Mathematics Mastery

What is it?

A guide for parents and carers

Key principles

- Fewer topics in greater depth
- Number sense and place value come first
- Problem solving is central
- Mastery for all pupils

What does the National Curriculum say?

"Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content."

"Those who are not sufficiently fluent should consolidate their understanding, including through additional practice, before moving on."

from: https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study

What does the National Centre for Excellence in the Teaching of Mathematics say?

Since mastery is what we want pupils to acquire (or go on acquiring), rather than teachers to exhibit, we use the phrase 'teaching for mastery' to describe the range of elements of classroom practice and school organisation that combine to give pupils the best chances of mastering mathematics.

Mastering maths means acquiring a deep, long-term, secure and adaptable understanding of the subject. At any one point in a pupil's journey through school, achieving mastery is taken to mean acquiring a solid enough understanding of the maths that's been taught to enable him/her to move on to more advanced material.

www.ncetm.org.uk

National Centre
for Excellence in the
Teaching of Mathematics

Lesson structure

Mathematics Mastery lessons should be pacey and have a planned flow between the three key elements of Fluency, Reasoning and Problem Solving activities. There are more opportunities to teach creatively, give feedback and assess learning.

Fluency:

Fluency is at the centre of the updated National Curriculum for **maths** and refers to knowing key **mathematical** facts and methods and recalling these efficiently. It is widely acknowledged that practice, drill and memorisation are essential if students are to become mathematically **fluent**.

Reasoning:

Mathematical reasoning is the critical skill that enables a child to make use of all other mathematical skills. With the development of mathematical

reasoning, students recognise that mathematics makes sense and can be understood.

Problem Solving:

The main goals in teaching **mathematical problem solving** are for children to develop their skills and abilities in order to solve real life problems and apply mathematics in real life situations.

Resources:

Pupils have access to concrete materials such as bead strings and place value counters so that they have time to fully explore mathematics.
Concrete is the "*doing*" stage. During this stage, students use concrete objects to model problems.

Pictorial 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

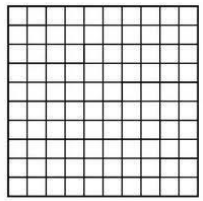
from the problem. Building or drawing a model makes it easier for children to grasp difficult abstract concepts (for example, fractions).

Abstract is the "*symbolic*" stage, where children use abstract symbols to model problems. 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.

From: mathsnoproblem.com/en/the-maths/teaching-methods/concrete-pictorial-abstract/

What are concrete resources?

Bead strings



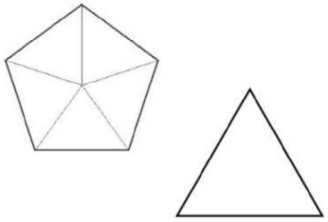
100 grids

Bar models

Number lines

Fraction towers

Cuisenaire rods



Shapes

Multi links

Dienes blocks

Numicon

Showing the number 6 using concrete resources:

Mathematical language

Mathematics Mastery lessons provide opportunities for pupils to communicate and develop mathematical language through:

- Sharing essential vocabulary at the beginning of every lesson and insisting on its use throughout.
- Modelling clear sentence structures using mathematical language, we manage this by giving children sentence starters, e.g. *I know this because…..*
- Language development activities through paired and group talk.
- Using the end of each lesson to assess understanding through pupil explanations.

How can we promote mastery?

Next Steps for Depth

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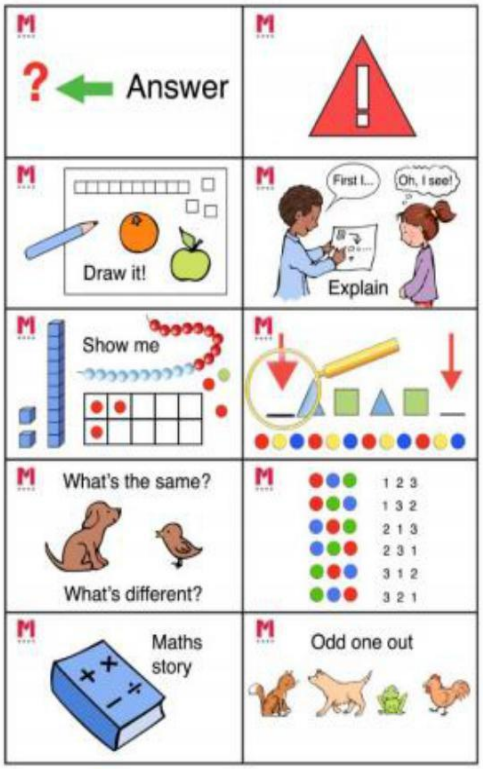

Next Steps for Depth

What's the question? If this is the answer, what could the question be?	**What's wrong with this?** Can you explain what is wrong with the example below and correct the error?
Draw it Draw a picture to explain or demonstrate what you have worked out.	**Reason it** Explain to your partner how you know. Remember to use the star words!
Show me Convince me that you are right.	**Find a pattern** What comes before/next? Can you see a pattern (in the numbers)? Can you see a pattern in the answers?
What's the same? **What's different?**	**Have you found all possibilities?** Are there any other possible answers? Have you found them all?
Tell a story Make up a real-life story using your equation/numbers or shapes.	**Odd one out** Find an odd one out and explain why it doesn't fit. Could another one be the odd one out? Why?

How can I become involved?

- Talk to your child about their learning and what they have learnt in their maths lessons each day.

- Discuss numbers all around you, e.g. door numbers, bus numbers, counting tins in a cupboard, adding up how much has been spent in your shopping, etc.

- Encourage your child to predict what number will come next in a sequence of door numbers – are they odd or even?

- Cooking and shopping with your child, getting them to weigh ingredients, using language such as "more" and "less/fewer".

- Focus on understanding the value of a number rather than just counting.

WHY MATHEMATICS IS IMPORTANT FOR ADULTS.

COOKING.

TIMES.

HEAT.

MEASURING.

SPORT.

WEIGHT.

TIME.

DISTANCE.

POINTS SCORED.

MENU.

EATING OUT.

CHANGE.

WHAT TO PAY!

10% FOR A TIP.

SHOPPING.

BEST DEALS.

TOTAL.

GOOD VALUE!

TRANSPORT.

SPEED.

DISTANCE.

TIMETABLE.

COST.

HOME.

HELPING WITH HOMEWORK.

BUDGET.

DECORATING.

EMPLOYMENT.

THERE ARE VERY FEW JOBS THAT DO NOT REQUIRE MATHS.

http://www.mathematicshed.com/uploads/1/2/5/7/12572836/_adultmaths.pdf