

Mastery Guide for parents

What is Maths Mastery at West Park Primary School

What does it mean to master something?

- I know how to do it
- It becomes automatic and I don't need to think about it- for example driving a car
- I'm really good at doing it – painting a room, or a picture
- I can show someone else how to do it.

Mastery of Mathematics is more...

- Achievable for all
- Deep and sustainable learning
- The ability to build on something that has already been sufficiently mastered
- The ability to reason about a concept and make connections
- Conceptual and procedural fluency

Key Features of a mastery approach

- **The class work together on the same topic**

The emphasis is on keeping the class together until specific concepts or skills are mastered and then moving on together. This does not mean that some children will be left behind or others not challenged. Differentiation is now achieved through and deeper understanding, as explained below.

- **Speedy teacher intervention to prevent gaps**

Those children that have not met the expected outcomes or have gaps in their understanding, will be helped by receiving short, immediate extra time on maths, either before the lesson (pre-teach), during the lesson or later in the day. This is a positive opportunity to prepare for learning or consolidate their understanding.

Key Features of a mastery approach continued...

- **Focused, rigorous and thorough teaching**

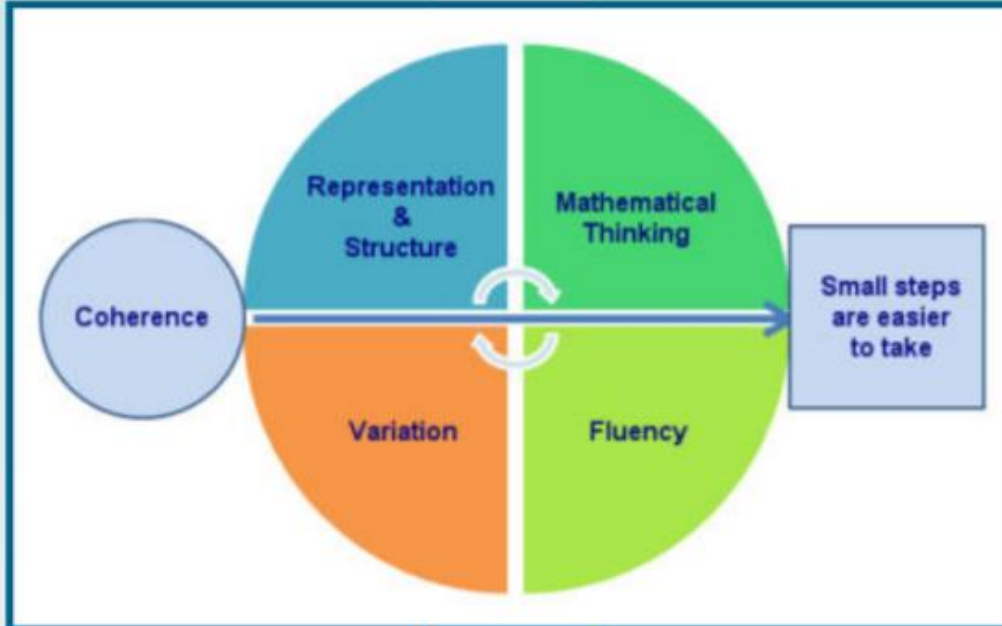
Within Mastery, the idea is to focus on one small step at a time in a lesson, with an emphasis on the mathematical structures involved and the best way to represent these through models and images. Each small step is important as it builds towards deep understanding of a concept.

- **More time on teaching topics – depth and practice**

The same topic is likely to have the same focus until the class has mastered the concept, skill or procedure being taught. This is particularly the case for number and calculations. Focus areas are being taught over a longer time with smaller steps of progress and time is for practice and depth, making the learning effective.

Representation and Structure
Representations such as objects and pictures are used in lessons expose the mathematical concepts being taught.

Mathematical Thinking
If taught ideas are to be understood deeply, they must not merely be passively received but must be thought about, reasoned with and discussed with others.



Variation
Varying the way a concept is initially presented to students, by giving examples that display a concept as well as those that don't display it. Also, carefully varying practice questions so that mechanical repetition is avoided, and thinking is encouraged.

Fluency
Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics.

Coherence
Connecting new ideas to concepts that have already been understood, and ensuring that, once understood and mastered, new ideas are used again in next steps of learning, all steps being small steps.

A central component to develop Mastery are the Five Big Ideas, drawn from research evidence, underpinning teaching for mastery. The diagram is used to help bind these ideas together.

Think and talk like a mathematician

- Mathematics language often uses common words in a new way. For example, 'difference', 'right', 'product', 'table'.
- Always encourage your child to explain how they have gone about solving a problem, and work with them to test, prove, explain, reflect and spot patterns. Questioning and prompts can be powerful tools to boost your child's mathematical thinking:
 - 'What do you think...?'
 - 'Why ...?' 'What will happen if...?'
 - 'What do you notice about...?'
 - 'Can you see a pattern between...?'
 - 'What if we try...?'
- Communicating and discussing maths problems (in a way that others can understand) demonstrates depth of understanding – another fundamental aspect of mastering mathematics.

Levels of learning

- There are 3 levels of learning:
- Shallow learning: surface, temporary, often lost
- Deep learning: it sticks, can be recalled and used
- Deepest learning: can be transferred and applied in different context

The deep and deepest levels are what we are aiming for by teaching maths using the Mastery approach.

A mathematical concept or skill has been mastered when a child can show it in multiple ways, using the mathematical language to explain their ideas, and can independently apply the concept to new problems in unfamiliar situations.

Mastery is a journey and long-term goal, achieved through exploration, clarification, practice and application over time. At each stage of learning, children should be able to demonstrate a deep, conceptual understanding of the topic and be able to build on this over time.

Growth Mindset is very closely linked with Mastery and fosters:

- a belief that effort creates success
- a belief that skill and ability can be increased over time
- mistakes are viewed as an opportunity to learn and develop ☐ builds resilience – don't give up easily
- think about how they learn, not just what

Traditionally, Maths has been taught by memorising key facts and procedures, which tends to lead to superficial understanding that can easily be forgotten. Children should be able to select which mathematical approach is most effective in different scenarios.

At West Park all pupils can achieve in mathematics! There is no such thing as a 'Maths person', that is the belief that some pupils can do maths and others cannot.

Teaching for Mastery involves

- High expectations for every child
- Fewer topics covered in greater depth
- Number sense and place value come first
- Problem solving is central, ensuring an understanding of why it works so that the children understand what they are doing rather than routines and procedures with grasping what is happening.
- Challenge is provided through an increased depth, rather than acceleration of content (moving into next year group content) This allows children to deepen their knowledge and improve their reasoning skills rather than accelerating on to new curriculum content.

Teachers promote mathematical thinking and reasoning during Maths lessons, through using carefully chosen questions

- What is the same? What is different?
- What do you notice
- Spot the odd one out. Why?
- Can you group these in some way?
- Can you see a pattern?
- Convince me
- Is there another way
- Is it always true, sometimes true or never true that_____?
- Can you spot the mistake? Explain why they are wrong.

How do we develop reasoning in lessons?

$$\frac{3}{8} + \frac{2}{8} = \frac{5}{16}$$

True

$$\frac{3}{9} - \frac{2}{9} = \frac{1}{9}$$

or

$$\frac{2}{14} - \frac{1}{7} = \frac{1}{7}$$

False?

Which is the odd one out? Why?



81

18

45

Teachers will secure fluency and then go deeper by using reasoning and problem solving

For example, if the learning intention was to multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 (Year 5) a series of questions may be ...

Fluency

- Complete the grid:

	$\times 100$	$\div 1000$	$\times 10$
365			
2669			
12			

- Fill in the boxes:

$$\boxed{} \times 100 = 38$$

$$56 \boxed{} = 5.6$$

$$0.8 \times 1000 = \boxed{}$$

- Some facts have been cut up. Work with a partner to put them back together.
e.g. $74 \div 10 = 7.4$

100	31
3100	$\div 1000$
$\div 100$	$\times 100$
31	$= 0.031$
31	$= 1$

Reasoning

- True or false?**
When you multiply whole and decimal numbers by 10, 100 or 1000, you just add noughts on to the end.
- If $5 \times 4 = 20$
Explain why these facts are true without working them out:
 $0.5 \times 4 = 2$
 $200 \div 4 = 50$
 $0.4 \times 0.5 = 0.2$

Problem Solving

- Put these calculations in order from smallest to biggest:

$$100 \times 540$$

$$5.4 \times 1000$$

$$5400 \div 10$$

$$5400 \div 1000$$

$$540 \div 10$$

- Using a number from column A, an operation from B and a number from C, how many ways can you find to make 70? (There are more than 4 ways!)

A	B	C
7	X	1
70		10
700	÷	100
7000		1000

Multiple representations for all- concrete, pictorial, abstract (CPA)

Objects, pictures, words, numbers and symbols are everywhere. The mastery approach incorporates all of these to help children explore and demonstrate mathematical ideas, enrich their learning experience and deepen understanding. Together, these elements help cement knowledge so pupils truly understand what they've learnt.

All pupils, when introduced to a key new concept, should have the opportunity to build competency in this topic by taking this approach. Pupils are encouraged to physically represent mathematical concepts. Objects and pictures are used to demonstrate and visualise abstract ideas, alongside numbers and symbols.

Concrete – children have the opportunity to use concrete objects and manipulatives to help them understand and explain what they are doing.

Pictorial – children then build on this concrete approach by using pictorial representations, which can then be used to reason and solve problems.

Abstract – With the foundations firmly laid, children can move to an abstract approach using numbers and key concepts with confidence.

How can you support at home?

Maths learning can happen anywhere. Maths is all around us and problem solving is at the heart of the mastery approach. Look for maths problems you can solve together, making connections between what your child has been learning at school and the world around them.

- **Follow a recipe:** work together to find out the quantities needed, ask your child to weigh the ingredients, discuss how you'd halve or double the recipe and discuss the ratio of ingredients.
- **Talk about the weather forecast:** is today's temperature higher or lower than yesterday's? What do the numbers mean?
- **Going shopping:** talk about the cost of items and how the cost changes if you buy two items instead of one. Let your child count out the coins when paying and discuss the change you get back. Use coins to explore addition, subtraction, multiplication and division.
- **Planning an outing:** discuss how long it takes to get to the park, and so work out what time you need to leave the house. Encourage your child to work out the best solution based on the time and distances. Discuss what shapes you see when you get there. Think and talk like