



AT A GLANCE...

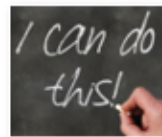
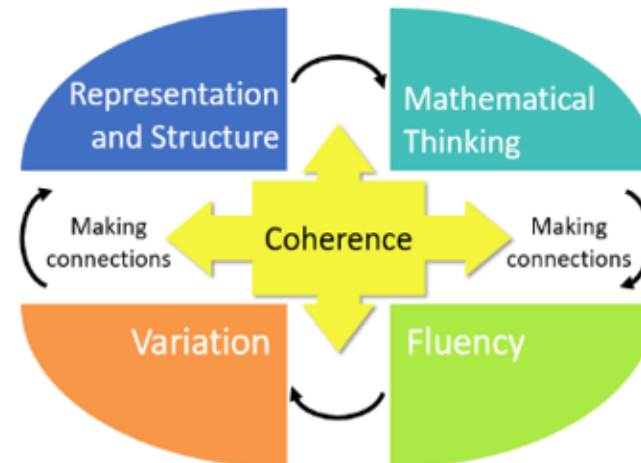
Mastery

Mastering maths means pupils 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.

The Five Big Ideas



Everyone Can Do Maths

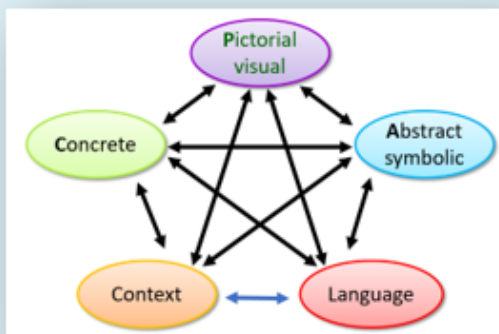
Representations and Structure

- ✓ Representations used in lessons expose the concept or mathematical structure being taught
- ✓ They are just tools: how they are used is essential - purposefully and appropriate
- ✓ Using a stem sentence to describe the representation can help children move to working in the abstract
- ✓ There will be some key representations which the children will meet time and again
- ✓ Manipulatives should be temporary; a 'scaffold' that can be removed once independence is achieved



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Representation and Structure / CPA



Representation and Structure

- ✓ **Concrete:** Concrete manipulatives and objects to act upon, or manipulate mathematical ideas
- ✓ **Pictorial / Visual:** Pictures, visual diagrams, number lines, graphs, graphical displays, to illustrate, show or work with mathematical ideas
- ✓ **Abstract symbolic:** Record or work with mathematical ideas using numerals, variables, tables and symbols
- ✓ **Language:** Use language to interpret, discuss, define or describe mathematical ideas
- ✓ **Context:** Situate mathematical ideas in everyday, real-world, imaginary or mathematical situations & contexts



Fluency

- ✓ Fluency demands more of learners than memorisation of a single procedure or collection of facts. It encompasses a mixture of **efficiency, accuracy and flexibility**
- ✓ Quick and efficient recall of facts and procedures is important in order for learners to keep track of the sub problem, think strategically and solve problems
- ✓ Fluency demands the flexibility to move between different contexts and representations of mathematics, to recognise relationships and make connections and to make **appropriate choices** from a whole toolkit of methods, strategies and approaches

Understanding Mastery



Mastery does not accelerate, it deepens.

Variation

- ✓ The central idea is to highlight the essential features of a concept or idea through varying the non-essential features
- ✓ When giving examples of a mathematical concept include
 - What it is
 - What it is not
- ✓ When constructing a set of activities / questions it is important to consider what connects the examples; what mathematical structures are being highlighted
- ✓ Vary practice questions so that mechanical repetition is avoided, and thinking is encouraged



$2 \times 3 =$	$6 \times 7 =$	$9 \times 8 =$
$2 \times 30 =$	$6 \times 70 =$	$9 \times 80 =$
$2 \times 300 =$	$6 \times 700 =$	$9 \times 800 =$
$20 \times 3 =$	$60 \times 7 =$	$90 \times 8 =$
$200 \times 3 =$	$600 \times 7 =$	$900 \times 8 =$

Mathematical thinking

- ✓ Mathematical thinking is central to deep and sustainable learning of mathematics
- ✓ Taught ideas that are understood deeply are not just 'received' passively but worked on by the learner. They need to be thought about, reasoned with and discussed
- ✓ Mathematical thinking involves:
 - looking for pattern in order to discern structure
 - looking for relationships and connecting ideas
 - reasoning logically, explaining, conjecturing and proving – not just giving the answer

Lesson Planning

- ✓ Medium-term planning should be designed to ensure time for the 5 big ideas of mastery to be sufficiently developed, whilst providing opportunities to overlearn concepts.
- ✓ Some aspects of the curriculum will require longer block teaching than others. Aspects such as measures may be incorporated into calculation. Maximise cross-curricular opportunities and daily routines.
- ✓ A sequence of lessons should small step children through new learning. Concrete, Pictorial and Abstract representations, mathematical thinking and variation of practise for fluency, reasoning and problem solving are essential features.



Coherence – making connections

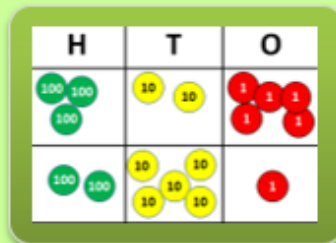
- ✓ Small steps are easier to take
- ✓ Focussing on one key point each lesson allows for deep and sustainable learning
- ✓ Certain images, techniques and concepts are important pre-cursors to later ideas
- ✓ Getting the sequencing of these right is an important skill in planning and teaching for mastery
- ✓ When something has been deeply understood and mastered, it can and should be used in the next steps of learning



Meeting the needs of all learners – NC 2014

- ✓ The majority of pupils will move through the programmes of study at broadly the same pace. (Mastery = opportunity, access and support to keep up)
- ✓ When to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage.
- ✓ Pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any acceleration through new content.
- ✓ Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

Varied practice – fluency, reasoning and problem solving



$$\begin{array}{r} 463 \\ + 275 \\ \hline \end{array}$$



$$\begin{array}{r} 45\text{ } \\ + \text{ } 67 \\ \hline 9\text{ } 3 \end{array}$$



Use the digits 0 to 9 once, arrange them so that they total the sum

$$\begin{array}{r} \square \square \square \\ + \square \square \square \\ \hline 720 \end{array}$$

Beth has made a necklace with 123 pink beads and 238 purple beads. How many beads are on the necklace altogether?

What's the perimeter of a triangle with sides of length 238mm, 319mm, 187mm?

Spot the mistake & explain why:

$$\begin{array}{r} 643 \\ + 358 \\ \hline 9911 \end{array}$$

254, 618, 345, 364, 628, 283
Use the six numbers to complete two sums $\square + \square = \square$

Use the digits 3, 4, 5, 6, 7, 8 to make two 3-digit numbers with a total closest to 800