



## The Importance of Mathematics

Mathematics is a creative and highly inter-connected 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 in most forms of employment. A high-quality mathematics education, therefore, provides a foundation for understanding the world, the ability to reason mathematically and a sense of enjoyment and curiosity about the subject.

Mathematics is a proficiency which involves confidence and competence with numbers and measures. It requires an understanding of the number system, a repertoire of computational skills and an ability to solve number problems in a variety of ways in which information is gathered by counting and measuring and is presented in graphs, diagrams, charts and tables.

Mathematics gives children a way of coming to terms with their environment. Practical tasks and real life problems can be approached from a mathematical point of view. Mathematics provides children with imaginative areas of exploration and study and gives them the materials upon which to exercise their mathematical skills. These skills are a necessary tool of everyday life. Mathematics should help children to develop an appreciation of, and enjoyment in, the subject itself; as well as a realisation of its role in other curriculum areas.

## Our Mathematical Intent:

Our aim at Kington Primary School is for all children to enjoy mathematics and have a secure and deep understanding of fundamental mathematical concepts and procedures when they leave us to go to secondary school. We want children to see the mathematics that surrounds them every day and enjoy developing life skills in this subject. We have adopted the Teaching for Mastery and Mastering Number model to help deliver these vital skills.

### Aims for our pupils:

- To develop a growth mindset and positive attitude towards mathematics.
- To become confident and proficient with number, including fluency with mental calculation and look for connections between numbers.
- To become problem solvers, who can reason, think logically, work systematically and apply their knowledge of mathematics.
- To develop their use of mathematical language.
- To become independent learners and to work co-operatively with others.
- To appreciate real-life contexts to learning in mathematics.

### Our children deserve:

- To be set appropriate learning challenges
- To be taught well and be given the opportunity to learn in ways that maximise the chances of success.
- To have adults working with them to tackle the specific barriers to progress they face.

## Teaching for Mastery in Mathematics

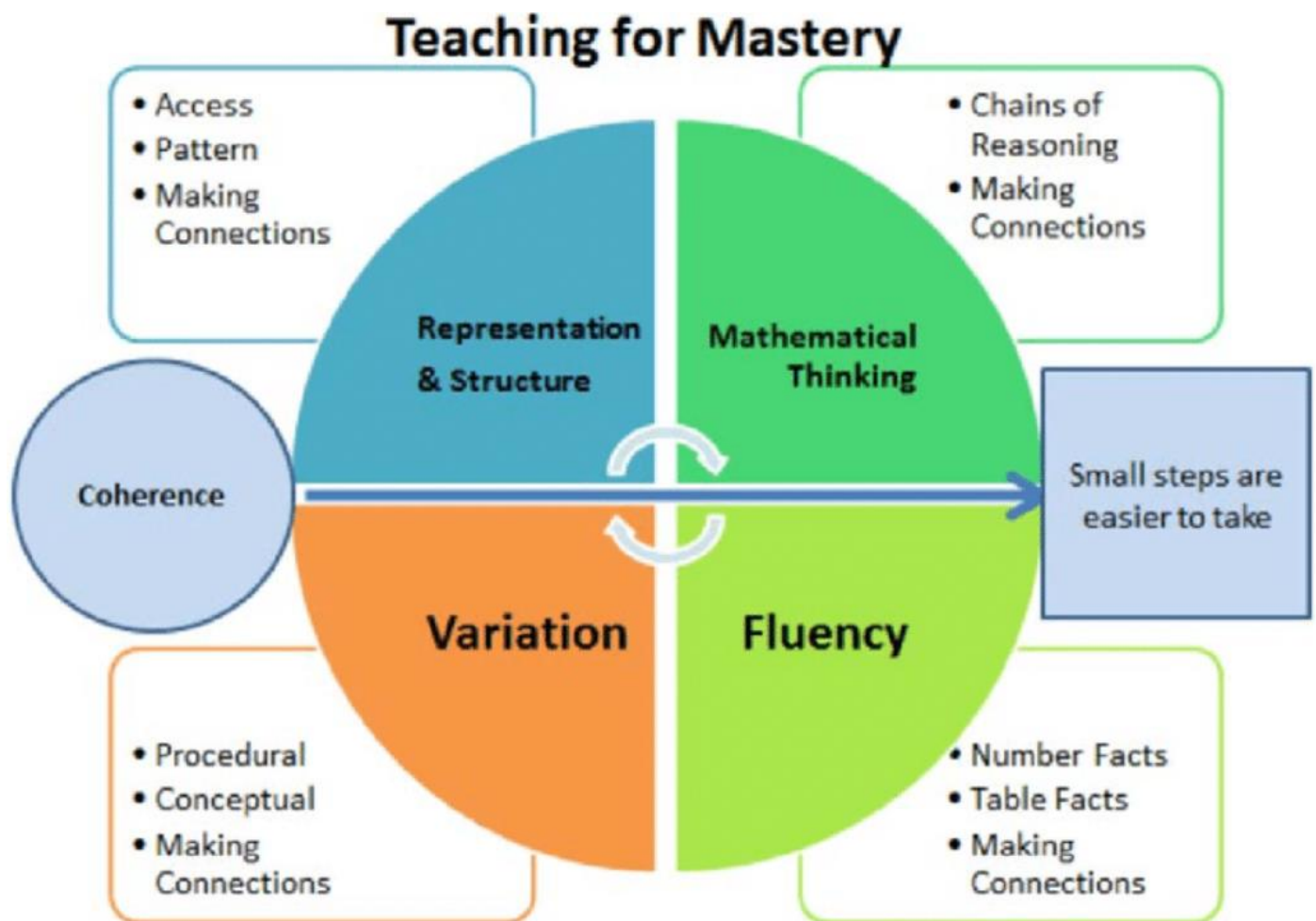
In September 2019, Kington Primary School began transitioning towards a mastery approach to the teaching and learning of mathematics. We understood that this would be a gradual process and take several years to embed. The rationale behind changing our approach to teaching mathematics lay within the NCETM Maths Hub Programme as well as the 2014 National Curriculum, which states:

- The expectation is that most pupils will move through the programmes of study at broadly the same pace.
- 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.

## FLUENCY – REASONING – PROBLEM SOLVING

These three key aims of the National Curriculum should be addressed in each sequence of learning.

### 5 Big Ideas of Mastery <sup>1</sup>



<sup>1</sup> This document has been created using content provided by the NCETM/Maths Hub Mastery Specialist Programme.

### **Our teaching for mastery is underpinned by the NCETM's 5 Big Ideas:**

- Opportunities for **Mathematical Thinking** allow children to make chains of reasoning connected with the other areas of their mathematics.
- A focus on **Representation and Structure** ensures concepts are explored using concrete, pictorial and abstract representations, the children actively look for patterns and generalise whilst problem solving.
- **Coherence** is achieved through the planning of small, connected steps to link every question and lesson within a topic.
- Teachers use both procedural and conceptual **Variation** within their lessons and there remains an emphasis on **Fluency** with a relentless focus on number and times table facts.

### **8 Classroom Norms to Establish:**

1. Everyone can learn mathematics to the highest levels.
2. If you 'can't do it', you 'can't do it **yet**'.
3. Mistakes are valuable.
4. Questions are important.
5. Mathematics is about creativity and problem solving.
6. Mathematics is about making connections and communicating what we think.
7. Depth is much more important than speed.
8. Mathematics lessons are about learning, not performing.

### **Teaching for Mastery Principles**

- It is achievable for all – we have high expectations and encourage a positive 'can do' mindset towards mathematics in all pupils, creating learning experiences which develop children's resilience in the face of a challenge and carefully scaffolding learning so everyone can make progress.
- Deep and sustainable learning – lessons are designed with careful small steps, questions and tasks in place to ensure the learning is not superficial.
- The ability to build on something that has already been sufficiently mastered – pupils' learning of concepts is seen a continuum across the school.
- The ability to reason about a concept and make connections – pupils are encouraged to make connections and spot patterns between different concepts (E.g. the link between ratio, division and fractions) and use precise mathematical language, which frees up working memory and deepens conceptual understanding.
- Conceptual and procedural fluency – teachers move mathematics from one context to another (using objects, pictorial representations, equations and word problems). There are high expectations for pupils to learn times tables, key number facts (so they are automatic) and have a true sense of number. Pupils are also encouraged to think whether their method for tackling a given calculation or problem is Appropriate, Reliable and Efficient (A.R.E).

- Problem solving is central – this develops pupils’ understanding of why something works so that they truly have an appreciation of what they are doing rather than just learning to repeat routines without grasping what is happening.
- Challenge through greater depth - rather than accelerated content, (moving onto next year’s concepts) teachers set tasks to deepen knowledge and improve reasoning skills within the objectives of their year group.

## Implementation of the Mathematical Curriculum

### Curriculum design and planning

- Staff use NCETM curriculum prioritisation materials and year group curriculum maps as a starting point in order to develop a coherent and comprehensive conceptual pathway through the mathematics. The focus is on the whole class progressing together.
- Learning is broken down into small, connected steps, building from what pupils already know. The lesson journey should be detailed and evident on lesson presentation resources as there is no requirement for teachers to produce detailed paper plans.
- Difficult points and potential misconceptions are identified in advance and strategies to address them planned.
- Key questions are planned, to challenge thinking and develop learning for all pupils.
- Contexts and representations are carefully chosen to develop reasoning skills and to help pupils link concrete ideas to abstract mathematical concepts.
- The use of high quality materials and tasks to support learning and provide access to the mathematics, is integrated into lessons. These may include White Rose Maths Schemes of Learning and Assessment Materials, NCETM Mastery Assessment materials, NRICH, visual images and concrete resources.
- Opportunities for extra fluency practice (instant recall of key facts, such as number bonds, times tables, division facts, addition and subtraction facts) should be provided outside mathematics lessons (morning starters or post-lunch).

We also follow the **Calculation Progression Documents for addition, subtraction, multiplication and division** as a whole school to ensure calculation skills are built upon.

### Lesson Structure

- Lessons are sharply focused; digression is generally avoided.
- Key new learning points are identified explicitly.
- There is regular interchange between concrete/contextual ideas, pictorial representations and their abstract/symbolic representation.
- Mathematical generalisations are emphasised as they emerge from underlying mathematics, which is thoroughly explored within contexts that make sense to pupils.
- Making comparisons is an important feature of developing deep knowledge. The questions “What’s the same, what’s different?” are often used to draw attention to essential features of concepts.

- Repetition of key ideas (for example, in the form of whole class recitation, repeating to talk partners etc.) is used frequently. This helps to verbalise and embed mathematical ideas and provides pupils with a shared language to think about and communicate mathematics.
- Teacher-led discussion is interspersed with short tasks involving pupil to pupil discussion and completion of short activities.
- Formative assessment is carried out throughout the lesson; the teacher regularly checks pupils' knowledge and understanding and adjusts the lesson accordingly.
- Gaps in pupils' knowledge and understanding are identified early by in-class questioning. They are addressed rapidly through individual or small group intervention, either on the same day or the next day, which may be separate from the main mathematics lesson, to ensure all pupils are ready for the next lesson.
- Teachers discuss their mathematics teaching regularly with colleagues, sharing teaching ideas and classroom experiences in detail and working together to improve their practice.

## **Foundation Stage**

The programme of study for the specific area of mathematics is set out in the EYFS Framework 2023:

*Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. 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 will develop a secure base of knowledge and vocabulary from which mastery of mathematics is built. In addition, it is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills across all areas of mathematics including shape, space and measures. It is important that 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.*

## **Mastering Number Programme**

This new programme, called 'Mastering Number' is aimed at strengthening the understanding of number, and fluency with number facts.

It is wholly consistent with and complementary to the Teaching for Mastery Programme, underpinning the approach with key number facts such as number bonds and recognising amounts without counting out. Since September 2021, our teachers in Reception, Year 1 and Year 2 have received training and resources equipping them to give their class a daily short 'number sense' session as part of scheduled maths teaching. The programme has now been extended to include a programme designed for Years 4 and 5 to strengthen their fluency and recall of vital number knowledge. We are also planning to run parent workshops throughout these year groups in the Summer term to help support their child's learning at home.

## **Cross-curricular**

Throughout the whole curriculum, opportunities to extend and promote Mathematics should be sought. Within every Science topic, for example, children will also develop their mathematical skills. This will help children appreciate how to 'work scientifically' but also practise discrete mathematical skills. Use of maths in design subjects, for example, also allows children to put their mathematical skills into a real-life context and demonstrates the importance of estimation and checking as well. Nevertheless, the prime focus should be on ensuring mathematical progress delivered discretely or otherwise.

## **Inclusion and equal opportunities**

All children are provided with equal access to the mathematics curriculum. We aim to provide suitable learning opportunities regardless of gender, ethnicity or home background. All children will have their specific needs met through differentiated work in conjunction with targets. TA support time is planned for and provided in relation to identified needs for individuals and groups.

## **Resources**

All classrooms have a number of mathematical, age appropriate resources. Resources which are not used or required regularly are stored centrally and accessed by teachers at the beginning of a topic. We also use a range of apps and web-based resources to help with consolidation and support in school and at home. These include Times Tables Rock Stars, Active Learn and BBC sites.

## **Displays**

Each classroom / resource area should have a maths display relating to current work. The maths display should be updated regularly to reflect the pace of learning. Displays can include: key vocabulary, children's work, teacher modelling, visual prompts and questions to develop reasoning skills.

## **Assessment**

Children in the Foundation Stage are assessed in accordance with the EYFS curriculum.

Teachers currently use our age-related expectations assessment sheets. This will then support making termly judgements as to whether a pupil is working at the expected level for the age-related expectations, below or above them. Using our online tracking system O Track, children who are significantly behind in terms of attainment and/or progress will be highlighted for staff to provide additional support and intervention.

Standard Assessment Tests (SATs) – These take place in the summer term for Years 2 (now optional) and 6 and should be analysed to inform future planning.

Multiplication Tables Check (MTC) – This is an online test completed in June by Year 4 children.

Summative assessment – at regular intervals, children will undertake tests from Testbase or White Rose. From Year 1, we now use termly NFER mathematics assessments to enable us to track children's progress and attainment and compare them to national standardised levels. Data will help inform planning and be compared to other internal data.

## **Marking and presentation**

Teachers are expected to adhere to the schools marking policy when marking books and presentation policy when guiding children as to how to present their work.

## **Impact - Monitoring and Evaluating the Mathematical Curriculum**

The subject coordinator, alongside the senior management team, are responsible for monitoring and evaluating curriculum progress. This is done through book scrutiny, planning scrutiny, lesson observations, pupil interviews, staff discussions, data analysis and audit of resources.

### **Review**

The mathematics policy will be reflected in our practice. The policy will be reviewed annually.

### **Current objectives taken from KPS Maths Action Plan 2023 – 2024**

- *Improve pupils' mathematical vocabulary and develop their confidence to apply in a range of contexts*
- *Increase staff subject and pedagogical knowledge in relation to use of precise maths vocabulary and open questions.*
- *Provide opportunities for collaboration and reflections on shared practice for staff.*
- *Establish annual parent workshop for R, Y1 & Y2.*