

# Planning for Maths Mastery at Bampton COE Primary School



2024

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# What is Mastery Teaching?

The following statements have been written in collaboration with all teaching staff. As a staff, we have a clear vision for how we want the learning experiences for every child to be.

- **EYFS:** Deep, secure and adaptable. The children need to live the maths and have a deep, practical understanding of what maths is and develop depth of understanding. Learning through play using concrete resources and developing this towards a pictorial representation. Giving the children the language to talk maths, explore the possibilities and problem solve collaboratively and independently. It instils confidence in children to have a go.
- **Year 1 and 2:** We use CPA, mixed ability partnerships, plus small group work, to deepen a child's understanding. We focus on reasoning so that the children are able to explain *How I know* through the constant use of stem sentences. Mastery teaching produces resilient learners and allows the quietly confident children to realise their potential. The use of practical resources such as rekenreks, facilitates subitising and partitioning.
- **Year 3 and 4:** We believe that Mastery extends children's thinking, as all children are being given the same learning opportunities to build a depth of understanding. Mastery teaching allows the children to make connections and apply their knowledge in unfamiliar mathematical situations. It builds resilient learners who are able to work collaboratively. Mastery teaching encourages children to have an enjoyment of maths, as it gives them ownership of their own learning. The Mastery approach closes the gaps in children's knowledge and through the use of CPA, understanding is deepened.
- **Year 5 and 6:** Mathematical concepts/procedures continue to be developed through CPA and continues to include manipulatives. Appropriate groupings ensure class discussions and talk time promote the understanding of concepts and the deepening of reasoning skills. Approaches to problem solving are modelled and misconceptions unpicked. The Mastery approach is multi-level questioning using different models and images. Children are encouraged to think deeper through a series of challenge tasks and questioning. Mastery is a regular cycle of fluency/reasoning and problem solving – all interlinked and not discrete.

# Why Mastery Teaching?

**EYFS:** Through exploring number, resources and problems with curiosity, children will develop automaticity, which allows them to apply the mathematical concepts in different contexts. This gives them a firm foundation towards the next stage of their educational journey.

**Year 1 and 2:** To give every child the opportunity to succeed. All children are able to access the maths curriculum by using different manipulatives and through small steps teaching. The quieter, less confident children, are able to discuss maths with their partners and no gaps in understanding are left. Mastery teaches for understanding rather than teaching to a test.

**Year 3 and 4:** Mastery teaching will benefit all children. All future mathematical learning will be built on solid foundations and will raise achievement for everyone. Mastery teaching instill's a love of math's and a belief that all pupils can achieve. It promotes understanding so all children have a deep understanding of mathematical concepts.

**Year 5 and 6:** Everyone learns together and the learning is more in-depth. No ceilings are put upon children's learning or ability. Through discussion of concepts, misconceptions can be unpicked. From teacher modelling, confident learners are developed. The deeper understanding means children become resilient in tackling unfamiliar mathematical problems.

# Group/ Setting

Mastery teaching is different – it is about the learning, exploration, discovery, noticing – spotting patterns and relationships and making links. Teachers facilitate learning by guiding the pupils to think for themselves.

Communication is a vital part of this process. It is through peer discussion, and the proving and disproving of ideas, that metacognition happens (being aware of one's thought processes). Through modelling stem sentences, this will support understanding.

As such, peer discussion in mastery teaching and learning is key, which is why you should consider the advantages of the mixed ability classroom:

- There will be more fruitful discussions for lower ability children to participate in.
- The higher ability children have the opportunity to explain their methods to lower achievers which ensures they have ascertained a depth of understanding.

## Interventions

Interventions will still occur, just not as we have previously known them. Where possible, these interventions will be in the moment, to ensure misconceptions are not embedded. We will use variation (this is showing the maths in different ways. A simple example:  $5 + 3 = \blacksquare$  or  $\blacksquare + 3 = 8$ ) to show the children different ways to link their learning, problem solve and be able to explain the mathematics that they have completed.

# Small Steps Planning for Mastery

Small increments of learning are fundamental to this approach. As is “over-teaching” core concepts such as number and place value and the four operations.

Due to this, the initial progress of children taught this way may seem less dramatic when compared to traditional Maths teaching.

However, this is simply because this style of incremental learning ensures children have a thorough conceptual understanding of the Maths.

The use of pre-teaching and over-teaching will develop core skills and give the lower attaining children assigned competence.

By taking smaller steps through learning, maths mastery teachings lead to deeper understanding of mathematical concepts, as children are given ample time to internalise their maths learning.

## **Know the lesson inside out in maths mastery**

To teach for mastery means being prepared, and teachers need to take into account what the non-negotiables are for that lesson:

- Subject knowledge. How best to teach the concepts with sound pedagogy
- Knowing the common misconceptions in the topic.
- Technical terms. Introducing the correct terminology
- Expectations. Having an expectation that children answer in whole sentences, using mathematical language
- Feedback. If possible, encourage staff to plan together and give feedback of practices that were or were not successful.

## **Spend ample time on concepts**

‘Over-teach’ concepts, especially the core areas of:

- Number and place value
- The four operations
- Times table and division facts

Seeing patterns and structures in Maths is the key to being able to generalise thinking and enables children to make sense of topics such as fractions and decimals. Children will be unable to see, for example, the relationship between equivalent fractions if they don’t know their times tables.

# Manipulative Resources

## **Best practice use of manipulatives**

- Investing, not only in resources, but also in a training plan which will ensure that manipulatives are used effectively.
- It is important that manipulatives are not solely relied upon – there is a danger that over-reliance on equipment will hinder progress.
- With experience, teachers will gauge when is most appropriate to use materials, which materials to use and when they should be removed. This can also be personalised to individual children depending on their needs.

## **Choosing the concrete resources you need for maths mastery**

Overall, you should allow autonomy when choosing equipment. When children are familiar with the manipulatives and how to use them, give them a chance to select their own choice of equipment to represent the problem they are to solve. This is helpful because:

- The teacher can see how well the student has understood the concept by assessing the relevance of the resources chosen.
- It promotes high-level thinking – pupils have to ensure that the resources chosen are made relevant to the problem and represent it adequately

# Use of Pictures / Models and Diagrams

Pictorial representations are just as vital as concrete materials. These are particularly helpful for engaging EAL pupils, SEN pupils and visual learners, as well as being a platform to express their understanding. Initially, the teacher may need to model different visual representations but as the children get used to using them, they may well go on to create their own.

There is no right or wrong model as long as it expresses accurately an explanation.

## **Bar modelling- the cornerstone of maths mastery**

Bar models were developed and used in Singapore and are an effective visual tool to help students break down, understand and solve a problem. Children need plenty of exposure to the different types of bar models before they can use them productively.

Through maths mastery learning, children should first learn [simple bar models to solve addition and subtraction maths word problems](#), then multiplication and division. Gradually they progress to being able to solve [more complex maths word problems for KS2 SATs with bar models](#).

## **What are bar models?**

Bar models are rectangular bars drawn to represent a scenario posed in a worded problem. These rectangles provide a way to 'see' the steps and the appropriate operations needed to solve the problem.

They model the worded problem in its most simplistic state, removing all words except for the key information. This allows the student to deal with one section of the worded problem at a time, and gives space to decide whether the piece of information is important in the context.

For EAL and SEN learners, this visual image is powerful, as they no longer need to worry about long sentences which they may find difficult to comprehend – they can now see what they have to do.



# Use of Questioning

## **Questioning techniques within maths mastery**

A hugely important part of a mastery classroom is questioning. More traditional 'chalk and talk' lessons can be transformed into an excited discussion by incorporating good questions.

In successful mastery classrooms, it is common to see hands thrown in the air in order to prove or disprove what has been asked. A cleverly asked question will see children 'struggling' between their own preconceived ideas and the logic that may be in front of them.

The peer discussions that take place as a result of questions posed are invaluable as a way for teachers to assess levels of understanding, and as a platform for pupils to learn from one another

True mastery in maths is demonstrated when two elements are combined:

- The reasoning and justifying of a concept.
- The correct use of technical language needed to convey a message.

## **What does this look like in the primary classroom?**

Noise level: This will be good noise – pupils on task trying to prove their point during peer or group discussions.

Teacher circulating: Asking appropriate questions will facilitate learning and deeper thinking.

- Teacher to teach the whole class, starting with the 'hook' to the learning
- Direct teaching
- Guidance practice (complete any appropriate intervention here)
- Independent
- Challenge (links back to direct teaching for going deeper for depth)

Unbiased attitude: It is important that the teacher neither validates nor rejects an answer or a theory for two reasons:

If the answer is confirmed correct, the rest of the class no longer need to think for themselves. An alternative approach is to ask several children what they think the answer is before asking, 'How do you know?'

It is up to the whole class to justify and reason the theory correct or incorrect. Teachers avoid 'telling' the students the answers, and the pupils have to work out why it must be correct – a more powerful type of learning that helps link concepts together.

### **What questions to ask in a maths mastery lesson?**

Some generic questions to ask that are perfect to help assess learning include:

- How do you know?
- Can you prove it?
- Can you come up with a different method?
- What do you notice?
- Will it always do that, and why?
- What happens if?
- Does your answer seem reasonable? Why/why not?

Thought must be given to the types of questions teachers ask. These need to be tailored to support or challenge learners.

One of the most important parts of challenging higher ability children is questioning. The power of a simple question should not be underestimated.

For example, ask questions such as:

- 'What do you notice?'
- 'Will it always happen?'

# Adaptive teaching and Assessment

Adaptive teaching in mastery sessions is not presented on different worksheets, but through teacher expectation and challenge. The positives of this are twofold. Less time-consuming planning and boosted confidence for lower attaining children (as the work isn't tiered).

For quick finishers, in depth [effective questioning](#) techniques such as these can be used to further their learning:

- “Can you come up with a ‘brand new’ technique to solve the problem?”
- “Can you write a leaflet to explain what you were working on today for an absent classmate?”

By assessing what they have written, teachers gain insight into pupils' depth of understanding and highlight any possible misconceptions. Activities from the [NCETM National Curriculum Assessment Materials](#) are useful for assessing children in their mastery learning.

# Use of Journaling

This is part of our on-going Action plan.

**EYFS:** The children show different representations of the same question/concept. This is through an open-ended and investigative approach.

**Year 1 and 2:** Through using the rekenreks the children complete the extension tasks. This is starting in Spring 1 2024 and photographic evidence will show the children's work and exploration. The task embeds the children's learning each week.

**Year 3 and 4:** Children are embedding their knowledge through weekly NRICH activities, which link to the topic that we are studying in class. The questions are investigative and encourage collaboration and resilience. The children record their workings in concrete and pictorial representations. The journaling activity encourages rich discussion and draws out the children's prior knowledge to make links and solve the problem.

**Year 5 and 6:** Presenting problems in unfamiliar formats, for example NRICH investigations and reasoning questions, for children to work to solve in mixed ability pairings and groups. Children are expected to write down their thought processes and articulate their strategies.