



# **Mathematics Policy**

**Updated: September 2023**  
**Next Review: September 2024**

This policy will be reviewed **at least** annually. It will also be revised following any concerns and/or updates to national and local guidance or procedures.

## **Curriculum Statement**

### **Intent**

The 2014 Primary National Curriculum for mathematics differs from its predecessor in many ways. One such difference is the emphasis on depth before breadth and a greater expectation of what children should achieve. This is known as the Mastery approach.

The 2014 National Curriculum for Mathematics have three core aims that all children:

- Become fluent in the fundamentals of Mathematics
- Are able to reason mathematically
- Can solve problems by applying their Mathematics

At the centre of the mastery approach to the teaching of mathematics is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems. Similarly, with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete materials and pictorial representations.

The 2014 National Curriculum is explicit in articulating the importance of children using the correct mathematical language as a central part of their learning (reasoning). Indeed, in certain year groups, the non-statutory guidance highlights the requirement for children to extend their language around certain concepts. It is therefore essential that teaching using the strategies outlined in this policy is accompanied by the use of appropriate and precise mathematical vocabulary. New vocabulary should be introduced in a suitable context (for example, with relevant real objects, apparatus, pictures or diagrams) and explained carefully. High expectations of the mathematical language used are essential, with teachers only accepting what is correct.

At Green Park Community Primary School, these skills are embedded within Mathematics lessons and developed consistently over time. We are committed to ensuring that children are able to recognise the importance of Mathematics in the wider world and that they are also able to use their mathematical skills and knowledge confidently in their lives in a range of different contexts.

We want all children to enjoy Mathematics and to experience success in the subject, with the ability to reason mathematically. We are committed to developing children's curiosity about the subject, as well as an appreciation of the beauty and power of Mathematics.

### **Implementation**

The principles and content adopted by the 2014 Mathematics curriculum reflect those found in particularly high-performing education systems from around the globe, notably Singapore, South Korea, Japan and China. Following the National Curriculum, Green Park implements the following practices in the teaching of Mathematics:

- Teachers reinforce an expectation that all children are capable of achieving high standards in Mathematics.
- The large majority of children progress through the curriculum content at the same pace; Significant time is spent developing deep knowledge of the key ideas that are needed to underpin future learning. This ensures that all can master concepts before moving to the next part of the curriculum sequence, allowing no pupil to be left behind.
- If a pupil fails to grasp a concept or procedure, this is identified quickly and early intervention ensures the pupil is ready to move forward with the whole class in the next lesson.
- The structure and connections within the mathematics are emphasised, so that pupils develop deep learning that can be sustained.
- Lesson design identifies the new mathematics that is to be taught, the key points, the difficult points and a carefully sequenced journey through the learning. In a typical lesson pupils sit facing the teacher and the teacher leads back and forth interaction, including questioning, short tasks, explanation, demonstration, and discussion.
- Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts.
- Teachers use precise questioning in class to test conceptual and procedural knowledge and assess children regularly to identify those requiring intervention, so that all children keep up.
- Children's explanations and their proficiency in articulating mathematical reasoning, with the precise use of mathematical vocabulary, are supported through the use of stem sentences provided by the teacher.
- Key facts such as multiplication tables and addition facts within 10 are learnt to automaticity to avoid cognitive overload in the working memory and enable pupils to focus on new concepts.

Source: <https://www.ncetm.org.uk/media/uhjhtxy1/the-essence-of-maths-teaching-for-mastery-june-2016.pdf>

To ensure that all teachers are using a consistent approach to the teaching of Mathematics, Green Park follows the nationally recognised and accredited White Rose Maths scheme of learning. White Rose Maths is designed as a cumulative curriculum, where each aspect of Mathematics is introduced and revisited multiple times over the course of a school year and builds upon a child's existing knowledge and understanding from EYFS to Year 6. Not only are these aspects revisited, they are also applied in other contexts, for example Place Value is taught as a unit, but is also drawn upon in Addition and Subtraction and Multiplication and Division. The EYFS scheme of learning is designed to ensure that children have a deep and secure understanding of number, as without this, accessing the rest of the National Curriculum becomes unfeasible.

Lessons follow a consistent format, aimed at reducing cognitive overload, and therefore allowing children to dedicate their working memory to the learning at hand. Each session begins with a review of previously encountered learning, to ensure that through repetition this learning is not lost and strengthen the neural pathways that support the rapid processing of mathematical processes. Following this, children will encounter a piece of new learning that builds upon their existing Mathematical schema and use guided and independent tasks to develop fluency. Once fluency has been achieved, children will encounter reasoning and problem solving tasks that are designed to get children applying their mathematical knowledge to real life problems and thinking about the 'why' when giving explanations and reasons.

At Green Park, we support Mathematical learning through the Concrete-Pictorial-Abstract approach. Children will begin by using concrete objects (such as: multilink cubes, counters, Base10) to physically represent the numbers they are working with. Once confident with these, children move to using pictorial representations (drawings) alongside the concrete objects and then to pictorial representations alone. Finally, children move onto the abstract stage, where they are able to solve a range of mathematical problems and equations using only the numerals and symbols to represent the processes.

White Rose Maths splits the teaching of mathematical concepts into 'blocks', which in turn are broken down into individual 'small steps'. This approach means that learning is granular and sequential, building on prior learning to build a well connected schema (mental model) for each concept. This also has the added benefit of teaching one small thing at a time, which reduced the chances of cognitive overload, where a child is presented with more new learning than their working memory can handle. Using this mastery approach, children who successfully master a concept have the opportunity to explore the concept in 'greater depth' with the support of extra challenges putting learning into practical contexts.

Children take part in a range of Mathematics interventions, including the use of Times Tables Rock Stars and Numbots to develop fluency and the use of Pixl therapies to plug gaps identified through regular teacher assessment.

At Green Park, we ensure that all staff are continually developing their understanding of the underpinning pedagogy through regular bite-sized training sessions, using the White Rose Maths CPD materials as a core resource. All staff have access to this training programme which teaches the five principles of:

- Bar Modelling
- Concrete, Pictorial and Abstract Methods
- Thinking Through Variation
- Reasoning and Problem Solving
- Mathematical Talk and Questioning

as well as delivering year group and block specific, on-demand training.

## **Impact**

Green Park has a supportive ethos and our approaches support the children in developing their collaborative and independent skills, as well as empathy and the need to recognise the achievement of others.

Often children can underperform in Mathematics due to the misconception that it is too difficult; or they lack the natural ability to succeed. By implementing the White Rose Maths scheme of

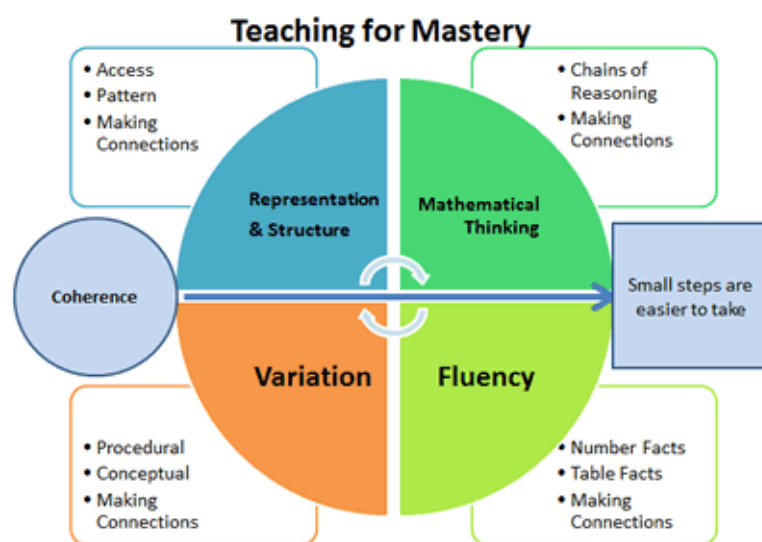
learning, we are working to overcome these barriers to success, by breaking down the learning into manageable chunks, building on prior knowledge and giving children of all abilities the opportunity to experience a level of challenge, but ultimately success in Mathematics through the development of a growth mindset.

Regular and ongoing assessment informs teaching, as well as intervention, to support and enable the success of each child.

These factors ensure that we are able to maintain high standards in Mathematics, with the aim of continuing to strive towards national levels of attainment in Mathematics and increasing the number of those working at greater depth at the end of KS1 and KS2.

From pupil voice surveys, children are able to speak about Mathematics in an increasingly positive way. They comment on the fact that they enjoy being able to use the concrete objects to help support them with their Mathematics and the fact that pictorial representations are often used by their teachers and displayed on Maths Working Walls helps them remember the processes they need to succeed. Some children expressed that they enjoy the reasoning and problem solving at the end of a lesson, because they can use their Mathematical knowledge in real life ways. Children particularly enjoy the use of technology within Mathematics, through apps such as 1-Minute Maths and Times Tables Rock Stars. When asked how their teachers support them if they struggle in Mathematics, children noted that interventions run in the afternoons if they did not understand the learning in a session and need some extra support or practice.

### **Teaching and Learning**



Effective teaching for mastery is underpinned by five big ideas, first published by the National Centre for Excellence (NCETM, 2017).

### **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.

<https://www.ncetm.org.uk/teaching-for-mastery/mastery-explained/five-big-ideas-in-teaching-for-mastery/>

Maths is taught daily during the morning. A typical maths lesson lasts approximately 1 hour and begins with a short revision of previously taught concepts. This ensures understanding is secure before introducing new concepts. The small step for the lesson is then shared with the children and they revisit key concepts from previous learning that support the key learning of the lesson. Children will then complete a range of tasks both as a guided activity with the teacher and then independently to develop fluency. The variation in this part of the lesson enables a deeper understanding of the concept and may include the use of related concrete resources, as well as representations of the problem to provide a secure base of understanding. Throughout the lesson teachers use careful questions to draw out children's discussions and their reasoning and the children learn from misconceptions through whole class reasoning. To support this, the teacher will often use a stem sentence to scaffold children's articulation of mathematical ideas and reasoning, and/or a generalisation that supports application of the concept.

This 'intelligent practice' supports mathematical thinking and enables children to: 'Recognise and use connections among mathematical ideas; understand how mathematical ideas interconnect and build on one another to produce a coherent whole; recognise and apply mathematics in contexts outside of mathematics'. (Annenberg Foundation, 2017)

Some children may struggle with the particular key concept of the lesson, and may receive in the moment support from an adult, such as additional scaffolding, modelling of the calculation procedure, highlighted copies of the task with key vocabulary or methods highlighted. Others will grasp the concept quickly and will be able to be moved on to explore in greater depth using a range of extension problems.

## **Assessment**

At Green Park, teachers give regular in the moment feedback to pupils, both orally and in written form – depending on the task and appropriate to the age and ability of the child. This feedback is vital in developing an effective culture of self-improvement.

The initial review of previous learning is completed as a quick communal task, with children showing their individual responses, allowing the teacher to quickly identify the children who

display gaps in understanding. These will be targeted for additional intervention to plug the gaps.

The fluency section of the lesson allows for assessment of procedural accuracy. The adults in the room will circulate and mark a set of questions, providing written feedback (Tickled Pink, Green for Growth) supporting children who have made more than a recording error. Depending on the age and ability of the children, some classes may use peer and self-marking for this section of the lesson.

Problem solving and reasoning tasks are an opportunity for children to demonstrate that they can apply and explain the newly acquired mathematical knowledge, and make connections to previous learning. Marking of these is completed by an adult who is able to assess which children have achieved the full trilogy of skills within the lesson (Fluency, Problem Solving and Reasoning) and who will need additional same day intervention to address a misconception or practice fluency further.

### **Formative Assessment**

White Rose Maths provides end of block assessments to allow teachers to gain an overview of how well a child has grasped a concept in Mathematics. This gives a picture of which children may have gaps or misconceptions and allows for planning to address these through further lessons or intervention.

Children also complete a weekly Mental Arithmetic paper, which gives the teacher an understanding of the level of fluency in concepts taught so far in the term.

Teachers are also asked to track progress in a Red, Amber, Green, Blue spreadsheet aligned to the small steps of the White Rose Maths scheme of learning. This provides an 'at a glance' view of how a class and individual pupils are performing across a series of lessons and where any individual or group gaps may be.

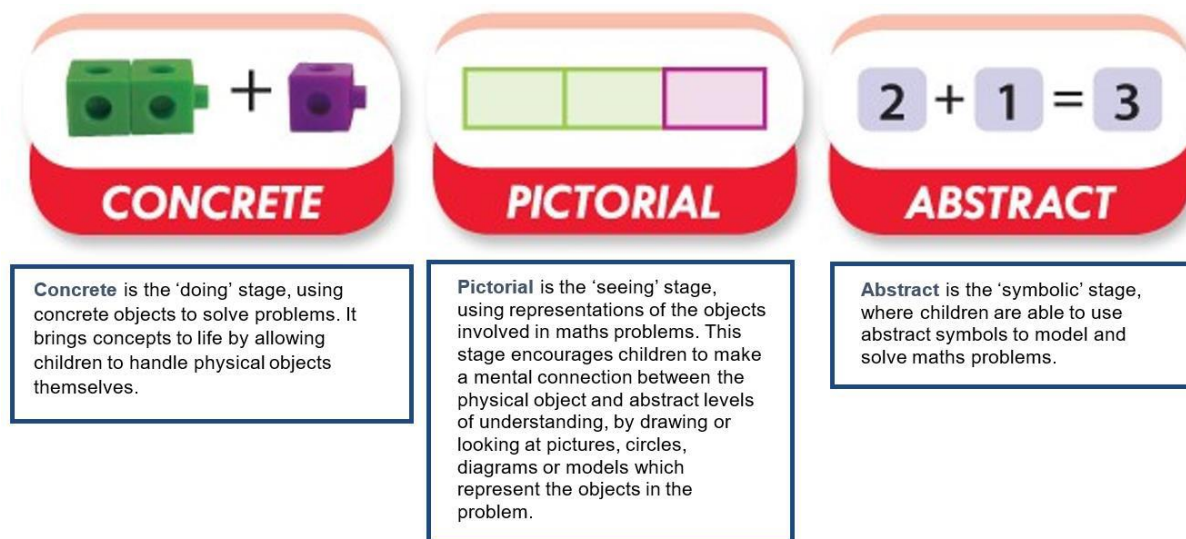
### **Summative Assessment**

At the end of each long term, during assessment week, children are administered an Arithmetic and Problem Solving & Reasoning paper, which covers all the lesson content taught in each of the long terms. The results of these assessment papers allows teachers to make judgements about a pupil's progress and attainment in Mathematics, their gaps in knowledge and understanding and where further intervention is needed to support closing these gaps.



## Planning and Resources

The use of manipulative objects is a key part of the White Rose Maths progression. This links back to the Concrete-Pictorial-Abstract concept:



Classrooms have access to a range of the manipulatives, in line with the resources used in the White Rose Maths scheme of learning and linked to the school's calculation policy. Children are exposed to a range of different representations of the same concept, using different manipulatives and these representations may change as the children progress through the year groups. For example, two-sided counters are used in the lower end of the school and Place Value counters are found in KS2.

Green Park subscribes to the White Rose Maths premium resources, which gives teachers access to the full curriculum, broken down into the small steps, each accompanied by a range of fluency, problem solving and reasoning questions. There are links to key concepts and common misconceptions as well as a bank of STEM sentences for each lesson. The site also provides teaching slides and videos and CPD for staff to understand the accompanying pedagogy for each small step. There are also a range of interactive resources that are compatible with Interactive Whiteboards, which allow teachers to demonstrate concepts with manipulative in front of a whole class.

Teachers are expected to have planning available for the Maths Subject Leader and SLT to view at least a week ahead of time. This ensures that in the event of absence, high quality lessons are ready to be delivered to the children. Whilst the mastery approach expects the majority of children to progress at the same pace, we acknowledge that Quality First Teaching dictates that we differentiate appropriately to meet the needs of our pupils. Teachers are free to source appropriate resources from other schemes, but only when these match the White Rose scheme of learning. Whilst layouts and pictures may differ, the vocabulary and procedures must be the same to ensure fidelity.

The Maths Subject Leader attends termly briefings ensuring that the school stays up to date with statutory guidance, as well as providing a networking opportunity to improve practices at our own school.

## **Curriculum**

### **EYFS**

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:

- Cardinality and Counting
- Comparison
- Composition
- Pattern
- Shape and Space
- Measures

In Reception, Development Matters 2021 informs the content to be covered in Mathematics. Teachers use a combination of the White Rose Maths EYFS scheme of learning and Ten Town to deliver the Mathematic portion of their curriculum to the children.

Children have a short daily Mathematic input, starting with an introduction to numbers to 10 and will complete an adult-led maths task weekly. This task is differentiated, so that children work in one of 8 ability groups to access the task at the correct level of development over the week. This combination of activities keeps children engaged and excited about Mathematics and ensures that they are not cognitively overloaded with too much new learning in one go. For those who struggle with Mathematics, daily interventions are run by the experienced TAs and teachers in the Reception class, with a focus on number sense.

Children also access Child Initiated activities daily, where they are free to explore and use their Mathematical knowledge to attempt simple independent tasks around the key Mathematical concepts. At Green Park we recognise the value of learning through play and the resilience that can be built when children are able to take a role in directing their own learning journey. During Child Initiated time, adults make observations linked back to Development Matters 2021, informing planning and tracking attainment and progress against the age-related expectations.

### **KS1 and KS2**

Through Years 1 to 6 we use a coherent programme of high-quality materials and exercises, which are structured with great care to build deep conceptual knowledge, alongside developing procedural fluency.

Our KS1 and KS2 teachers use White Rose Maths Premium lesson slides, which they adapt accordingly, with children recording their work in exercise books. At Green Park we are conscious to make sure that children are not spending time on unnecessary tasks, such as copying out pictorial representations or long worded questions. Therefore, children may stick in some questions from the scheme of work and answer others by writing out the question and answer.

The structure of a lesson is described in detail in the above teaching and learning section. The progression of both knowledge and skills are available to view on the school website, with links to the National Curriculum coverage and Ready to Progress Criteria.

## **Equal Opportunities (see also Equal Opportunities Policy)**

We will ensure that all children are provided with the same learning opportunities regardless of social class, gender, culture, race, disability or learning difficulties. As a result, we hope to enable all children to develop positive attitudes towards others.

All pupils have equal access to Mathematics and all staff members follow the equal opportunities policy. Resources for SEN children and gifted & talented will be made available to support and challenge appropriately.

## **Inclusion**

Taking a mastery approach, differentiation occurs in the support and intervention provided to different children, not in the topics taught, particularly at earlier stages. The National Curriculum states:

'Children 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.'

There is little differentiation in the content taught but the questioning and scaffolding individual children receive in class as they work through problems will differ, with higher attainers challenged through more demanding problems, which deepen their knowledge of the same content before acceleration onto new content. Children's difficulties and misconceptions are identified through immediate formative assessment and addressed with rapid intervention – commonly through individual or small group support later the same day or within the lesson.

A range of inclusion strategies, disseminated by the SENDCO, are embedded in practice and teachers are aware of the special educational needs of the children in their Maths class, as well as those who have English as an additional language.

Although the expectation is that the majority of children will move through the programmes of study at broadly the same pace, the 2014 National Curriculum states:

'Decisions about when to progress should always be based on the security of children's understanding and their readiness to progress to the next stage.'

If a child's needs are best met by following an alternative plan, including coverage of the content from a previous year, this will be overseen by the SENDCO, in collaboration with the class teacher and with the knowledge of the SLT. Specific arrangements for the provision of children with SEND will be communicated to parents and carers during SEND reviews.

## **Role of the Subject Leader**

- The subject leader will raise the profile of Maths at Green Park Community Primary School through best practice.
- They will model lessons, as appropriate to new staff, ECTs and peers to support continued professional development.
- They will ensure the high quality of Maths displays around the school and involve the school in 'celebrations' of Maths, including participation in events such as 'World Maths Day'.

- The subject leader will support staff in providing opportunities for learning outside the classroom in Maths and will identify and organise opportunities which enable this, as appropriate.
- The subject leader will monitor progression and continuity of Maths throughout the school through lesson observations and regular monitoring of outcomes of work in Maths exercise books.
- The subject leader will ensure that all staff have access to year group plans and the relevant resources which accompany them.
- The subject leader will monitor children's progress through the analysis of whole school data. They will use this data to inform the subject development plan which will detail how standards in the subject are to be maintained and developed further.
- The subject leader will, on a regular basis, organise, audit and purchase central and class-based Maths resources.
- Through attending MSL Briefings, the subject leader will keep up to date on current developments in Maths education and disseminate information to colleagues.
- The subject leader will develop opportunities for parents/carers to become more involved in Maths education.
- The subject leader will ensure that all staff have access to professional development including observations of outstanding practice in the subject.

## **Parents**

- The school recognises that parents and carers have a valuable role to play in supporting their child's mathematical learning. An overview of the Maths curriculum is available on the school's website, as well as guidance in the progression in calculation methods used by the school. Paper copies of these documents are also available on request and the curriculum letter, sent home by each year group, also outlines the Maths topics to be covered.
- Activities which link to each Maths topic are suggested for parents and carers to try at home with their child in each Reception newsletter.
- Children are given Maths homework through weekend Home Discovery tasks from Reception to Year 6. These will link to the topics taught in class and related to the age-related expectations and Ready to Progress Criteria.
- Parents are informed of their child's progress at Parents Evenings and this is also communicated in written school reports.
- Parents and carers are encouraged to speak to their child's Maths teacher at any point during the year, either informally or by making a specific appointment. Information about their child's standards, achievements and future targets in Maths is shared during parent/carer meetings, as well as ways that parents/carers may be able to assist with their child's learning.
- The school also provides a number of opportunities for parents/carers to learn about what their child is learning and the way their child is being taught through Come and Play/Come and Look sessions.