Maths at St Bridget's Primary School

At St Bridget's Primary School, we strive for our children to be successful and proficient mathematicians. Our intent is to ensure that every child, regardless of background, has a rich and meaningful mathematics education.

Mathematics is a creative and highly inter-connected discipline and is essential to everyday life and critical to science, technology and engineering. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

We want our children to love Maths! We foster a growth mind-set culture and instil the mind-set in every child and staff member that everyone can do maths!

* We believe that if you can't do it, you can't do it yet!
* Mistakes are valuable and help us learn.
* Questions are really important and asking questions deepens our understanding.
* Mathematics is about making connections and communicating what we think.
* Mathematics is about being creative and problem solving.
* Mathematics is about being fluent and flexible.
* Deep understanding of maths is much more important than speed.

We follow a Teaching for Mastery approach, believing that mastering a mathematical concept is achievable for all children, teaching for secure and deep understanding of mathematical concepts through manageable steps, making connections and developing reasoning alongside procedural and conceptual fluency.

Intent, Implementation and Impact of Mathematics in EYFS

Our intent in EYFS is to ensure that all children develop firm mathematical foundations in a way that is engaging, and appropriate for their age.
There are six key areas of early mathematics learning, which collectively provide a platform for everything children will encounter as they progress through their maths learning at primary school, and beyond.

SIX KEY AREAS OF EARLY MATHEMATICS LEARNING

Cardinality and Counting

The cardinal value of a number refers to the quantity of things it represents, e.g. the numerosity, 'howmanyness', or '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. Subitising is another way of recognising how many there are, without counting.

Comparison

Comparing numbers involves knowing which numbers are worth more or less than each other. This depends both on understanding cardinal values of numbers and also knowing that the later counting numbers are worth more (because the next number is always one more). This understanding underpins the mental number line which children will develop later, which represents the relative value of numbers. i.e. how much bigger or smaller they are than each other.

Composition

Knowing numbers are made up of two or more other smaller numbers involves 'part-whole' understanding. Learning to 'see' a whole number and its parts at the same time is a key development in children's number understanding. Partitioning numbers into other numbers and putting them back together again underpins understanding of addition and subtraction as inverse operations.

Pattern

Seeking and exploring patterns is at the heart of mathematics. Developing an awareness of pattern helps young children to notice and understand mathematical relationships. Patterns may provide the foundations of algebraic thinking, since they provide the opportunity for young children to observe and verbalise generalisations.

The focus in this section is on repeating patterns, progressing from children copying simple alternating AB patterns to identifying different structures in the 'unit of repeat', such as ABB or ABBC. Patterns can be made with objects like coloured cubes, small toys, buttons and keys, and with outdoor materials like pine cones, leaves or large blocks, as well as with movements and sounds, linking with music, dance, phonics and rhymes. Children can also spot and create patterns in a range of other contexts, such as printed patterns, timetables, numbers and stories.

Shape and Space

Mathematically, the areas of shape and space are about developing visualising skills and understanding relationships, such as the effects of movement and combining shapes together, rather than just knowing vocabulary. Spatial skills are important for understanding other areas of maths and children need structured experiences to ensure they develop these. Here, the focus is on actively exploring spatial relations and the properties of shapes, in order to develop mathematical thinking (rather than on shape classification, which requires prior knowledge of properties). This section is concerned with developing the two aspects of spatial awareness and shape awareness, with some progression identified within each.

Measures

Mathematically, measuring is based on the idea of using numbers of units in order to compare attributes, such as length or capacity. Although young children engage with using rulers and experience being measured in centimetres, kilos – and years! – the measuring units themselves are hard to understand. Children need to realise which attribute is being measured, e.g. weight as opposed to size, and the idea of conservation: that the amount stays the same, even if the appearance alters, e.g. if dough is stretched out or in bits. In order to understand units, they need to realise that two items can be compared using a third item, or 'go between', such as a stick.

Finally, children need to understand how equal size units are used repeatedly to express an amount as a number. While young children can engage actively in making comparisons and exploring equivalence of length, volume, capacity and weight in different ways, some of these ideas are challenging and will develop later in primary school.

For instance, weight (mass or density) is difficult to distinguish from size since it is invisible, and the concept of conservation is harder to understand for weight and capacity. Measuring with non-standard units of different sizes in order to appreciate the need for equal units is less effective with younger children, so centimetre cubes are recommended as accessible units. While time

is also elusive to measure, young children can sequence events and, for example, count 'sleeps'. (Money as a measure of value is too advanced to consider here.)

EYFS and KS1 teachers are currently working with the NCETM Maths Hubs in their year group specific work groups to implementing the 'Mastering Number Programme 2021-22.' This programme develops solid number sense, including fluency and flexibility with number facts, which will have a lasting impact on future learning for all children. This programme also involves high quality professional development for teachers. The mastering Number programme is wholly consistent with teaching for mastery.

In the EYFS we follow the 'Statutory Framework for the Early Years Foundation Stage'

There are two Early Learning Goals for Mathematics:-
Mathematics Early Learning Goal: Number
Children at the expected level of development will: - 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.
Early Learning Goal: Numerical Patterns
Children at the expected level of development will: - 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.

Impact

Pupils' skill, knowledge and understanding is assessed against the EYFS Early Learning Goals. The impact of the curriculum on learners will be monitored primarily by the class teacher who is responsible for all teacher assessment. Teacher assessment is recorded each term. The Maths Leads, EYFS Lead and Headteacher monitor progress on a regular basis in the form of observations, data analysis, pupil progress meetings and work sampling.
Formative Assessment will be a key part of every lesson. The teacher will share the objectives for the lesson with the children and make sure they are clear what is being expected of them to successfully achieve the objective. The short-term assessment will also involve the teacher checking the children's understanding at the end of the session to inform future planning and lessons. Summative assessment is undertaken against the ELGs.

Ultimately, the impact of the EYFS Maths curriculum will be measured in the children's attitudes to Mathematics alongside outcomes for learners across the Key Stage and in the statutory end of key stage assessment in the ELGs.

Intent, Implementation and Impact of Mathematics in KS1

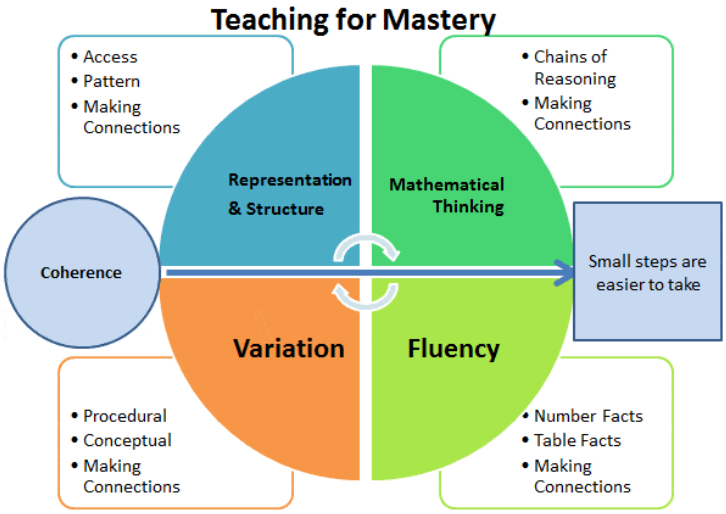
Curriculum Intent and Implementation

In line with the National Curriculum objectives for Mathematics, our intent is 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.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.
The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Central to our approach are the 5 Big Ideas which underpin Mastery in Mathematics (NCETM) - the diagram below is used to help bind these ideas together:-



Here's a flavour of what lies behind them:

Coherence

Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Representation and Structure

Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation

Mathematical Thinking

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others

Fluency

Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics

Variation

Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

The national curriculum for mathematics reflects the importance of spoken language in pupils' development across the whole curriculum – cognitively, socially and linguistically. The quality and variety of language that pupils hear and speak

are key factors in developing their mathematical vocabulary and presenting a mathematical justification, argument or proof. They must be assisted in making their thinking clear to themselves as well as others and teachers should ensure that pupils build secure foundations by using discussion to probe and remedy their misconceptions.
We expect and encourage children to use mathematical language to describe, discuss, examine, justify and synthesise. Children discuss mathematical concepts and approaches and share their ideas and approaches while using the correct terminology.

To further enhance our Mathematics curriculum, EYFS and KS1 teachers are currently working with the NCETM Maths Hubs in their year group specific work groups to implementing the 'Mastering Number Programme 2021-22.' This programme develops solid number sense, including fluency and flexibility with number facts, which will have a lasting impact on future learning for all children. This programme also involves high quality professional development for teachers. The mastering Number programme is wholly consistent with teaching for mastery.

Impact

Pupils' skill, knowledge and understanding is assessed against the National Curriculum attainment targets. The impact of the curriculum on learners will be monitored primarily by the class teacher who is responsible for all teacher assessment. Teacher assessment is recorded each term. The Maths Leads, KS1 teachers and Headteacher monitor progress on a regular basis in the form of observations, data analysis, pupil progress meetings and work sampling.
Formative Assessment will be a key part of every lesson. The teacher will share the objectives for the lesson with the children and make sure they are clear what is being expected of them to successfully achieve the objective. The short-term assessment will also involve the teacher checking the children's understanding at the end of the session to inform future planning and lessons.
Summative assessment is undertaken using standardised tests at intervals determined by the Headteacher.
Ultimately, the impact of the KS1 Maths curriculum will be measured in the children's attitudes to Mathematics alongside outcomes for learners across the Key Stage and in the nationally released data from KS1 SATS.

Intent, Implementation and Impact of Mathematics in KS2

Our ambition is to ensure our maths curriculum is accessible to all and caters for every child's ability, whilst ensuring we provide every opportunity for children to reach their full potential. We believe Mathematics is a tool for everyday life. Mathematics teaches us how to make sense of the world around us. Our maths curriculum enables us to develop children's ability to calculate, communicate, reason and solve problems.

We endeavour to ensure all children become fluent in the fundamentals of mathematics so that they develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately. We deliver lessons that are creative and engaging. We want children to make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems using a Concrete, Pictorial, into Abstract approach.

We intend for our pupils to be able to apply their mathematical knowledge to Science and across a range of other subjects. We want children to recognise that Mathematics has developed over centuries and has been the fundamental basis for huge advances in Science, Engineering, Technology and Sport.

We believe in making mathematical learning come alive within a real-life context and endeavour to make sure that the children realise the subject is essential to everyday life and financial literacy. Irrespective of year group, we want our children to have the ability to reason mathematically and have an appreciation of the beauty and power of mathematics, whilst embracing a sense of enjoyment and curiosity about the subject. We strive for all to be actively engaged in their own learning, to be motivated and eager and to achieve and attain to their full potential in Mathematics.

Implementation

Planning is based on National Curriculum objectives with priority given to those objectives covered in the NCETM Ready to Progress materials and documents. Teachers select materials from a variety of sources, such as White Rose Maths, to support their planning. A mastery approach to learning is fundamental to planning. Lessons are designed so that conceptual understanding underpins learning, and that opportunities are provided to embed learning before moving on to the next step. Lessons are planned and sequenced so that new knowledge and skills build on what has been taught before. As mathematics is a logically

structured subject, based on a set of axioms, gaps in understanding directly impact on subsequent learning.

The aim of all lessons is to develop children's knowledge, understanding and skills, applying these to a variety of contexts.

Maths lessons do not need to fit a specific format. However, when planning a sequence of lessons, teachers will:

• Use precise questioning to test conceptual and procedural knowledge.
• Know how and when manipulatives should be used to scaffold difficult tasks or enhance understanding.
• Introduce new concepts in small steps.
• Provide opportunities to use skills in a range of contexts.
• Include tasks and challenge questions which challenge pupils to apply and deepen their learning and mathematical reasoning.
• Provide opportunities for individual, group and whole-class activities and discussions.
• Ensure the use of high-quality maths language. (Pupils should read, spell and pronounce mathematical vocabulary correctly).
• Provide opportunities to work with a computer as a mathematical tool.
• Revisit concepts and number facts to ensure learning is committed to long term memory.

Revisiting prior learning can be done as part of a daily maths lesson but can also take place separately as a quick activity, or quiz.

Daily opportunities are needed for pupils to practise and improve their mental maths skills as well as their written calculations. These should be structured so that children are encouraged to strive to improve their time and score each week.

Calculation Policy

Staff refer to the Calculation Policy when teaching formal methods, while recognising that sometimes pupils find or adapt their own efficient methods along the way. All children also have access to their own personal account of 'Times Tables Rockstar' where they can practise individually and compete against other pupils and classes in school to develop fluency.

Impact

Pupils' skill, knowledge and understanding is assessed against the National Curriculum attainment targets. The impact of the curriculum on learners will be monitored primarily by the class teacher who is responsible for all teacher assessment. Teacher assessment is recorded each term. The Maths Lead, KS2 teacher and Headteacher monitor progress on a regular basis in the form of observations, data analysis, pupil progress meetings and work sampling.

Formative Assessment will be a key part of every lesson. The teacher will share the objectives for the lesson with the children and make sure they are clear what is being expected of them to successfully achieve the objective. The short-term assessment will also involve the teacher checking the children's understanding at the end of the session to inform future planning and lessons.

Summative assessment is undertaken using standardised tests at intervals determined by the Headteacher. Ultimately, the impact of the KS2 Maths curriculum will be measured in the children's attitudes to Mathematics alongside outcomes for learners across the Key Stage and in the nationally released data from Year 4 MTC and KS2 SATS.