

Maths policy overview

Teaching for mastery

As a school we follow the teaching for mastery approach in maths which is based on teachings in Shanghai.

What is teaching for mastery?

Mastering maths means pupils of all ages acquiring a deep, long-term, secure and adaptable understanding of the subject. The phrase 'teaching for mastery' describes the elements of classroom practice and school organisation that combine to give pupils the best chances of mastering maths. Achieving mastery means acquiring a solid enough understanding of the maths that's been taught to enable pupils to move on to more advanced material.

Children are taught in mixed ability groups, with the exception of a small group of children who cannot access the same curriculum. These children are taught in a smaller "support group" and will follow a slightly different curriculum as appropriate. The aim is that all children in this group have the potential to rejoin the main maths class.

A one-page summary of the principles of teaching for mastery can be found here:

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

When teaching for mastery, there are 5 big ideas that should be considered:

- **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 (images / diagrams) 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.

For supporting research and evidence on the teaching for mastery approach, visit this link:

<https://www.ncetm.org.uk/teaching-for-mastery/mastery-explained/supporting-research-evidence-and-arguments/>

Maths No Problem

We use the Maths No Problem (MNP) scheme to teach maths at Elmhurst. It is a text-book scheme accredited by the Department for Education that teaches the full National Curriculum following the teaching for mastery approaches. This means that the 5 big ideas above are incorporated into the scheme already which supports teachers with their planning.



Maths No Problem guides to maths mastery can be found here:

<https://mathsnoproblem.com/en/resources/maths-mastery-guide/> (more general about mastery)

<https://drive.google.com/file/d/1S6lOI3nbKgLFFUFdMgRc2hXCBbGkUe5C/view?usp=sharing> (how MNP follows the principles of mastery specifically)

Lesson structure

Each Maths No Problem lesson follows the same structure:

1. **Explore** (previously called In Focus) - this is the starting point for all lessons. It is designed to be an open and exploratory investigation for children. They should attempt the problem largely independently and it is an opportunity for children to bring together what they already know and apply it to a new situation. During this time, children might explore with concrete resources and/or they might record their thoughts as journaling in their maths books.
2. **Master** (previously called Let's Learn) - after the children have explored the opening problem, it is then time to come together and discuss it. Children will share their methods with the class and the teacher will use this opportunity to identify the main learning or target method in the lesson.
3. **Guided Practice** - an opportunity for children to practise the new learning point of the lesson. This is often best completed on white-boards as this makes it lower stakes.
4. **Workbook** (independent / intelligent practice) - children solve similar problems independently.
 - a. In Key Stage 1, children complete these questions in the MNP workbooks
 - b. In Year 3, children complete the first half of the year in the MNP workbooks and then move to squared maths books
 - c. In years 4, 5 and 6 children complete all work in squared maths books as this allows for more jottings and freedom to solve as they want.

All of the questions and representations have been carefully selected and planned to fit with the teaching for mastery approach. Teachers are expected to think about each lesson carefully and to be aware of how each question builds on the previous one.

A MNP quick guide to lesson structure:

<https://drive.google.com/file/d/1RqMe2HiA5NhQXXIfBXHNWvU2GW8RVOGv/view?usp=sharing>

Challenge

It is vital that all children are challenged in every maths lesson. For some children, the challenge may simply be the key learning in the lesson or the questions given in the scheme. For others, there may need to be additional challenge provided. Some examples of how children are challenged are below:

- During the Explore part of the lesson, children may be asked to think of additional strategies for solving a problem or to think of showing something in a different / more creative way
- Children may simply be asked to write down something interesting that they have noticed in the lesson or when solving some questions. Further challenge may involve them having to explain why this interesting thing happens!
- The questions given in the Guided Practice and Workbook sections of the lesson are designed to increase in challenge
 - Teachers should be able to identify the progression in challenge within these questions - how does each one build on the previous?
- Children can be taught to challenge themselves by writing and answering their own "What if ... ?" questions (changing numbers in the question or adding to the scenario)
- Children can be challenged to show the same idea or concept but using a different representation
- Finally, teachers may need to provide additional challenge questions for fast finishers
 - True or false?
 - Always, sometimes or never?
 - What did you notice about ?

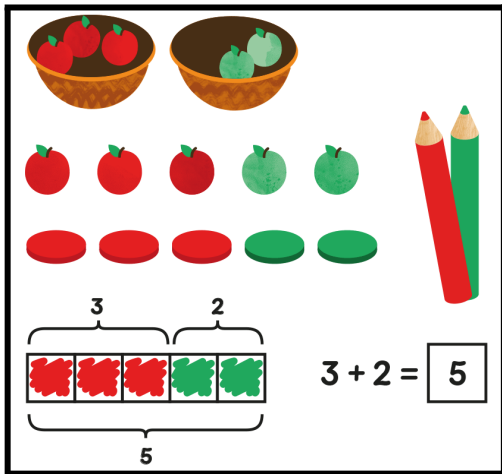
- Some are provided on these documents as a starting point:

https://drive.google.com/drive/u/0/folders/1qwSqblq7kN6_TMlIFsW_BWAtBddZcZiV

Support

All children are supported in their learning in maths through the use of the CPA approach.

- **Concrete** - this is the “doing” stage. During this stage, students use concrete objects to model problems. This brings concepts to life by allowing children to experience and handle physical (concrete) objects. With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.
- **Pictorial** - this is the “seeing” stage. Here, visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem. Simply put, it helps students visualise abstract problems and make them more accessible.
- **Abstract** - this is the “symbolic” stage, where children use abstract symbols to model problems. Students will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem. The abstract stage involves the teacher introducing abstract concepts (for example, mathematical symbols). Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols (for example, +, −, x, /) to indicate addition, multiplication or division.



In this as example, the fruit baskets and fruit are concrete.

The counters and bar model are pictorial.

The final calculation is abstract.

This is used in all age groups by all children, especially when teaching a new topic. The idea is that children will move through these stages to eventually solve problems abstractly. Some children will move through this process faster than others, but children should all be taught how to move away from the resources - they cannot rely on them forever.

If a child is struggling in a lesson, taking them back a step will be hugely helpful. For example, if a child is struggling with place value, taking out the Dienes or place value counters will support them.

For more support and guidance, please visit these sites:

Introducing CPA in EYFS:

<https://mathsnoproblem.com/blog/teaching-tips/early-years-maths-mastery-introducing-cpa-approach/>

Myths and misconceptions surrounding CPA:

<https://mathsnoproblem.com/blog/teaching-maths-mastery/myths-and-misconceptions-surrounding-the-cpa-approach/>

How to move children from concrete to abstract learning:

<https://mathsnoproblem.com/blog/teaching-maths-mastery/concrete-resources-to-abstract-learning/>

Journaling

Journaling in maths is when children write down their thoughts and ideas about a question or concept. It is mostly done independently and can be presented in any way that the children want (within the confines of the school presentation guidelines!)

Maths No Problem video explaining journaling: <https://vimeo.com/205911521/1421b7da69>

A MNP quick guide to journaling:

<https://drive.google.com/file/d/1S0kDYJoS-ZjaZfsWSS971--ThKlBYQfk/view?usp=sharing>

Ideas for journaling

- Describe / explain how to solve a problem
- Evaluate more than one method to solve a problem - which is most efficient?
- Be creative - write your own story for a problem.
- Write down something you have noticed that is interesting

Journaling is most often completed as a response to an Explore task at the start of the lesson, but can also be used as an assessment opportunity at the end of a unit. Some additional opportunities are provided by Maths No Problem at the end of each topic - Mind Challenge and My Maths Journal.

Arithmetic

A skill that is vital to succeeding in maths is arithmetic. This is when the children are taught to accurately and efficiently solve questions involving the four operations (calculation only, no word problems). At Elmhurst, arithmetic skills are taught and practised in two ways:

1. As full maths lessons from either Maths No Problem or Number Sense Maths when it is the first time a concept is introduced
2. As starters in lessons throughout the year for constant revision

In Key Stage 1, we use the Number Sense Maths programme to systematically teach children to be fluent in their addition and subtraction facts. This programme is explained in depth on our addition and subtraction fluency policy:

https://docs.google.com/document/d/1PZQQ4Xw_vq3nOHpSWdm3O5o89qAYwexEGsRbMf9FoJk/edit

As children progress onwards from Year 2, this learning moves onto times-tables fluency. This will be explained in our multiplication and division fluency policy, but this is still in the process of being updated.

Finally in Years 5 and 6, fluency with fractions and decimals becomes key. Children need to be able to add, subtract, multiply and divide these confidently and accurately.

As well as mental strategies, children need to be accurate and efficient when solving written calculations too. Details explaining how we teach this at Elmhurst can be found in our calculation policies:

Addition: https://docs.google.com/document/d/1HW_u9KqkrEqOAAgi-JUaugTRDza87RI-5sFKgsMzxQs/edit

Subtraction: <https://docs.google.com/document/d/1yLr0UIHZ77A3BajLbgMrXBYm9D4rlynbRu3gF0sdNek/edit>

Multiplication:

https://docs.google.com/document/d/1mXGtIWJtKc85Sn_zmJ88PAPHR3j-pJ-LVcR0UjI6TqY/edit

Division: https://docs.google.com/document/d/1hm7LQUAh6lc_SeLHbU1lfgTBU9X-G6UdageFHgWlhdg/edit

Maths Talk

Talk and oracy in maths are vital to children's success; they must be able to talk confidently about the maths that they are working on and use the correct vocabulary.

Children should always be encouraged to explain their thinking in everything that they do. Teachers should always be asking questions such as *How did you get that?* or *Can you explain what you did?* or simply, *Why?* When answering these questions, children must use correct mathematical vocabulary to ensure clarity in what they are saying. This also ensures consistency across the school which makes children feel more confident

and secure in their learning. The key vocabulary for each lesson is given on the Maths No Problem website in the teacher guide. Teachers should model this vocabulary at all times to support children in learning it.

Some useful blog links about maths talk:

<https://mathsnoproblem.com/blog/teaching-practice/maths-as-a-language/>

<https://mathsnoproblem.com/blog/teaching-tips/boost-oracy-maths-classroom/>

<https://mathsnoproblem.com/blog/teaching-practice/talk-in-classroom-for-learning/>

Teacher subject knowledge support

It is really important that all teachers are confident in their subject knowledge before teaching a unit of maths.

Here are some suggestions for places to visit if you require support:

- Maths Lead (Lucy Ford)
- Other Maths Mastery Specialists in school (Farzana Ahmed, Liz Turner)
- The Maths No Problem online teacher guide
- LNE Maths Hub (office in the staffroom - Samira Islam, Ginny Reddick)
- External sources such as the NCETM:

<https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/>

NCETM / Maths Hub

The Maths Hubs Programme, coordinated by the NCETM, brings together mathematics education professionals in a collaborative national network of 40 hubs, each locally led by an outstanding school or college, to develop and spread excellent practice, for the benefit of all pupils and students.

<https://www.ncetm.org.uk/maths-hubs>

We are the lead school of the London North East Maths Hub (<https://lneastmathshub.org.uk/>). This means that teachers have access to a wide range of fully-funded training programmes throughout the year (covering mathematical subject knowledge and also the teaching for mastery pedagogy). A number of our teachers have been trained by the NCETM to be Primary Mastery Specialists which means they have received in-depth training on teaching maths mastery.