpret and construct simple pictograms, tally charts, block diagrams and tables
- ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- ask-and-answer questions about totalling and comparing categorical data

Cross Curricular Learning

Mathematics learning happens in all areas of the curriculum and we take every opportunity to teach maths in a meaningful and contextual way.

English

Mathematics contributes to the teaching of English in our school by promoting the skills of reading, writing, speaking and listening. We encourage children to read and interpret problems in order to identify the mathematics involved. The children explain and present their work to others during plenary sessions. Younger children enjoy stories and rhyme that rely on counting and sequencing. Older children encounter mathematical vocabulary, graphs and charts when using non-fiction texts.

Computing

The effective use of ICT can enhance the teaching and learning of mathematics when used appropriately. When considering its use, we take into account the following points:

- ✓ ICT should enhance good mathematics teaching. It should be used in lessons only if it supports good practice in teaching mathematics;
- ✓ Any decision about using ICT in a particular lesson or sequence of lessons must be directly related to the teaching and learning objectives for those lessons;
- ✓ ICT should be used if the teacher and/or the children can achieve something more effectively with it than without it.

Science

Almost every scientific investigation or experiment is likely to require one or more of the mathematical skills of classifying, counting, measuring, calculating, estimating and recording in tables and graphs. In science pupils will for example order numbers, including decimals, calculate simple means and percentages, use negative numbers when taking temperatures, decide whether it is more appropriate to use a line graph or bar chart, and plot, interpret and predict from graphs.

Art, Design and Technology

Measurements are often needed in art and design and technology. Many patterns and constructions are based on spatial ideas and properties of shapes, including symmetry. Designs may need enlarging or reducing, introducing ideas of multiplication and ratio. When food is prepared a great deal of measurement occurs, including working out times and calculating cost; this may not be straightforward if only part of a packet of ingredients has been used.

History, Geography and Religious Education

In history and geography children will collect data by counting and measuring and make use of measurements of many kinds. The study of maps includes the use of co-ordinates and ideas of angle, direction, position, scale and ratio. The pattern of the days of the week, the calendar and recurring annual festivals all have a mathematical basis.

Physical Education and Music

Athletic activities require measurement of height, distance and time, while ideas of counting, time, symmetry, movement, position and direction are used extensively in music, dance, gymnastics and ball games.

Planning

Our planning across KS1 is based on the renewed framework and the 2014 curriculum. Teachers use the Abacus scheme to support their long, medium and short term planning.

Year groups complete weekly plans for the teaching of mathematics in KS1. These weekly plans list the specific learning objectives for each lesson and give details of how the lessons are to be taught. Differentiated activities are included and SEN and EAL provisions are highlighted. Planning shows challenge using the schools Hot, Boiling and On-Fire system. Teaching staff assess focus groups by annotating the children's books. All teachers evaluate their lesson objectives in order to inform future planning. Senior leaders regularly monitor plans.

Assessment

We assess children's work in mathematics from three aspects, long term, short term and medium term. In KS1 we assess the focus groups daily by annotating children's books using a marking strip and next

steps are provided in line with our marking policy. Children are given opportunities to act upon any next steps that have been highlighted. In the foundation stage the assessments are completed on labels which form their Learning Journey.

Medium term assessment takes place at the end of each term. The children's progress is recorded on to our school's assessment grids. Half termly checks are also completed for specific targeted children. Year 1 and 2 use the abacus assessment to support their teacher assessments.

We make long term projections with the help of the end-of-year tests, data from EYFS and previous years, Fischer Family Trust information and teacher assessment.

Assessments are analysed by class teachers to identify any underachieving children or groups with their class and by the Senior Leadership Team to identify underperforming or potentially underperforming groups across the year group. Individuals or groups are identified and strategies are then put in place to support their progress, either through focused support using the number box or support materials offered in their independent work.

Children's Recording of Work

At Elmwood Infant School we place great emphasis on our teaching of mathematics, the importance of discussion and the development of thinking and reasoning skills. Children are actively encouraged to use pictures, diagrams and written methods to support their work. Great importance is given to collaborative work and talk partners. Photographs are used to record children's practical work in their books.

In the Foundation Stage, the emphasis is on practical learning and emergent recording. The children work towards recognising and reading numbers, and the correct formation of numbers. At this stage the teacher may model simple calculations. The emphasis is for children to recognise patterns in numbers and be confident in talking about larger numbers and their relationships with the need to count, order and problem solve. (See Calculations Policy)

Displays

Throughout the school there are mathematical displays which:

- Celebrate the children's achievements and reflect our diverse school community.
- Ask questions to promote mathematical thinking.
- Contain key vocabulary.
- Support curricular targets.
- Promote independent working and are an integral part of teaching.
- Support learning throughout a unit of work.

Resources

Each classroom is equipped with the equipment to teach mathematics, these include, number lines, numicon, hundred squares, dice counters etc.

Five Minute Box - The five minute box is incorporated into day from targeted work by support staff with specific children. The Five Minute Box was designed within school settings to fulfil several purposes:

- To provide an easy to manage teaching system for any child who needs extra time to learn or to consolidate basic skills;
- To ensure that any child who may turn out to be dyscalculia has had multi-sensory teaching for 2 years rather than waiting to be diagnosed at the age of 7 and then having to start from the beginning again;

- Most importantly, it is a system that children engage in with the utmost enthusiasm, taking ownership of their learning and progressing from the very first time they open the Box.

Computing

Computers are fully integrated into the school's mathematics teaching. Computers are in each classroom and have programmes involving number, data handling, pattern etc. Smart boards are installed in all classrooms and laptops are used throughout KS1 in all areas of the curriculum.

School/Home Links

Homework is set weekly in accordance with our Homework Policy. Homework may focus on the practice and recall of specific facts or the consolidation of work completed during the week. Abacus active learn primary is used to set the children differentiated activities that they can access independently from home. KS1 also have a maths game scheme where children take a maths game home every week and parents are asked to comment on their experiences.

Reporting

Reporting to parents and carers is carried out through the regular parent/teacher consultation meetings and annually through the written report. Parent/carers are informed of the children's achievements and curriculum targets on these evenings. They are also informed about what the children will be learning through the curriculum newsletter half-termly.

Monitoring and Evaluation

The purpose of monitoring and evaluation activities is to raise the overall quality of teaching and the levels of children's attainment. Regular monitoring by the head teacher and maths coordinator ensure that the standards of teaching mathematics at Elmwood are high. Monitoring will include:

- Scrutiny of planning;
- Lesson observation and feedback;
- Book scrutiny;
- Scrutiny of progress and attainment.

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