



## Beyond Expectations – Maths Mastery

### How to develop a maths mastery pathway in your school

Maths mastery improvement at: **Whitesheet Primary Academy**

1) What is maths mastery?

2) Maths mastery principles (non-negotiables)

- How we are applying 'Beyond expectations – maths mastery' in our school in terms of both maths mastery leadership and teaching & learning
- What we need to do next – our next steps are



As a Trust, we see maths mastery as '**deep, sustainable conceptual understanding for all.**'

#### Definition of Mastery

Learning that is sufficiently embedded, deep, connected and fluent, in order for it to be sustained, built upon and connected to (Debbie Morgan, Director NCETM)

#### Rationale

The 2014 changes to the national curriculum in mathematics set out three main aims:

- become **fluent** in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- **reason** mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

The rationale for this change is that England is significantly underachieving in terms of developing mathematicians capable of deep, sustainable mathematics understanding which serves them well at GCSE, A-Level and in life. Moreover, our historic emphasis on procedural understanding has led to children poorly understanding mathematical concepts: research from South East Asia shows us that when the emphasis of teaching and learning is on conceptual understanding, many of the difficulties in maths that children have, do not exist. All children can achieve well in mathematics.

To be a successful mathematician, these 3 things are ESSENTIAL:

1. **Correct concept about maths concepts (deep, personal understanding)**
2. **Correct concept of the nature of maths (finding things out...creative thinking as problem solvers)**
3. **Correct concept about themselves as a learner (metacognition & self-regulation)**

### What is Maths Mastery?

- Evidence-based approach to teaching maths
- Helps pupils develop a deep, long-term and adaptable understanding of maths
- Inclusive approach where all children achieve
- Slower pace which results in greater progress

Debbie Morgan (Director of NCETM) <https://mathsnoproblem.com/en/mastery/what-is-maths-mastery/>

Maths mastery teaching and learning is at the heart of all we do in order for us to teach effectively against the National Curriculum aims 2014. Traditional, pre-2014 provision will not adequately prepare our children, and therefore we need to have a plan in place to embrace maths mastery understanding and practice to ensure **deep, conceptual, sustainable learning for all children.**

### A new way of thinking and teaching: maths mastery essentials ideas -

#### Whole class moves through content at the same pace

When teaching maths for mastery, the whole class moves through topics at broadly the same pace. Each topic is studied in depth and the teacher does not move to the next stage until all children demonstrate that they have a secure understanding of mathematical concepts.

#### Time to think deeply about the maths

Students are given time to think deeply about the maths and really understand concepts at a relational level rather than as a set of rules or procedures. This slower pace leads to greater progress because it ensures that students are secure in their understanding and teachers don't need to revisit topics once they've been covered in depth.

#### Builds self-confidence in learners

In a traditional primary school maths lesson, children are put in different groups and given different content based on their anticipated ability. This means that from an early age children are classed as those who can and can't "do maths". Teaching maths for mastery is different because it offers all pupils access to the full maths curriculum. This inclusive approach, and its emphasis on promoting multiple methods of solving a problem, builds self-confidence and resilience in pupils.

#### Differentiates through depth rather than acceleration

Though the whole class goes through the same content at the same pace, there is still plenty of opportunity for differentiation. Unlike the old model, where advanced learners are accelerated through new content, those pupils who grasp concepts quickly are challenged with rich and sophisticated problems within the topic. Those children who are not sufficiently fluent are provided additional support to consolidate their understanding before moving on.

#### Moving to maths mastery requires a significant and long-lasting investment in your staff.

Investing in mastery is an investment in staff, the training will improve their teaching practice and:

1. **Expertise.** There is a degree of pedagogical expertise required to facilitate this type of learning effectively, so investing in staff CPD is a brilliant way to enhance staff subject knowledge.
2. **Confidence.** Having the confidence to teach mastery is vital. Setting up a maths working party of enthusiastic staff members is one way to help champion the necessary shift towards teaching mastery.
3. **Research.** Organisations such as the NCETM (National Centre for Excellence in the Teaching of Mathematics) and MA (Mathematics Association) offer a range of courses.

### Small steps lead to deeper understanding

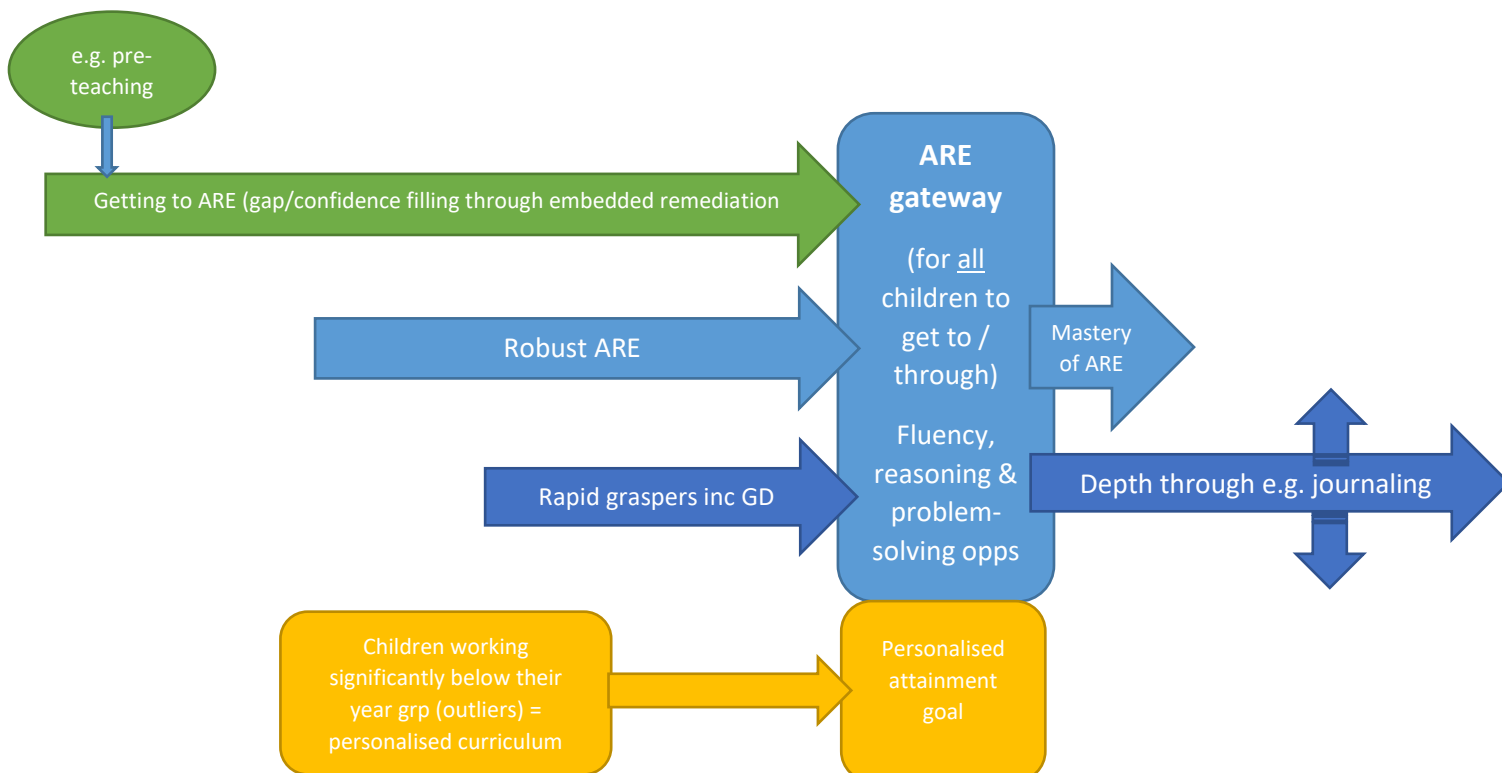
Mastery is not a 'quick fix', and the whole school needs to be on board and committed. It takes time for teachers to learn how to effectively teach each mathematical concept. Additionally, pupil progress shifts from 'doing' lots, to 'thinking' lots, these deeper changes in mathematical thinking and understanding will be evidenced in books. Consideration does need to be given to upper KS2 in particular, as they will not necessarily have benefited from long-term maths mastery teaching and learning – so their provision needs to pull in gaps from previous years. This 'embedded remediation' is a key component of maths mastery teaching. For those with significant gaps, pre-teaching will be considered as an effective, teacher-led catch up method.

All children, in all year groups will benefit from 'embedded revision' (pulling through in seconds the essentials of prior knowledge and understanding) so that all children are ready for learning as they revisit the maths concept (spiral curriculum) in a subsequent year group. To this end, the 'initial learning' of mathematical concepts which occurs primarily in EYFS and year 1, couldn't be more critical – as all future learning sits on this conceptual bedrock.

### Small steps, which include variation (intelligent practice) can be seen in a positive light for three reasons:

1. The small steps in learning do not overwhelm pupils and are carefully crafted to provide the children with intelligent practice (varied practice rather than repetitive practice). Children 'catching up' may require a longer run way, but still achieve what is expected (green arrow). *'Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.'* NC 2014.
2. Every child can access the learning and the concepts are fully embedded before moving on; (see below – all learners through the ARE gateway). Advanced learners / rapid graspers learn well as maths mastery embeds the 'enrichment model', providing carefully crafted learning opportunities for them to develop as mathematicians. *'Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems.'* NC 2014
3. Teachers can make formative assessments during lessons and through active marking, allowing the class to advance at the same time (see Dufour). These small increments of learning are fundamental to learning conceptually. If a 'jump' to the next concept is too large, children become lost and gaps start to form in their knowledge. This can be particularly evident in those with poor attendance. However, teaching mastery does account for this. These children are able to catch up through 'embedded remediation' as concepts are revisited at a subsequent time.

### Key teacher intention: all learners through the ARE gateway



Lesson design, to enable effective maths mastery teaching and learning is critical.

## What Defines Mastery Teaching?

Teaching for mastery is underpinned by 5 key principles (NCETM 5 Big Ideas):

1. **Coherence:** Sufficient time is spent on well-planned sequences to ensure that key concepts are developed and deeply embedded before moving on.

A comprehensive, detailed conceptual journey through the mathematics. A focus on mathematical relationships and making connections. **'Ping Pong' between the teacher and the children.** Provides a clear and coherent journey through the mathematics. Provides detail. Provides scaffolding for all to achieve. Provides the small steps.

2. **Representation and structure:**

Mathematics is an abstract subject, representations have the potential to provide access and develop understanding. Mathematical concepts are explored and understood through strong models, images and representations such as Base 10, 10-grids, Numicon, block modelling, Cuisenaire, algebra tiles, part part whole models, part whole relationships etc. *"Mathematical tools should be seen as supports for learning. But using tools as supports does not happen automatically. Students must construct meaning for them. This requires more than watching demonstrations; it requires working with tools over extended periods of time, trying them out, and watching what happens. **Meaning does not reside in tools; it is constructed by students as they use tools"***

3. **Fluency:** Factual knowledge (e.g. number bonds and times tables), procedural knowledge (e.g. formal written methods) and conceptual knowledge (e.g. of place value) are taught in a fully integrated way and are all seen as important elements in the learning of mathematics. Children are able to efficiently select the best method from a variety that they have developed, to solve problems. *In teaching procedural and factual knowledge, ensure the students gets to automaticity.* Explain to students that automaticity with procedures and facts is important because it frees their minds to think about concepts.

Daniel Willingham: "Is it true that some people just can't do math?"

4. **Variation:** Conceptual variation and procedural variation are used extensively throughout teaching, to present the mathematics in ways that promote deep, sustainable learning. This is especially evident in the practice that children are given in each session. It is generally perceived as one of the most valuable experiences within Chinese mathematics education community (e.g. Sun, 2011).

- **The role of repetition *I say, you say, you say, you say, we all say***

This technique enables the teacher to provide a sentence stem for children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding. For example:

*If the whole is divided into three equal parts, one part is one third of the whole.* Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions. Repeated use helps to embed key conceptual knowledge.

<https://www.ncetm.org.uk/resources/48070>

- **Memorisation** does not necessarily need to be devoid of understanding. It can be developed first with limited understanding and then used as a framework to deepen understanding. The understanding can be developed first and then the facts memorised.

5. **Deep mathematical thinking:** Thinking about relationships. The reasoning behind mathematical processes is emphasised. Teacher/pupil interaction explores in detail how answers were obtained, why the method/strategy worked and what might be the most efficient method/strategy.

- **Intelligent Practice** *In designing [these] exercises, the teacher is advised to avoid mechanical repetition and to create an appropriate path for practising the thinking process with increasing creativity.* Gu, 1991

- **How do we teach for it?**

- Representing the mathematics in ways that are accessible
- Whole Class Ping Pong style
- Avoid cognitive overload
- Repetition and stem sentences

- Learning facts to automaticity
- Variation and intelligent practice

### **In summary: crucial to effective mathematical learning:**

1. Give children enough time to process, so that they 'notice' the maths and discover for themselves (Piaget)
2. Let children explore the mathematical concept for themselves (Dienes)
3. Give children concrete resources (manipulatives / representations, images etc.) so that they have a physical experience with mathematics, this is especially critical in the initial stages of learning and helps prevent misconceptions (Bruner)
4. Facilitate children talking about maths. Through social experience children will amass some of the most important aspects of mathematical thinking - comparison / contributing / originating / listening / deciding etc. etc. (Vygotsky)
5. Let the children pivot their thinking around one problem (one idea): getting children to find 5 ways of working out one question leads to more effective learning than having 5 problems each with one thought. Low floor / high ceiling. (Boaler)

### **A new way of thinking and teaching: maths mastery essentials ideas -**

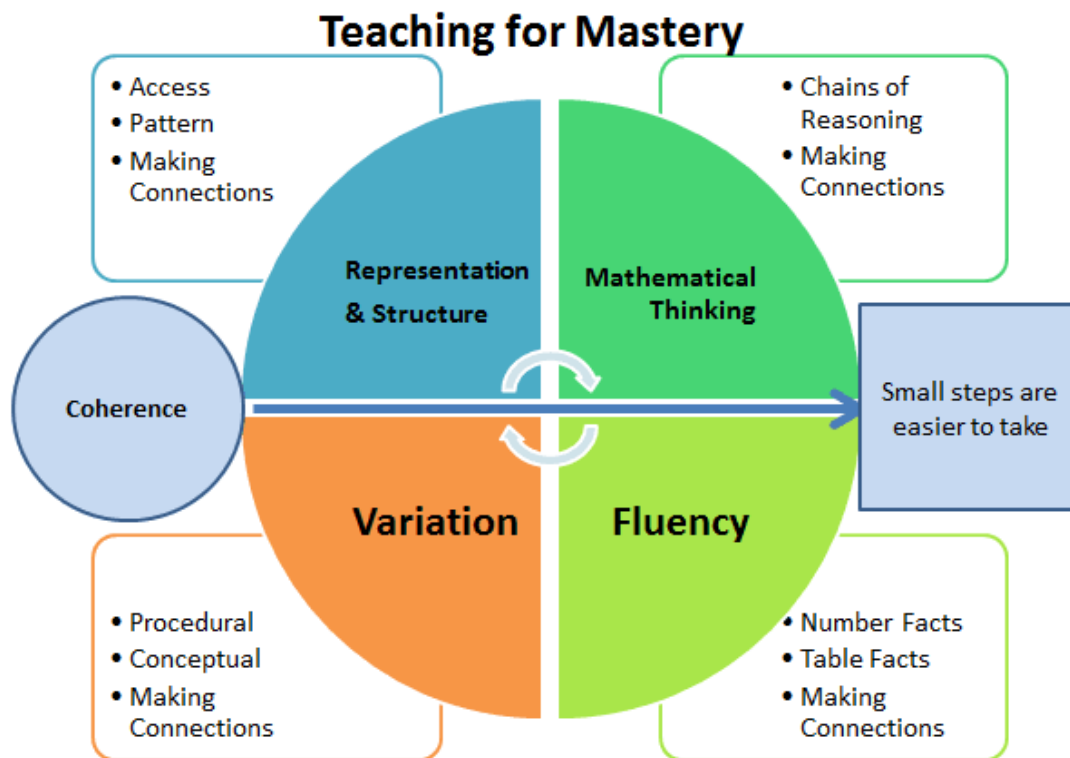
- The main mathematical difficulties children have, are not from misunderstanding basics concepts, but from disconnected procedural learning / being confused by instrumental steps.
- Differentiation within maths mastery is giving the children the pathway they need to succeed. We must give children cognitive freedom to use concrete materials and visual representations in their learning pathway (within structured learning opportunities) ...until they are ready for / mature enough to manage the more symbolic (abstract) method. This is true differentiation for children needing support. Advanced learners / rapid graspers - we challenge without giving them more.
- Differentiation, for any learner – catching up or advanced – can be based on any of the three essentials in order to be a successful mathematician:
  1. Correct concept about maths concepts (deep, personal understanding)
  2. Correct concept of the nature of maths (finding things out...creative thinking as problem solvers)
  3. Correct concept about themselves as a learner (metacognition & self-regulation)
- As teachers, we must be guided by the ability of the children to manage their metacognition...if they cannot handle long division (formal method) yet, do the less symbolic method. Both necessitate conceptual understanding. 'We do not learn from experience; we learn from reflecting on experience.' John Dewey
- Grouping learners: the two important variables that impact on outcomes, stated by Dufour's research, are:
  - 1) variability (not fixed grouping)
  - 2) personality (as long as they get along)
- We need to be aware of 'pseudo-advanced' learners – children who are advanced in computation, but don't have commensurate and reliable number sense, and cannot think adaptively.
- Finally, we must remember that we are teaching on top of things the children already know.... therefore, the children need to perceive learning as revising and building on prior knowledge. Crucially, mathematics teaching needs to lead from gaining both conceptual understanding and enabling learners to figure out problems.

### **Tools to support teacher planning and consideration of the mathematics:**

**The Planning S** - Key conceptual ideas on Post-its. Representations. Difficult points. Variation. Going deeper. Likely misconceptions. Making connections...

The schools represented in these videos have all been involved in the England-China Exchange project within the **Maths Hubs Programme** and are starting to embed a teaching for mastery approach. Part-way through their journey

they agreed to be filmed, in order to share progress being made. The videos are presented to show teachers seeking to embed some of the key features of teaching for mastery, such as whole class teaching, a step-by-step journey towards deep understanding of a concept, high expectations of mathematical language used by pupils and a strong belief that all children can achieve. We **strongly** encourage teachers not to consider these videos in isolation, but to view them alongside the accompanying **PowerPoint presentations**. These draw out key pedagogical points, along with resources used by the teacher during the lesson. There are also teacher, pupil and subject leader interviews. <https://www.ncetm.org.uk/resources/48209>



### Why mastery - summary

- Conceptual understanding is taught alongside procedural understanding. Teacher pedagogical knowledge needs to be supported.
- Small, ordered steps embed and build on learning.
- Ensure that the whole school are on board and 'champions' are in place to drive the new teaching style.

### Planning - summary

1. Map out learning objectives so that you have a clear understanding of the underpinning mathematical concept being learned; progressive small steps
2. All children work on the same mathematical concept and through intelligent practice so that they are adequately supported and/or challenged.
3. Design tasks that are meaningful and which children can relate to.
4. Know the lesson well and be aware of potential misconceptions.
5. Assess mastery and depth rather than coverage.
6. 'Provide time' for children to process their thinking, this is critical in order for children to embed and link knowledge and understanding together.
7. Use plain language in the initial stages of learning, build in formal terminology as the children become more confident with the concept. Encourage children to answer questions in full sentences so that they gain an internal structure.

## Planning – useful thinking

Planning from a maths scheme  
(i.e. MNP)



Use and utilise the SoW / Maths Framework lesson plan, teacher to use planning time to annotate the mathematical conceptual understanding progression, teaching of etc (rather than cutting and pasting out of the SoW into an academy planning format)

Planning from a maths framework  
(i.e. Whiterose maths)



If you have no structure to your lesson design – use EEF Metacognition and self-regulated learning.

### **Deep, effective practice includes commitment to:**

Teacher – deep understanding of mathematical concept, what and how to teach, possible misconceptions, manipulatives choice to expose and explore mathematical structure...etc. etc.

### **How?**

**S plan the unit (underpinning maths concept)  
(requires CPD and coaching)**

# Whitesheet Primary Academy: Maths No Problem

## Big Brain Thinking: BBT

### Maths No Problem: Design

**Don't waste  
a good mistake...  
Learn from it.**

Robert Kiyosaki  
InspiratorBoost.com

**Explain it** – All children are provided opportunities for **Big Brain Thinking** ...within a lesson, explaining their methods to their partner...validating why their methods / strategies are the most effective...

**Convince me** – *Are you sure?* -Children must identify their partner's misconceptions and reason why their answer is correct but their partner is not.

**Prove it** – Children are challenged to independently prove that they have reached the correct answer. Eg. Using an alternative method.

**Use it** – Children are challenged to apply their learning, within another context.



### Part 1: In Focus

Children focus on a single problem but look at it from multiple perspectives.

At this stage children are:

- Presented with a **visual representation** of the problem
- Provided manipulatives to help them explore
- Asked to work with their partner to work out different methods – 'Try 2 - 3 on a clever day!'
- Given opportunities to **talk** to grapple for meaning
- **Questioned**
- Given **time to explore**
- Given **time to process** and **gain confidence**

Mathmagical Maths  
No Problem at  
Whitesheet ...

### Part 2: Let's Learn

At this stage children are:

- Asked to explain their solution to the class
- Presented with alternative methods from the children in the MNP textbook. The teacher adds layers to structure children's responses. Children capture their thoughts and understanding, so far, in their MNP Journals...

### Part 4: Independent Application

Children apply their learning independently – this is a time where 'struggle' leads to greater depth of understanding

Children are given questions that follow a structured spiral approach drawing out deep understanding. The children can add to their MNP Journals at this time if they wish.

### Part 3: Guided Practice

Children practise for consolidation and fluency.

At this stage children are:

- Presented with similar problems that are slightly different each time (variation not repetition)
- At this point, any children who still have misconceptions, will work with an adult to address issues...

### Catering for all learners

We adopt a **Concrete - Pictorial- Abstract** approach (CPA)

- We present different levels of challenge and questioning.
- Create choice and challenge children's thinking.
- Allow time for children to process thoughts and ideas.

**Assessment** of process not product.

Can asked....




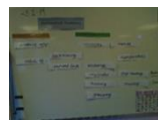
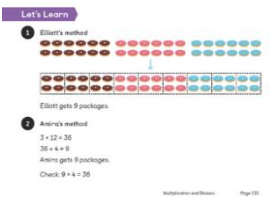
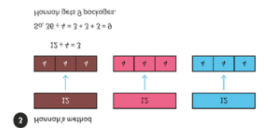


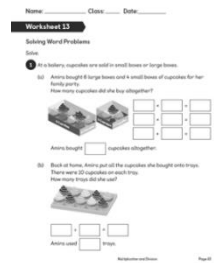
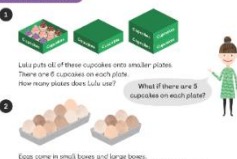
Can you ... **Show me?**

Give you ... **Draw it?**

Can you ... **Explain it?**

Can you ... **Prove it?**

# Maths No Problem: Lesson Plan Design at Whitesheet ...

Week Beginning:	In Focus			Let's Learn			
	Explore	Manipulatives	Vocabulary	Structured discussion	Journaling	Read & Reflect	
Lesson 1: Each lesson Supporting children to move from Concrete to Pictorial to Abstract	<p>Solving Word Problems <b>Lesson 13</b></p> <p><b>In Focus</b></p>  <p>Chorlie repacks the doughnuts in these 3 boxes into packages of 4 doughnuts each. How many packages does he get?</p> <p>In Focus Task presented to children – stick in to Journal</p> <p>Give time for the children to explore their thinking and ideas collaboratively.</p> <p>Opportunity to try out ideas - use manipulatives / real life objects.</p> <p>Draw out language – child speak</p> <p>No right or wrong answers</p> <p>Teacher acts as a catalyst for deep mathematical thinking</p>	<p>Refer to MNP for recommended manipulatives</p>  <p>Have accessible to children at all times</p> <p>Access to resources to support growing fluency</p> 	<p>Vocabulary on display at all times -</p>  <p>Vocabulary moved from... Words I need to know &amp; understand...</p> <p>Across to....</p> <p>Words I understand and can use</p>	<p><b>Let's Learn</b></p>  <p>Opportunity for children to compare strategies with 'our friends in the book'.</p> <p>Teacher explicitly models strategies / methods.</p> 	 <p>Allow the children to capture &amp; explain their thoughts and ideas.....</p> <p>Show it....Draw it.....Prove it....Explain it</p> <p>How many ways.....at least 1...2 is great...3 on a 'clever day'</p>  <p><b>Read &amp; Reflect.....</b></p> <p>Children engage metacognitively with what they know and how it will help them</p> <p>Time to evaluate effectiveness of different strategies</p>		
					<p><b>Independent - Maths on your own</b> ← <b>Guided - Trying out, maths talk</b></p>		
				<p>Important for children to work independently – teacher to step back. Children need to be supported through their 'struggles' with finding the right strategy to solve the problem.</p> 	<p><b>Guided Practice</b></p>  <p>Time to 'Stick or Twist' ....those ready, move on ...others work supported to address misconceptions consolidate thinking.</p>	<p>Maths Talk Time – children talk through their ideas – using chosen strategies / manipulatives to solve. Teacher assess understanding / misconceptions.</p>	

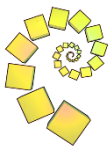
## Next Steps.....

**Early Years:** As we embed MNP across KS 1 and 2, we are also working to develop further a rich mastery approach to Maths with our Reception Children.

Currently, our Reception Teacher uses the same approach, structure, techniques, language and strategies as MNP in order to create linkage and smooth transition in to Year 1. This is supported by the use of:

- **Numberblocks:** Numberblocks introduces the concept of number to young children gently through engaging storylines which feature loveable characters. Each episode combines story, song and animation to introduce ideas in a way which makes number exciting and easy to understand.
- **NRICH activities linked to the document below:** NRICH tasks embrace the aims of the curriculum (problem solving, reasoning, fluency) as well as curriculum 'content'.

<https://nrich.maths.org/12662>



## NRICH Curriculum Mapping Documents

NRICH tasks linked to the English Primary National Curriculum for mathematics in EYFS, Y1, and Y2



### Key areas of focus: Working to...

- Provide mathematically rich environments
- Give time to explore and develop depth of understanding
- Provide meaningful experiences in a range of contexts

Build enjoyment of mathematical ideas, language and activities

- Develop and enrich mathematical language
- Promote purposeful interactions with confident adults

### The use of Journals in MNP:

All children in both KS1 and 2 are using journals to promote and develop their mathematical thinking. Journals are used every lesson to capture and explain their thinking.

### Children are encouraged to explain their ideas through:

- Jottings
- Diagrams/pictorial representations
- Written explanations

Currently, we are focussing on supporting the children to develop 4 key ways of capturing their understanding and working through being asked to:

- Show it
- Draw it
- Prove it
- Explain it

Over time and, as children move through the school, their explanations will develop to become less descriptive and more evaluative.

The focus of our work with KS1 and 2 is to develop and extend the evaluative approaches to journaling. There will be phased progression through staged approaches to build skills and confidence. We are linking in to the work completed by Nelson Primary School who have produced an excellent document called:

“21 Ideas for Promoting and Developing Mathematical Thinking through Journaling”

<http://ineastmathshub.org.uk/wp-content/uploads/2016/12/21-Ideas-for-Journaling.pdf>

### Further guidance in establishing, growing and developing a maths mastery approach:

**7 maths mastery PATHWAYS currently across the Trust** – see ‘Choosing the right maths scheme (framework)’ 3<sup>rd</sup> space learning, for more information.

Mathematics Framework	Schools
WhiteRose Maths <ul style="list-style-type: none"> <li>• <i>Long term overview</i></li> <li>• <i>Yr grp and unit planning with small steps</i></li> <li>• <i>EEF lesson design (planning structure)</i></li> </ul>	St Peter’s The Trinity Shrewton
MNP	TY Beechcroft Whitesheet Beaminster St Mary’s Dunbury
Inspire	St John’s
Maths mastery	Milldown
Currently undefined	St Bart’s Southbroom St Andrew’s
Use EEF lesson design	Marden Vale Wilton

### NCETM working Groups (TRGs)

Angus (St Bart’s) – manipulatives with Boolean maths hub  
 Laura (Y1 Milldown) - manipulatives with Jurassic maths hub  
 Becky (Beechcroft) – EYFS maths with Jurassic maths hub  
 TAs KS1 (Beechcroft) – improving subject knowledge  
 Primary TfM – Maths Hubs 2019...more information to follow (Jan 2019)

### Growing your maths mastery pathway: effective teaching & learning of mathematics:

1. **Headteachers** feel informed, empowered and have vision for maths mastery in their school, and an understanding of how the Trust's Strategic vision for maths mastery and the Hub network can support this.
2. There is a **whole school** commitment to ongoing, quality maths mastery **CPD** to support, expose and explore the school's chosen pathway: this includes teachers and TAs.
3. Every school has a **maths mastery champion (leader)** who attends central training – so that there is a person with expert maths mastery thinking. This model would enable maths SLs to become more skilled from their individual starting points. E.g. a day's training on each of the 5 big ideas, so that maths SLs are well-versed in each area and can leave being able to lead staff CPD in their own schools. Maths Hub maths expert.
4. **Demystify maths mastery** – NCETM videos (see below), Dr Yeah Ban Har videos. Effective maths mastery teaching to be filmed and shared – aspects of maths mastery agreed at Hub level, for example. Need driven by schools. (Clarity comes from seeing it). Schools will be encouraged to **sign up for the Maths Hub Teaching for mastery programme 2019/20** to facilitate and support their development.
5. **Hub maths SLs network meetings** to move forward and support maths mastery subject leadership – i.e. securing the basics (fluency and calculation), using manipulatives to expose and explore mathematical structure, teaching reasoning - problem solving.
6. **Maths mastery advocate in each Hub**. Initially derived from the Maths Working Group - Thrive: DH, Emmaus: Ben H, WBH: CT, Spire: OM. (HILs to support network facilitation.) HILs also belong to this group.
7. **Mixed age maths teaching** ... a next step to explore further (useful references below).
8. **DSAT's strategic vision for maths mastery** offers signposting for schools at the different stages of engagement – readiness for mastery, in to establishing and implementing maths mastery, moving in to sustaining and empowering maths mastery.

## Information on textbooks

Use of high-quality textbooks to support teaching for mastery:

- The use of well-designed and tested textbooks is critical for the successful implementation of teaching for mastery. A good textbook is an aid both for the teacher in planning lessons, and for the pupil during lessons and working on their own.
- For this reason, a proportion of the overall Department for Education (DfE) funding for teaching for mastery, first announced in July 2016, is being made available to Primary Mastery Specialists and those schools participating in the Maths Hubs projects (Work Groups) that they lead, to help buy high-quality maths textbooks that meet **criteria** drawn up by the DfE.
- Each school year, publishers are invited to submit textbooks for review against the criteria by an expert panel established by the DfE.
- In the most recent review, announced on 20 November 2018, the panel concluded that *Maths - No Problem!* (published by Maths - No Problem!) and *Power Maths Key Stage 1* and *Power Maths Key Stage 2* (published by Pearson) had met the published criteria.

## Helpful documents

NCETM

- Mastery <https://www.ncetm.org.uk/resources/47230>
- The essence of maths teaching for mastery <https://www.ncetm.org.uk/files/37086535/The+Essence+of+Maths+Teaching+for+Mastery+june+2016.pdf>
- Five big ideas in teaching for mastery <https://www.ncetm.org.uk/resources/50042>
- Why mastery readiness isn't just mastery-lite <https://www.ncetm.org.uk/resources/52695>
- Debbie Morgan (Director of NCETM) five big ideas to develop mastery
- **Case studies supporting teaching for mastery** <https://www.ncetm.org.uk/resources/49019>
- **Teaching for Mastery in a Mixed Age Class** <https://www.ncetm.org.uk/resources/49022>

- Coherence and small steps (maths mastery). Watch this video from China and observe the carefully crafted small steps of the maths lesson. <https://www.youtube.com/watch?v=16pphPJKtFM>

EEF

- Metacognition & self-regulated learning – mastery lesson design (Section 3, p17)  
[https://educationendowmentfoundation.org.uk/public/files/Publications/Campaigns/Metacognition/EEF\\_Meta\\_cognition\\_and\\_self-regulated\\_learning.pdf](https://educationendowmentfoundation.org.uk/public/files/Publications/Campaigns/Metacognition/EEF_Meta_cognition_and_self-regulated_learning.pdf)

Third Space Learning

- The ultimate guide to maths mastery
- Choosing the right maths scheme (framework) <https://thirdspacelearning.com/resources/resource-slt-guide-maths-scheme-of-work/>
- Mastering mixed ability maths <https://thirdspacelearning.com/resources/resource-mastering-mixed-ability-maths-resource/>
- The ultimate guide to maths manipulatives <https://thirdspacelearning.com/resources/resource-ultimate-guide-maths-manipulatives/>

Babcock

- Mixed age maths teaching <https://www.babcockldp.co.uk/improving-schools-settings/mathematics/teaching-for-mastery/primary-teaching-for-mastery/teaching-for-mastery-mixed-age-classes>

Maths No Problem (MNP)

- Key aspects of maths mastery videos. Useful for CPD starters and for parents.  
<https://mathsnoproblem.com/en/parent-videos/>
- How To Extend A Task for Advanced Learners | Maths – No Problem!  
<https://www.youtube.com/watch?v=c5ZcWuyHy7E>
- What is Bar Modelling? By Maths Mastery Expert Dr Yeap Ban Har (Part 1) | Maths – No Problem!  
<https://www.youtube.com/watch?v=l6lpio8JntU>
- What is Bar Modelling? By Maths Mastery Expert Dr Yeap Ban Har (Part 2) | Maths – No Problem!  
<https://www.youtube.com/watch?v=i7LAHc1qvig>
- Year 4 Singapore Maths Model Lesson: Measuring Area | Maths — No Problem! See how Dr. Yeap Ban Har uses problem-solving, hands-on materials and group work to teach the concept of measuring area in this Year 4 Singapore maths model lesson ...[https://www.youtube.com/watch?v=67Bd\\_UVsfTU](https://www.youtube.com/watch?v=67Bd_UVsfTU)

It models very well the process of stepping or building a learning journey. This is a good CPD video to explore many aspects of maths mastery...most notably the children making the connections in their learning through finding out, rather than being told. In developing from traditional maths teaching to maths mastery teaching, this has been shown and the teachers asked to look at the questioning from Dr Yeap Ban Har, the structure of the lesson (timing) and the consistent back and forth dialogue between teacher and learners.

There is an element of exploration and rich discussion for **19 minutes to ensure all understand the concept before they begin the activity**, with the use of manipulative resources.

The style of information transfer is different than what we are used to. Information is given to the children in a way that suggests the teacher is unsure. Lots of can you help me etc. His subject knowledge is clearly exceptional but the way he delivers it is very effective.

All are accessing the content and the end result is a suitably pitched activity that all (it appears) have achieved.

**Some key points (there are others) are (in minutes)**

5:34 - waiting for response and not giving the answer

19 minutes - children begin activity / task.

24 minutes - Shape naming as a side line but children don't know - comfort in saying - let me know tomorrow if you find out.

29.34 minutes the girl is presented with a problem that requires her to visualise the solution - the use of the manipulative resources and the questioning in the lesson has given her confidence to tackle the question.

Useful

Mike Askew – foundational tasks...draws out the maths and enables generalising at the start of the lesson (book)

All are from the teaching to mastery range printed by Marshall Cavendish:

9789810116736 - Whole numbers

9789810117757 - Fractions

9789810195908 - Decimals