



Mathematics Policy

Introduction

Mathematics is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. 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.

The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics;
- reason mathematically;
- can solve problems by applying their mathematics. (National Curriculum 2014)

Our curriculum

The content and principles underpinning the 2014 mathematics curriculum and the maths curriculum at Roe Farm Primary reflect those found in high-performing education systems internationally, particularly those of east and south-east Asian countries such as Singapore, Japan, South Korea and China. The OECD suggests that by age 15 students from these countries are on average up to three years ahead in maths compared to 15 years in England. We learn from their education systems by adopting a 'mastery approach' to teaching commonly followed in these countries. These principles and features characterise our approach:

- Teachers reinforce an expectation that all pupils are capable of achieving high standards in mathematics;
- The large majority of pupils progress through the curriculum content at the same pace. Differentiation is achieved by emphasising deep knowledge and through individual support and intervention.
- Teaching is underpinned by methodical curriculum design and supported by carefully crafted lessons and resources to foster deep conceptual and procedural knowledge;
- 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 pupils regularly to identify those requiring intervention so that all pupils keep up.

The intention of these approaches is to provide all children with full access to the curriculum, enabling them to achieve confidence and competence – 'mastery' – in mathematics.

The Foundation Stage

In the Early Years Foundation Stage (EYFS), we relate the mathematical aspects of the children's work to the Development Matters statements and the Early Learning Goals (ELG), as set out in the

EYFS profile document. Mathematics development involves providing children with opportunities to practise and improve their skills in counting numbers, calculating simple addition and subtraction problems, and to describe shapes, spaces, and measures. The profile for Mathematics areas of learning are Number (ELG 11) and shape, space and measures (ELG 12). We continually observe and assess children against these areas using their age-related objectives, and plan the next steps in their mathematical development through a topic-based curriculum.

- There are opportunities for children to “bump” into Maths throughout the EYFS (both inside and outside) – through both planned activities and the self-selection of easily accessible quality maths resources
- Children are just as likely to access the Mathematics curriculum through cooking activities in the kitchen, building activities in the construction area or in the outdoor area
- Whenever possible children’s interests are used as a vehicle for delivering the curriculum. For instance, an interest in dinosaurs may give rise to sorting, counting and recording the number of dinosaurs in small world play
- Staff support children’s learning through planned activities but also value and support self-initiated mathematical learning.
- Towards the end of Reception teachers aim to draw the elements of a daily mathematics lesson together so that by the time children move into Year 1 they are familiar with a structured lesson / activity.

Years 1 - 6

- 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 textbooks and workbooks from the ‘Maths - No Problem!’ series, which is based on the principles of how Mathematics is taught in Singapore and aligned with the National Curriculum 2014, to support their planning and delivery of Mathematics teaching.
- The ‘Maths - No Problem!’ textbooks and workbooks are arranged in chapters and, over the course of the academic year, all units of the National Curriculum 2014 are covered.
- Planning is carried out half termly with teachers planning learning intentions, ‘Steps to Success’, identifying possible misconceptions, key vocabulary and ways to challenge pupils.
- If the needs of the children are best met following an alternative plan, which deviates from the National Curriculum 2014, then the class teacher and the SENCO/Phase/Subject Leader discuss this and decide on a way forward.
- Times Tables software (TT Rock stars) is used along side our Mastery curriculum to consolidate and increase fluency in tables.

A Typical Lesson – Maths – No Problem!

Lessons which last approximately 1 hour and 15 minutes are taught daily at 9:15 am. Before the main lesson each class has a slot to complete their TT Rock stars practice. This is a carefully sequenced programme of daily times table practice aimed at developing fluency in tables. Data is entered into the software weekly. This is followed by a short ‘Maths blast’ where children have the opportunity to consolidate previous learning and practice skills that need regular attention. Maths no Problem starts with an ‘In Focus’ problem, which they discuss in partners. This is a problem solving activity, which prompts discussion and reasoning. In Key Stage One, these problems are almost always presented with objects (concrete manipulatives) for children to use. Pupils may also use manipulatives in Key Stage Two. Teachers use careful questions to draw out pupils’ discussions and their reasoning.

The class teacher then leads pupils through strategies for solving the problem, including those already discussed. At this part of the lesson, the children might need to write down their strategy in their books. The strategies may be displayed on sheets of paper in the classroom. The class then try some questions in ‘Guided Practice’. Carefully designed variation in these questions builds fluency and deep understanding.

When they are ready to apply their learning independently, the children answer questions in their own workbook. If some children are not ready by this point, they will continue 'Guided Practice' with the teacher in a small group. If some pupils are advanced in this area of mathematics and have completed the questions independently, they will be given extra tasks to consolidate and deepen their learning, which they will complete in their books.

A child's journey through a 'Maths no Problem' lesson is clearly set out in exercise books. Each session will have a learning objective, subheadings to clearly show each section of the process and 'challenge' and 'intervention' symbols to highlight where additionality has been received by the child.

These guidelines demonstrate what we expect from our teachers and pupils in mathematics

Key Aspects	Teacher	Pupils
High expectations of engagement and attainment for every child	Conveys the message that progress is made through engagement and effort. Expects every pupils to succeed. Is enthusiastic about the learning expected. Gives every pupil the opportunity to experience or master key ideas.	Have high aspirations, believe they can achieve and work hard in order to do so. Want to learn and enjoy learning.
	Follows a mastery curriculum. Differentiates through scaffolding, questioning and use of concrete and pictorial representations – instead of offering pupils different tasks. Uses speaking and listening activities, engaging resources and novel 'ways in' to a concept. Extends through further developing depth of language, conceptual understanding or mathematical thinking. Immediately acts on assessment from questioning and observation	Explore mathematics and ask questions to deepen their appreciation of the subject. Are challenging by solving less routine problems, demonstrating using concrete manipulatives/ drawing diagrams, explaining in full sentences or asking their own questions.
Fewer topics, greater depth Depth of mastery for all	Develops conceptual understanding through multiple representations and connections. Has a full understanding where and why this lesson falls in the sequence and in the longer term development of pupils' mathematical understanding. Anticipates and incorporates misconceptions and inaccuracies.	Have access to concrete manipulatives. Manipulate objects or use pictorial representations to deepen their understanding. Make links between concrete, pictorial and abstract representations Link new learning to previous learning in mathematics, other subjects and beyond school. Demonstrate conceptual understanding through tackling new problems.
	Develops communication of mathematical ideas, justifications and proofs Uses modelling to support pupils in developing independence in their mathematical recording. Considers own language and models expected language use clearly and accurately.	Participate in pair/group discussion tasks. Are ready to answer in class questioning/ discussion. Speak in full sentences. Use correct mathematical words and symbols. Use the key words.
	Develops mathematical thinking and ability to generalise Ensures every pupil participates in active thinking through a variety of questioning techniques. Encourages use of independent learning strategies, such as journaling. Involves pupils in generalising by comparing and classifying mathematical objects or talking about what might be sometimes, always or never true.	Do as much of the cognitive work – the writing, thinking, analysing and talking – as possible. Seek general patterns and create examples.

Every opportunity is used to develop mathematical problem solving	Ensures that lesson time is used purposefully . Makes clear what pupils should be doing at every point in the lesson, so no time is wasted. Minimises teacher talk.	Participate fully – everyone is engaged in the task. Collaborate, discussing their thinking. Work independently for some of the lesson. Demonstrate mastery and the ability to ‘go it alone’
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Resources

- The use of Mathematics resources is integral to the concrete – pictorial – abstract approach and thus planned into our learning and teaching.
- We have a wide variety of good quality equipment and resources, both tangible and ICT based, to support our learning and teaching.
- These resources are used by our teachers and children in a number of ways including:
- Demonstrating or modeling an idea, an operation or method of calculation, e.g.: a number line; place value cards; dienes; money or coins; measuring equipment for capacity, mass and length; bead strings; the interactive whiteboards and related software; 3D shapes and/or nets; multilink cubes; clocks; protractors; calculators; dice; number and fractions’ fans; individual whiteboards and pens; and 2D shapes and pattern blocks, amongst other things;
- Enabling children to use a calculation strategy or method that they couldn’t do without help, by using any of the above or other resources as required
- Standard resources, such as number lines, multi-link cubes, dienes, hundred squares, shapes, etc. are located within individual classrooms.
- Resources within individual classes are accessible to all pupils who should be encouraged to be responsible for their use.
- Further resources (often larger items shared by the whole school) are located in the Mathematics Cupboards.
- A range of Mathematics related software is also available and this is accessible via the shared server, which children can access when projected onto the Interactive Whiteboards in each classroom; by using individual iPads or by using the ICT suite.
- Teachers are encouraged to use the school playgrounds as an outdoor classroom when possible, for example, when teaching length, area or perimeter.
- Each child in Years 1 to 6 has access to the subscription only TT Rock stars website, which they can access at home or at school to support their learning in Times tables. The website follows and supports the National Curriculum 2014 and learning can be child lead or teacher lead, with individual teachers setting work for the children, which appears when they access the website. Regular challenges are set by class teachers and achievements are celebrated both in class and whole school achievement assemblies.
- Teachers’ resources are largely based on the ‘Maths - No Problem!’ series, which can be accessed online. Every teacher has an account and also access to the Academy Video Training library.

Arithmetic Practice

Every Friday classes issue their children with an age specific arithmetic test. Children complete the test which is then marked with them by the teacher who picks up on any major misconceptions and addresses them through the ‘Maths Blast’ slots the following week. Children record their scores and make notes on areas that need developing.

Cross curricular

Opportunities are used to draw mathematical experiences out of a range of activities in other subjects, such as in PE, Science and Design and Technology, to enable children to apply and use Mathematics in both real life and academic contexts.

Pupil support and differentiation

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

‘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.’

There is little differentiation in the content taught but the questioning and scaffolding individual pupils 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. Pupils’ 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.

Inclusion (please refer also to the School’s Inclusion Policy)

- Inclusion is about every child having educational needs that are special and the School meeting these diverse needs in order to ensure the active participation and progress of all children in their learning.
- Inclusive practice in Mathematics should enable all children to achieve their best possible standard; whatever their ability, and irrespective of gender, ethnic, social or cultural background, home language or any other aspect that could affect their participation in, or progress in their learning.

Parents/Carers

- The School aims to involve parents/carers in their children’s learning as much as possible and to inform them regularly of their child’s progress in Mathematics.
- Parents/carers have the opportunity to meet with child’s class teacher at least three times a year at Parents’ Evening Meetings and receive written reports during the year.
- Parents/carers are encouraged to speak to their child’s Mathematics 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 Mathematics is shared with parents/carers at these times and also ways that parents/carers may be able to assist with their child’s learning.
- Parents/carers are encouraged to support their children with homework.
- 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 parent workshops and online videos especially designed for parents.

Subject Leader

- The role of the Subject Leader is to provide professional leadership and management in Mathematics in order to secure high quality teaching, effective use of resources and high standards of learning and achievement for all pupils.
- They will achieve this by affecting the following key areas: strategic direction and development; learning and teaching (including planning and marking and presentation); leading and managing staff; and efficient and effective deployment of staff and resources.

- The Subject Leader has regular discussions with the Head teacher and other senior leaders about learning and teaching in Mathematics.