Tachbrook Nursery School
Mathematics Policy

‘Happy, healthy & high expectations’
Rewritten: September 2024

Mathematics Policy

Introduction

Our Mathematical Policy outlines our approach to promoting mathematical development and numeracy skills in children during their early years of education. This policy aims to provide a comprehensive framework that fosters a positive and engaging mathematical learning environment, supporting children's mathematical understanding, problem-solving abilities, and overall numeracy development.

Aims:

Principles and Goals

1. Inclusivity: We believe that every child can develop mathematical abilities, and we will provide a supportive and inclusive learning environment that caters to individual needs and learning styles.

2. Play-based Learning: We recognise the importance of play in early years maths education. We will integrate mathematical concepts and activities into play-based experiences, allowing children to explore mathematical ideas in a fun and interactive manner.

3. Real-Life Connections: We will emphasise the use of mathematical concepts in real-life situations to help children understand the relevance of mathematics in their everyday lives, such as through cooking, planting, model making, water & sand play, building with construction toys etc.

4. Collaboration: We will encourage collaborative problem-solving and group activities to develop children's social and communication skills while engaging with mathematical concepts.

5. Progression and Continuity: Our mathematics curriculum will be designed to ensure a progressive and coherent learning journey, building on children's prior knowledge and experiences.

Curriculum

1. Number Sense: We will introduce and reinforce number recognition, counting, ordering, and basic operations (addition and subtraction) through hands-on activities and games.

2. Shape, Space & Pattern: We will provide opportunities for children to explore and identify shapes, spatial relationships, patterns, sand, water, puzzles, and creative activities.

3. Measurement: We will introduce measurement concepts such as length, weight, volume, and time, allowing children to explore and compare quantities through practical experiences.

Teaching Strategies

1. Differentiated teaching: Our staff will employ a range of teaching strategies, adapting to individual learning needs and providing appropriate challenges to extend children's mathematical understanding.

2. Enabling environments: We will provide a variety of open ended resources, visual aids such as number friezes, counting books, puzzles, maths games, loose parts, sand and water equipment a interesting selection of counting, ordering & sorting, correspond etc. to enhance mathematical exploration and conceptual understanding.

3. Language Development: We will promote mathematical language and vocabulary development through discussions, modelling, questioning, meaningful interactions, enabling children to articulate their mathematical thinking.

4. Assessment and Progress Monitoring: We will use ongoing observations, formative assessments, and child-led activities to monitor progress and tailor learning accordingly.

Partnerships:
Parent Engagement

1. We will involve parents and carers in their child's mathematical learning journey through regular communication, workshops, and providing ideas to support home-based activities.
2. At parents meetings, parents have an opportunity to share with the class teacher the child's developing mathematical knowledge. Teachers will offer ideas on how they could continue to support this at home and refer to these notes for future planning at nursery.
3. Maths story session. At this session children will listen to and join in with rhymes, songs and stories that have a mathematical theme. Books & the rhyme is displayed for parents so they can sing the rhyme at home and see examples of books that have a mathematical theme.

Professional Development
Our staff will have access to continuous professional development opportunities, staff meetings and training.

How we teach Mathematical Development
Children's learning is linked to our curriculum progression map. This maps out progress children will make during their time at Tachbrook. Half termly learning objectives are linked to individual learning activities which all children are able to access.

There are many branches of mathematical knowledge but in our work with children under five we are concerned with the following:-

Knowledge, understanding, skills & understanding

NUMBER	• sorting, matching, sets, counting, number names • correspondence, conservation, subitising, number problems

	• numerals (reading & writing), ordinal numbers • estimating, comparing
SHAPE & SPACE	• 2d shapes - names & properties • 3d shapes - names & properties • positional relationships - behind, under, on top of, in front of, perspective, area, volume, tessellation , plans, maps, diagrams, viewing objects from different angles, using positional language to describe routes, journeys and places
MEASUREMENT	• comparing sizes, weight, volume, capacity, length, height, area. • using comparatives & superlatives – heavy, heavier, heaviest, wide, wider, widest, long, longer, longest • using nonstandard and standard units of measure, time, and money
PATTERN	• sequencing, • ordering • symmetry • repeats - visual & auditory, artificial & in nature • describe a pattern, continue a pattern, copy a pattern, create patterns, spot a mistake within a pattern, create a pattern

1. Number

Before young children can count accurately or add, subtract, multiply and divide, they need to develop a thorough understanding of many other concepts through a wide range of experiences which at first may seem to have nothing to do with mathematics. Many of these experiences will have started long before a child starts nursery and will continue through their time here and beyond.

We aim to enable each child to develop the following:

Knowledge & Understanding of:

- **Permanence** - that objects continue to exist even when out of sight. This is normally learned by the end of a baby's first year. A sign that the concept has been learned is a baby's delight in peek-a-boo games which are not at all amusing if you believe that out of sight means gone.

- **Sorting** - organising objects in different ways according to different criteria. This is the basis of logical thought. Babies start sorting out their bodies from the rest of the world and move on to ever more complex categories. Sorting can happen continually in everyday life as well as at school - sorting the dirty clothes from the clean clothes, the red bricks from the blue.

- **Sets** - when we sort we inevitably put things into sets i.e. collections or groups. The members of a set may have intrinsic properties in common e.g. a set of triangles;

they may have functional properties in common, e.g. a tea set; or they may have nothing in common except the boundaries of the set itself e.g. the set of things in my handbag.

- **Matching** - this involves the comparing of 2 (or more) objects to see if they are identical - this can be in shape, size, and amount etc. It means looking for similarities and noticing differences.

- **Counting** - knowing the names of the cardinal numbers (one, two, three etc.); reciting them in right order, matching each number name to an object being counted (i.e. 1-1 correspondence); knowing the arrangement of the set does not affect the number (permanence); knowing about zero (or nought).

- **1-1 Correspondence** - this refers to matching the members of one set with the members of another and establishing an exact correspondence between the two, e.g. a match between the members of the set of children and the set of chairs around the table. Understanding this concept is crucial to counting when the members of the set of number names (1, 2, 3, etc.) have to be matched in exact correspondence to the members of the set of objects being counted. Children will be able to perform 1-1 correspondences before they can count accurately e.g. in the home corner a child setting the table with a spoon for each doll will know if there are not enough and ask/look for more even if she/he cannot count with 1-1 correspondence. Knowing in this way that 2 sets correspond i.e. have the same number of members is fundamental to counting. Children may well be able to recite the number names, even in the correct sequence, at a very early age but until they have 1-1 correspondence they will not be able to start counting accurately.

- **Cardinality**- The cardinal value of a number refers to the quantity of things it represents, e.g. the 'threeness' of three. When children understand the cardinality of numbers, they know what the numbers mean in terms of knowing how many things they refer to. Counting is one way of establishing how many things are in a group, because the last number you say tells you how many there are. Children enjoy learning the sequence of counting numbers long before they understand the cardinal values of the numbers.

- **Conservation** - this concept is built on an understanding of permanence. It also applies to other branches of maths (shape & measurement). In number it means that a child knows 5 objects are still 5 objects whether arranged in a line or a circle.

- **Subitising-** is another way of recognising how many there are, without counting them one by one. Children need opportunities to see regular arrangements of small quantities, e.g. a dice face, structured manipulatives, etc., and be encouraged to say the quantity represented. Children also need opportunities to recognise small amounts; usually up to 5, when they are not in the 'regular' arrangement, e.g. small handfuls of objects.

- **Comparison –** This is built on the understanding of matching. In number this means children can see if the amount they have counted is the same, more and/ or less than another amount.

- **Composition**: This is built on the understanding that a number can be made up from two or more smaller numbers e.g. 3 and 2 make 5. Children need opportunities to see small numbers within a larger collection. For example, allow children opportunities to talk about the numbers they can see. For instance, with giant ladybirds: "There are 5 spots altogether. I can see 4 and 1, I can see 3 and 2" etc. Encourage exploration of all the ways that 'five' can be and look. Children are encouraged to look closely at numbers to see what else they can see. This reinforces the concept of conservation.

- **Number Problems:** children will be given opportunities to solve real world mathematical problems and discuss mathematical ideas throughout the day e.g. "there are 5 of you but there doesn't seem to be enough chairs". This is also linked to number operations which will also be explored in a practical way.

1. **Addition** - combining two sets, initially a very practical activity with concrete objects. As objects are added to the set, children will at an early stage have to start counting again from the beginning. With practice and increased understanding of numbers they will be able to "add on "from the last number in the set e.g. "and 1 more makes 5". Children will be encouraged to represent and record addition using symbols and graphic forms. When they have 1-1 correspondence and can read/write numerals and have internalised the concept of combining two sets and understand that number names represent amounts, then they can do simple written sums using symbols + and = .

2. Subtraction - this is the mirror of addition, i.e. removing members from a set, first practically, then internally by counting backwards and then in written form.

3. Division- the sharing out of a set amongst the members of another set e.g. dividing cake into 4 for four children. Children will have lots of practical experiences of this concept in their daily lives both at home and in the nursery. What will take longer to develop will be the understanding of dividing something **equally** so that all four portions are of the same size. An understanding of the abstract division of a set of numbers by another number (eg 12÷ 4 =3) will not normally be developed while a child is at nursery.

Skills we want children to learn:

- To handle and explore a wide variety of materials and objects -manufactured and natural
- To use mathematical language connected with number - number names; adjectives that describe properties e.g., hard soft, colour names; language of comparison- more, less, fewer, the same as,
- To count in sequence
- To count accurately to 5
- To record mathematical observations in a variety of ways - tallying, drawing, charts.....
- To read and write numerals to 5
- To apply developing mathematical knowledge to solving everyday problems.

2. Shape & Space

This is the area of maths that encompasses 2D and 3D shapes - regular and irregular. It is concerned with how shapes do and do not fit together. It is concerned with the positions that shapes or objects take up in relationship to each other - behind, in front of, under etc. It will encompass representations of objects in space such as plans, maps, and diagrams. Children's first experiences of shape and space will be very much centred on their own bodies and physical movements and immediate surroundings. Although their understanding will develop a more abstract quality as they mature, this active, physical element of learning continues to be vital in the nursery years.

We aim to enable each child to develop the following:

Knowledge & Understanding of:

- Names and properties of 2D shapes - sides, corners
- Names and properties of 3D shapes - faces, angles, edges
- Objects look different in size and shape from different points of view
- Positional language to describe journeys, routes and places using words like 'in front of' and 'behind'.

Skills

- To language that describes positional relationships
- To use language that describes positional relationships - under, between, on, in, behind, in front of, beside, next, left, right.....
- To represent/interpret shapes and positions in space through maps, plans, diagrams.
- To tessellate - fit regular shapes together to cover a continuous space

3. Measurement

This is concerned with height, length, width, weight, size, time, money, volume, area, capacity, age.

However, for our children the starting place for measuring will be observing and comparing very concrete properties, either of their own bodies or objects in their immediate world e.g. "I'm bigger than you" or "you've made a long train". It will involve very practical explorations of objects - filling and emptying containers, lifting, carrying, organising play materials, shopping, cooking, bus journeys.

They can proceed to using non-standard units to establish relationships between two things - e.g. "I can run around the garden 3 times in the time it takes that water to stop dripping" or, "a trolley with two children is harder to pull because it is heavier". Standard measures requires quite a sophisticated use of representation and equivalence. Some under-fives may be ready to take this on in some areas of measurement e.g. length. Most children will not be able to understand such abstract concepts at this age. That does not mean they can't hear terms such as "that's 30cm long" when measuring material for a cloak, for example.

We aim to enable each child to develop the following:

Knowledge & Understanding of:

- Language that describes properties of objects that can be compared and measured - tall, short, thick, thin, wide, narrow, long, fat, thin, large, little, big, small, heavy, light, quick, slow, old, young, full, empty.
- Equivalence between objects e.g. two unit blocks take up the same amount of space in the block box as 1 long block.
- Names of standard units of measure e.g. days of week, days of the years, pence and pounds, metres, centimetres, millimetres etc.

Skills

- To compare capacity, length, height etc. in practical situations
- To use comparatives and superlatives e.g. tall, taller, tallest
- To use knowledge of measurement to solve everyday problems

4. Pattern

This area of maths includes and builds on some of the concepts already looked at in earlier sections. It has a strong link with art and design. It also is a foundation for the later learning of algebra.

We aim to enable each child to develop the following:

Knowledge & Understanding of:

- **Sequencing** - that events and objects can be put into order - either a time order or an order based on position, number, and size.
- **Repeats** - that patterns involve the repeating of individual elements in a predictable order. Patterns can be visual, aural, and tactile.
- **Patterns** can be found in nature or be made by people
- **Symmetry** - individual shapes or combinations of shapes that possess a particular property i.e. balance. There are different types- simplest being bilateral symmetry - the two halves of a shape or a pattern or a picture balance each other completely around the axis of symmetry.

Skills

- To recognise a pattern in their environment- both natural and made
- To describe a pattern
- To copy a pattern
- To continue a pattern
- To create patterns
- To spot a mistake within a pattern.

Attitudes

There are certain attitudes that we wish to encourage in children in respect of all the four areas above -

- Curiosity
- Perseverance
- Reflectiveness

How we Promote this Development

Organisation & Resources

Maths Area

This provides one focus for maths activity. It is where we store structured equipment related to each of the areas of maths (accessible to the children). In this area we have out a selection of books that support all areas of maths learning. More maths equipment is kept in the stock cupboard. In addition, we provide for mathematical learning to take places throughout the nursery and throughout the day in the following ways.

Number

- Toys/equipment for sorting and matching - animals, spots, ladybirds
- Workshop - free access to range of materials and tools
- Tidy-up times, storage of equipment
- Unit blocks - large and small
- Story books with a number content
- Cooking: recipe cards and manuals that support counting and matching equipment
- Ten frames, counting grid, number lines
- Magnetic number tiles, matching numeral tiles to those on the board
- Counting rhymes, songs, books,
- Home corner play - dressing dolls, laying the table etc.,
- Tallying
- Board games
- Dice games
- Clay/dough - changing length and thickness of sausage, sharing out clay/dough
- Estimating- how many balls can you throw in a bucket?
- Recording and labelling

Shape & Space

- Puzzles
- Sorting bowls and objects
- Playdough
- Unit blocks - large and small
- Mosaic tablets
- Shape hunt; seeing and matching objects within the environment
- Climbing equipment - ladders, steps, barrels, hidey holes, hoops
- Ring games and dance
- Large masses of clay/dough
- Construction toys/railway/trackways/obstacle courses
- Transporting equipment around the garden
- Storage/tidying up/containers
- Workshop/woodwork
- Viewing nursery/objects/people from different viewpoints/angles

- Map-making; plans, diagrams e.g. from the Bauplay
- Planning and making routes in the Garden using maps
- Books and stories

Measurement
- Sand and water play - filling, emptying containers, jugs, water wheels,
- Measurements of spoonfuls or cups when cooking, making dough or mixing paint.
- Self-service drinks table (full cup)
- Unit blocks
- Calendars, diaries and clock
- Days of the week at story time
- Daily/weekly routines and events
- Graded inset puzzles; ordering equipment
- Metre stick, rulers
- Toy money/real shopping trips
- Cooking –numbered spoonfuls, full cups, timing, sharing
- Estimating
- Workshop
- Comparing children's heights - against wall, by drawing, cutting, silhouettes etc.
- Digging, climbing
- Gardening
- Snack time; pouring a cup of water, milk, cutting fruit & vegetables (full, empty, half full, half, quarter, whole)

Pattern
- Music activities
- Pegs and peg board
- Mosaic tablets
- Natural objects - shells, feathers, fur
- Threading
- Man-made - brick walls, carpets, wallpaper, borders
- Collage, graphics
- Sequencing blocks/games
- Sequence of events using visual schedules
- Use of mirrors for reflection and symmetry
- Book design/illustrations
- Repetition in stories
- Ordinal numbers - 1st, 2nd, 3rd in games etc.

It is important that children have the opportunity to record their mathematical observations, knowledge and understanding throughout the nursery. We therefore have paper, pencils, and clipboards in each area, inside and outside. Children will be encouraged to use a variety of means of representing things mathematically - tallying, drawing, charts, numbers. Large chalks and large pieces of paper supplement recording in the garden.

Problem Solving
This is a skill that children need to develop. It applies to all areas of mathematical

development (as well as other areas of the curriculum). It has a very particular place in maths. It can promote collaborative team effort as well as individual learning; it is a means by which children can both demonstrate and increase their understanding of concepts.

It can be a very useful starting point for planning mathematical activities and experiences as well as assessing children's knowledge. It can help to integrate and consolidate children's knowledge and experience. It is a skill/approach that can be applied and exploited in lots of situations that occur every day in the nursery that may not at first appear to have a mathematical content. For example, after a week of heavy rain the sand pit is water logged. We can tell the children not to play there. Or we can turn it into a learning opportunity by asking them "How we can make the sand pit suitable for playing in?" We need to avoid having a one and only "right" answer in mind. Children must be able to try out their range of suggestions if they are to develop as confident problem-solvers.

Weekly Maths Teaching

Story, song & rhyme bags
Reading mathematical books regularly means children have frequent opportunities to revisit and talk about concepts they are learning. Reading books with adults and peers offers children the opportunity to discuss their thinking and develop their ideas on a topic.

'Stories allow children to relate to their own lives through contextualisation. Having illustrations also means abstract concepts can be more meaningful as they are represented visually' (NCETM, 2019).

In addition to our curriculum and enabling environment, once a week during story time, there is a focus on rhymes, songs and stories that have a mathematical theme. Books are read in order of progression and aim to develop children's knowledge, skills and understanding of mathematical concepts through the story. Copies of some of these are kept in the book basket in the maths area which can be changed throughout the year. They can be referred to by children in their play and support adults teaching specific concepts.

We have a list of core maths songs and rhymes displayed in both rooms and in story baskets. Children should know these songs and rhymes really well by the time they leave nursery. They include '1,2,3,4,5, Once I Caught a Fish Alive' and 'Five Little Speckled Frogs'. These are chosen to promote counting in sequence, counting with correspondence and have a strong repetitive structure. Most song/ rhyme has a prop bag with corresponding magnetic props.

Record keeping

Staff should make short notes/ observations on the following:

- Children's developing number, shape, space, measure and pattern skills
- Precise recording of children's knowledge e.g. record which numbers children recognise, what number they can count to using 1:1 correspondence, conservation of number, shape recognition etc.
- Termly tracking should also be used to plan for children who are not on track.

Conclusion
Our Early Years Mathematics Policy reflects our commitment to nurturing mathematical

curiosity, fostering problem-solving skills, and developing numeracy capabilities in our young learners. By providing a stimulating and inclusive environment, we aim to instil a positive attitude towards mathematics and lay a strong foundation for lifelong mathematical learning.