

# GRESHAM PRIMARY SCHOOL

# MATHEMATICS POLICY

## April 2024

Policy Updated: April 2024  
Date for Next Update: April 2026

Signed by:

_____	Headteacher	Date: _____
_____	Chair of governors	Date: _____

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## INTENT AND AIMS

***“Mathematics is a creative and highly interconnected discipline that has been developed over centuries, providing the solution to some of history’s most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment.” (National Curriculum, 2014)***

At Gresham Primary School, we believe that all children can and will achieve in mathematics. It is our responsibility, as teachers and leaders, to provide an environment and experiences that enable children to -

- become fluent in the fundamentals of mathematics;
- develop a deep understanding of the fundamentals of mathematics;
- develop the ability to reason and solve problems.

### **The National Curriculum**

The national curriculum identifies three key strands in Maths:

**Fluency** – the ability to recall fundamental mathematical concepts and skills rapidly and accurately.

**Reasoning** – being able to explain an answer, prove something correct or incorrect, use enquiry skills to ask key questions, and make predictions and spot patterns within mathematics.

**Problem Solving** - applying mathematics to a variety of problems, including breaking down problems into a series of simpler steps and persevering in seeking different solutions.

Gresham Primary School uses the national guidance and cognitive science to inform the teaching of mathematics.

### **A Mastery Approach**

In order to give all children the opportunity to achieve the above outcomes, Gresham Primary School is implementing a maths mastery approach. Children are deemed to have ‘mastered’ a particular objective when they are able to build on it to develop understanding of new mathematics. For each objective, children must have enough conceptual and procedural fluency to enable them to solve non-routine problems in unfamiliar contexts without relying on memorised procedures. Our teaching for mastery approach is underpinned by the NCETM’s 5 big ideas.

The Five Big Ideas which underpin teaching for mastery:

**Coherence** - Lessons are broken down in to 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.



## LESSON STRUCTURE AND CONTENT

### Whole-Class Teaching

All children are taught as a whole class, and each child is given access to the same lesson content. All children will attempt the same, core tasks. Appropriate support is available for any child who might need it, and there are opportunities to deepen learning even further through the provision of more challenging questions and activities (Diving Deeper Challenges). It is expected that those who finish the core tasks before the majority of the class - and show solid understanding - give highly accurate answers and top quality, in-depth explanations.

Lessons are commonly taught using an episodic style or 'ping pong' approach, so called because the teacher orchestrates a continual back-and-forth dialogue with the children, using questions, short tasks, explanations, reviews, demonstrations and discussions. This enables the teacher to vary the pace and direction of the lesson if necessary, and to continuously monitor the progress of the class. This allows teachers to quickly identify any misconceptions and address them within the lesson. Typically, lessons include the following elements: retrieval, recap, vocabulary exploration, standard



representations, non-standard representations, non-concepts, fluency, reasoning and problems solving. Not all aspects are necessary in all lessons: teachers retain some autonomy in deciding what is most appropriate in each lesson.

Where needed, additional support may be given in the following ways: manipulatives, further use of representations, carefully directed questioning, additional time and activities to consolidate understanding and the use of flexible focus groups. Interventions are offered outside of lesson time to further support those who may not grasp concepts fully. For more information around support of special needs, please see the SEND Policy.

**Problem-solving**



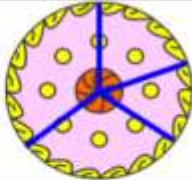



Problem solving is not seen as a separate activity but rather is embedded in every lesson. Carefully chosen contexts are provided for the abstract mathematical concepts being taught to provide extra scaffolding and so that children can develop their reasoning skills. Using predominantly White Rose resources, teachers create short, independent tasks for children to complete to consolidate learning and to assist with formative assessment. Children who grasp concepts rapidly are challenged through the provision of rich and sophisticated tasks or questions rather than being accelerated onto new content. Time is given to review problems, identifying possible approaches and good examples of reasoning.

‘Goal Free’ problems are routinely used in lessons. With just a picture, sentence, table or graph, the goal is left to the children. With a conventional goal specific problem, concerns about the final goal can intrude upon thinking and overwhelm the working memory. The children’s attention is split between thinking about the first step and thinking about the other steps that they need to take next. By limited the cognitive load on children, the working memory is freed up to explore the presentation and glean information and allows children to work on parts of the question one at a time, rather than being overwhelmed trying to solve every part at once. Goal free problems, also provide opportunities for children to make more links in their learning, both retrospectively and prospectively. Goal free problems provide an activity all children can access at their own ability. Their discussions also provide a useful assessment opportunity for teachers. Below are examples of a Goal Specific Problem and a Goal Free Problem:

Goal Specific Problem	Goal Free Problem
<p data-bbox="220 1532 422 1547">Aly and Jack buy some stickers.</p> <div data-bbox="245 1585 647 1756">  </div> <p data-bbox="264 1771 389 1809">Pack of 12 stickers £10.49</p> <p data-bbox="539 1771 608 1809">12 stickers 99p each</p> <p data-bbox="220 1843 475 1859">Aly buys a pack of 12 stickers for £10.49</p> <p data-bbox="220 1877 475 1892">Jack buys 12 single stickers for 99p each.</p> <p data-bbox="204 1973 715 2002"><b>How much more does Jack pay than Ally?</b></p>	<p data-bbox="825 1532 1027 1547">Aly and Jack buy some stickers.</p> <div data-bbox="850 1585 1252 1756">  </div> <p data-bbox="869 1771 994 1809">Pack of 12 stickers £10.49</p> <p data-bbox="1144 1771 1212 1809">12 stickers 99p each</p> <p data-bbox="825 1843 1080 1859">Aly buys a pack of 12 stickers for £10.49</p> <p data-bbox="825 1877 1080 1892">Jack buys 12 single stickers for 99p each.</p> <p data-bbox="809 1973 1112 2002"><b>What can you work out?</b></p>

## Many and Varied Representations

A great deal of emphasis is placed on developing children's conceptual understanding. The majority of ideas in maths are entirely abstract, generally characterised by a string of symbols that, without an understanding of what they signify, are meaningless. In order for children to attach meaning to these abstract ideas, we need to expose them to the underlying mathematical structure. This is done through the use of concrete and pictorial resources, which help children to construct a mental image of the maths. To ensure that children gain a comprehensive understanding of each concept, teachers provide sufficient variation in the representations and examples that they give.

standard	non-standard	non-concept
		
$76 = 70 + 6$ 	$76 = 60 + 16$ 	$76 = 7 + 6$ 

Teachers also think carefully about the order in which they present questions so that important features of a concept or strategy are emphasised.

## Retrieval Practice and Fluency

Daily opportunities are also given to improving children's procedural fluency; that is their ability to recall core number facts (including addition, subtraction, multiplication and division facts) quickly and efficiently. Children are expected to learn some facts off by heart and they are taught mental strategies to quickly derive others. Children in every class are given daily opportunities in school to practise and develop their procedural fluency. Children in Years 2 to 6 use Times Tables Rockstars at home and at school to support them to be able to recall rapidly the times tables.

The daily 'Maths Mix Up' is used as regular retrieval practice in which children are asked questions from previous learning and from a range of topics. These are achievable (not new content that requires explanation) and completed and reviewed with 10 or 15 minutes. Extension opportunities are built into this for 'fast finishers' to provide addition challenge.

## Language

Developing and using accurate mathematical language is essential. Children are expected to use precise mathematical language and to speak in full sentences so that mathematical ideas are conveyed with clarity. Vocabulary is routinely taught in maths lessons to ensure children have the tools to both understand and communicate their thoughts.

## MATHS IN THE EARLY YEARS

Teachers in the EYFS ensure the children learn through a mixture of adult led activities and child-initiated activities both inside and outside of the classroom. Mathematics is taught through an integrated approach. This is supported by the Birth to 5 Matters non statutory guidance as well as White Rose Medium term plans for EYFS Maths.

Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers.

By providing frequent and varied opportunities to build and apply this understanding - such as using manipulatives, including small pebbles and tens frames for organising counting - children develop a secure base of knowledge and vocabulary from which mastery of mathematics is built.

The curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures.

children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes.

At the end of the reception year, children are assessed against the early learning goals (ELGs). There are two elements for the mathematics ELGs, number and numerical pattern. The mathematics ELGs are as follows:

ELG: 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.

ELG: 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.

## **PLANNING AND ASSESSMENT OF MATHS**

The Gresham Maths Curriculum Map (underpinned by the White Rose scheme) outlines the order of topics as acts at teacher long term planning. To ensure teachers' time is used most effectively, weekly or daily lesson plans are not expected. Instead, lessons can be planned directly onto the lesson slides. These in turn can be shared with other adults in the class.

Formative assessment is continually used to inform planning and next steps. To ensure teachers have a firm grasp of what children have learnt over the course of a unit, end of unit assessment are given to at least years 2-6. These are short, low stakes tests. Children also complete tests which span several topics at the end of term. Teachers provide a final assessment against key objectives at the end of the year.

For detail on marking and feedback, please see the Feedback and Marking Policy.

## **DISPLAY AND RESOURCES**

In the classrooms there should be, either on display or easily accessible to children, age appropriate resources and manipulatives.

Mathematical vocabulary should be displayed so that children use this to demonstrate their understanding.

There should be maths learning on display in classrooms to encourage a positive attitude and enthusiasm towards mathematics for all groups of children.

A 'learning wall' should be visible in class to promote the teaching and learning of mathematics, to enjoy their successes and to make links to prior learning.

## **LEADERSHIP**

The subject leader is responsible for updating the mathematics policy, and making sure it reflects current mathematic schemes and initiatives both nationally, and within Gresham.

Identifying key focuses from the SIP and ensuring that teaching and learning in maths is helping Gresham to meet these targets. This includes analysing and reporting on data.

Monitoring and checking the quality of lesson. This can take the form of book scrutinies, lesson observations, learning walks and pupil interviews.

The subject leader carries out Pupil Progress Meetings with staff on a termly basis to discuss mathematics achievement within each class.

Being responsible for managing intervention 'booster' groups for children across the school either before or after school.

Maintaining a positive attitude to mathematics and actively encouraging this throughout the school by 'drop-ins' to classes, speaking to pupils and by enthusing with them about their learning in maths.

To read updates from the DfE regarding the introduction of new government initiatives.

Organising and running staff training and providing CPD and INSET training for staff.

## **HOME LEARNING**

Home learning is used to embed and consolidate the mathematical learning that has been happening in class.



Children from Year 1 to Year 6 children complete Times Tables Rockstars activities on line.

Children from Year 1 to Year 4 are given a specific times table to learn weekly. They are tested on this times table and the scores are recorded. Times tables underpin a many mathematical concepts and can help children make links to prior learning with increasing ease. Year 4 children will be tested on their times tables up to 12 x 12 and this practise will prepare them for this.

Children may be given a specific maths task to complete as part of their home learning. This could be a written task or they may be asked to practise a specific skill. This will often be a way to consolidate or pre-teach the mathematics objectives the children are studying in class.

Online learning is used for children to practise and consolidate their recent work in class. Children in Year 1 to Year 6 can use MyMaths where teachers log in to set specific tasks for children to complete from home. Reception children are given access to similar online programmes and websites from both home and school.

### **Monitoring and Review**

This policy is reviewed biennially by the headteacher. Any changes or amendments to this policy will be communicated to all staff members by the headteacher. The scheduled review date for this policy is April 2026.