Mathematics Mastery

The principles of Mathematics Mastery and how they're delivered

Principle 1: Conceptual Understanding

Mathematics tasks are about constructing meaning and making sense of relationships. Learners deepen their understanding by representing concepts using objects, pictures, symbols and words.

Different representations stress and ignore different aspects of a concept and so moving between representations and making explicit links between them allows learners to construct a comprehensive conceptual framework that can be used as the foundation for future learning.

We use the content of the national curriculum as the starting point for our curriculum but this is expanded upon by making explicit the foundational knowledge that learners need to understand in order to access this.

Tasks are sequenced to help learners build a narrative through different topics. These topics are then sequenced in a logical progression that allows learners to establish connections and draw comparisons.

Multiple representations are carefully selected so that they are extendable within and between different areas of mathematics. Using these rich models encourages learners to develop different perspectives on a concept.

Principle 2: Language and Communication

Mathematical language strengthens conceptual understanding by enabling pupils to explain and reason. This must be carefully introduced and reinforced through frequent discussion to ensure it is meaningfully understood.

The more learners use mathematical words the more they feel themselves to be mathematicians. Talk is an essential element of every lesson and time is dedicated to developing confidence with specific vocabulary as well as verbal reasoning.

The content of our curriculum carefully progresses in order to induct learners into the mathematical community. A large part of this community is confident use of the language, signs and symbols of mathematics. Verbal and non-verbal communication is part of every sequence of learning in the curriculum.

This often starts with more informal language initially, building up to formal and precise mathematical language.

Talk tasks are part of every lesson in the curriculum to help with this development.

Principle 3: Mathematical Thinking

By the time they reach school, all pupils have demonstrated a significant range of innate ways of thinking that can be harnessed in the classroom to develop mathematical thinking.

We must support pupils to develop mathematical ‘habits of mind’ – to be systematic, generalise and seek out patterns.

The creation of a conjecturing environment and considered use of questions and prompts are important elements of encouraging learners to think like mathematicians.

Our curriculum is designed to give learners the opportunities to think mathematically. Throughout the curriculum you will see tasks that require learners to specialise and generalise, to work systematically, to generate their own examples, to classify and to make conjectures.

This is aided by our prompts for thinking which help make these important parts of mathematics more explicit.

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How does our mission inform the structure of our curriculum?

We have made decisions on how the curriculum is structured. These decisions are driven by the overarching principles described above and to enable all learners to enjoy and succeed in mathematics.

One curriculum for all

Mathematics Mastery provides a single curriculum map that all learners are expected to follow. This means that all learners have the same access to the curriculum content and there is no ceiling imposed on what learners can achieve.

While there is only one curriculum, we recognise that not all learners come to each lesson at the same starting point. For this reason, we provide additional resources designed to help learners access the main curriculum and also provide planning resources designed to help teachers adapt lessons to provide scaffolding and depth according to the needs of their learners.

A curriculum map organised into mastery half terms

In the MM curriculum extended time is spent within a single area of mathematics. This allows teachers to spend more time developing learners' conceptual understanding. It also provides opportunities to go into greater depth within a concept area and make connections with other areas of mathematics.

A cumulative curriculum

The MM curriculum is organised to be cumulative. This means that mathematical concepts that are taught earlier in the curriculum are revisited in the context of a new area of mathematics.

This helps learners to make connections between different mathematical concepts. Retrieving, using and applying concepts regularly, transferring to new contexts helps develop fluency as well as conceptual understanding.

The six-part lesson structure

A six-part lesson gives a structure in which to implement the pedagogic principles of the curriculum. The different parts of the lesson allow teachers to bring the different dimensions of depth to the foreground. Having a consistent structure for each lesson ensures that learners are exposed to the pedagogies associated with each dimension.

How do we support schools to implement the curriculum?

Professional development

Ongoing, sustained and subject-specific professional development is at the heart of the Mathematics Mastery programme. A greater understanding of the principles that underpin the programme will result in an enactment of the curriculum that is closer to our intention.

The leadership of maths course is designed so that the MMSL gains a full understanding of the dimensions of depth and what these look like in the classroom in a range of contexts. We ensure that there are opportunities for teachers to collaborate, share best practice and engage in subject-specific professional development.

Developing subject and pedagogical knowledge

An important distinction to make when thinking about the needs of a team is between subject knowledge and pedagogical knowledge. Individuals in teams may need to develop their own understanding of parts of the subject as well thinking about the ways in which it can be taught.

Professional development should aim to address both of these needs. We provide opportunities for both at a variety of levels, from engaging with the lesson resources to working collaboratively with teams.

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What should assessment look like in implementation?

Formative assessment

Evidence points to high quality formative assessment leading to the greatest learning gains.

We provide opportunities and guide teachers in asking questions that will reveal learners' understanding of a concept.

Most importantly we provide opportunities for meaningful dialogue to take place in lessons. It is by giving learners opportunities to talk, and by listening carefully to what they say, that we gather some of the richest data on their understanding, in order to influence teachers' next moves.

Summative assessment

We recommend that schools are cautious when using the results of summative assessments. This is because the domain from which test items are sampled is usually much larger in a summative assessment compared with a formative assessment.

This makes it impossible to make a reliable inference about a student's learning within a subcategory of this larger domain. We also urge caution when linking the results of summative assessments to any future performance in public examinations.

Due to their low impact on future teaching, we recommend that the number of summative assessments in a year should be relatively low and to thoroughly interrogate the quality of the assessment that is used.

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What does it mean to know more, remember more and be able to do more mathematics?

In order for learners to make sense of a new idea or relationship learners need to incorporate it into their current understanding and see how it connects with ideas and relationships they have encountered previously.

The greater their understanding of what has been taught previously, the more sense-making they will be able to do in the future with increasingly complex mathematics. Therefore, we believe that the key to knowing more mathematics lies in understanding.

We also believe that learners who make sense of the mathematics they are learning have more memorable and enjoyable experiences that are more likely to be remembered in the long term. They will also be able to do more as they understand how to push the boundaries of what they know and apply it to solve problems.