



Mathematics Policy September 2017

Being numerate is fundamental to pupils' learning across the curriculum, their ability to be independent and their future life choices. By making connection between the various areas of maths they encounter and applying learnt mathematical skills to everyday problems, pupils are better able to make sense of their own experiences of the world and their place in it.

We follow a **mastery approach** to mathematics based on a set of principles and beliefs. Fundamental to this is a belief that all pupils are capable of understanding and doing mathematics, given sufficient time. Pupils are neither 'born with the maths gene' nor 'just no good at maths'. With good teaching, appropriate resources, effort and a 'can do' attitude all children can achieve in and enjoy mathematics.

Our **mastery curriculum** is one of a set of mathematical concepts and big ideas for all. All pupils need access to these concepts and ideas and to the rich connections between them. There is no such thing as 'special needs mathematics' or 'gifted and talented mathematics'. Mathematics is mathematics and the key ideas and building blocks are important for everyone.

When **teaching for mastery**, we follow a set of pedagogic practices that keep the class working together on the same topic, whilst at the same time addressing the need for all pupils to master the curriculum and for some to gain greater depth of proficiency and understanding. Challenge is provided by going deeper rather than accelerating into new mathematical content. Teaching is focused, rigorous and thorough, to ensure that learning is sufficiently embedded and sustainable over time. Long term gaps in learning are prevented through speedy teacher intervention. More time is spent on teaching topics to allow for the development of depth and sufficient practice to embed learning. Carefully crafted lesson design provides a scaffolded, conceptual journey through the mathematics, engaging pupils in reasoning and the development of mathematical thinking.

Achieving mastery of particular topics and areas of mathematics, we believe is not just being able to memorise key facts and procedures and answer test questions accurately and quickly. It involves knowing 'why' as well as knowing 'that' and knowing 'how'. It means being able to use one's knowledge appropriately, flexibly and creatively and to apply it in new and unfamiliar situations. The materials provided seek to exemplify the types of skills, knowledge and understanding necessary for pupils to make good and sustainable progress in mastering the primary mathematics curriculum.

The essential idea behind mastery is that **all children** need a **deep** understanding of the mathematics they are learning so that:

- Future mathematical learning is built on solid foundations which do not need to be re-taught
- There is no need for separate catch-up programmes due to some children falling behind
- Children who, under other teaching approaches, can often fall a long way behind, are better able to keep up with their peers, so that gaps in attainment are narrowed whilst the attainment of all is raised

Our children will:

- Become fluent in the fundamentals of mathematics so that they are efficient in using and selecting the appropriate written algorithms and mental methods, underpinned by mathematical concepts.
- Solve problems by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.
- Reason mathematically by following a line of enquiry and develop and present a justification, argument or proof using mathematical language.
- Be prepared for the next stage in their education.

Early Years Foundation Stage (EYFS) Curriculum

Mathematics is a specific area of development within the EYFS curriculum. Teaching and learning at this stage comprises of two main components: 'Number' and 'Shape, Space and Measure'. In order for our children to learn these essential building blocks, teachers plan regular learning opportunities which incorporate repetitive, practical and multi-sensory experiences which allow the children to master mathematics.

We understand the importance of immersing children in learning. Therefore, in order to learn mathematical vocabulary, children will learn number rhymes and songs and play games which encourage the use of mathematical language.

Taking a mastery approach, differentiation occurs in the support and intervention provided to each child. There is no differentiation in content taught, but the questioning and scaffolding individual children are provided with or select in the setting will differ with rapid graspers challenged through more demanding problems which deepen their knowledge of the same content. Children's difficulties and misconceptions are identified through ongoing observation and addressed through opportunities within continuous provision and skilful interaction with adults. Children are supported to self-select meaningful resources and methods and to communicate mathematically in a variety of ways.

Key Stage 1 and 2 Curriculum

Mathematics is based on the National Curriculum for Mathematics and then the Maths – No Problem! curriculum overviews. 'Number' teaching units are arranged at the start of the year with measurement, geometry and statistic later, where skills learnt in number, will be applied. Teaching is planned using the Maths – No Problem! Textbooks and Workbooks as a starting point. Lesson planning is designed to scaffold children's learning, using small incremental steps which become more complex over the learning journey, with links between units clearly made and built upon in order to embed children's understanding.

Each lesson follows a similar structure: a contextual problem, the teaching section of the lesson which includes lots of teacher/pupil and pupil/pupil discussion, guided practice - a methodical approach, where children practise new skills with regular opportunity to clarify understanding, before independent practice - a time for independent learning. At this point some children where additional support would be beneficial, work with the teacher while the 'rapid graspers' will deepen their understanding with challenge questions.

All classes have concrete and pictorial resources specific to their year group and these will be used extensively in modelling and representing mathematical concepts and to provide an image when these materials are no longer used. Children will have access to and be encouraged to use manipulatives in their lessons.

In order to ensure all children master a concept, some lessons may take longer than one session.

Developing fluency, reasoning and problem-solving

- Become fluent in the fundamentals of mathematics so that they are efficient in using and selecting the appropriate written algorithms and mental methods, underpinned by mathematical concepts.
- Solve problems by applying their mathematics to a variety of problems with increasing sophistication, including in unfamiliar contexts and to model real-life scenarios.
- Reason mathematically by following a line of enquiry and develop and present a justification, argument or proof using mathematical language.

Of the three aims, achieving fluency will allow children the opportunity to reason mathematically and to solve problems and can be seen as a pre-requisite of these processes. Often the difficulty in problem solving is not the maths but understanding the problem and finding a way-in that is the difficult process for many children. Being fluent encourages pattern recognition and can provide that way-in to a problem, while children are able to reason within their understanding, questioning what they know and being curious of unknowns, making generalisations and conjectures as well as tackling problems which are both familiar and unfamiliar.

Lessons are planned using a structure which ensures that children develop their number fluency, reasoning and problem-solving skills.

Fluent computational skills are dependent on accurate and rapid recall of basic number bonds to 20 and times-tables facts. Spending a short time every day on these basic facts quickly leads to improved fluency. This can be done using simple whole class chorus chanting. This is not meaningless rote learning; rather, this is an important step to developing conceptual understanding through identifying patterns and relationships between the tables (for example, that the products in the $6 \times$ table are double the products in the $3 \times$ table). This helps children develop a strong sense of number relationships, an important prerequisite for procedural fluency.

Efficiency in calculation requires having a variety of mental strategies. In particular we will emphasise the importance of 10 and partitioning numbers to bridge through 10. Young children benefit from being helped at an early stage to start calculating, rather than relying on 'counting on' as a way of calculating. Rather than, for example, starting at 7 and counting on 4, children could use their knowledge and bridge to 10 to deduce that because $7 + 3 = 10$, so $7 + 4$ must equal 11.

All children will use 'Rolling Numbers' and (from Year 2) TTrackstars, both at school and at home to develop fluency in multiplication and division facts.

Teaching formal written methods for calculation provides the opportunity to develop both procedural and conceptual fluency. We will ensure that children understand the structure of the mathematics presented in the algorithms, with a particular emphasis on place value. We will use base ten apparatus and, later, place value counters, using these representations to support the development of fluency and understanding.

Informal methods of recording calculations are an important stage to help children develop fluency with formal methods of recording. These informal methods will only be used for a short period, to help children understand the internal logic of formal methods of recording calculations.

In order to support children's development of reasoning, it is expected that all children and adults speak in full sentences when answering a question. The use of sentence stems provides support for children when structuring their answers and developing an accurate use of mathematical language. It is important to use visual representations and concrete resources. Understanding, however, does not happen automatically, children need to reason with others and with themselves and make their own connections. We help children get into good habits right from the start in terms of reasoning and looking for pattern and connections in the mathematics. We frequently use the questions "What's the same, what's different, what do you notice?" to help comparisons to be made.

Calculation progression

The calculation progression document outlines the developmental stages for calculation from Reception through to Year 6. As with the rest of the mathematics curriculum, the aim is that children master their age-related expectation before moving on. The progression document clearly outlines the steps that children take which will allow them to master a formal written method in each of the four operations.

The policy is shared with parents so that homework can be supported in line with the school approach and the targets that all children in the year group will be working on during the coming term are sent home to provide parents with information on their child's learning.

Assessment

On-going and summative assessment in maths is undertaken in line with the Assessment and Feedback policies. However, there is also subject-specific assessment practice for mathematics.

A short while after a unit of learning, children can undertake assessment activities that are taken from the Maths Journal section at the end of each unit in the MNP! text books or a similar assessment activity. Review sections of the MNP! work books can similarly be used, in addition to formative assessment from maths lessons. Children from Years 1-6 will also take a termly assessment linked to the targets covered which can be used as additional evidence of understanding.

Data is entered onto Target Tracker. There is no minimum number of pieces of evidence required for each objective but the professional judgement of the teacher in 'building a picture' of a child's attainment from all of the above sources of information, will be used to arrive at a final decision.