

Key Stage 3 mathematics: mastery professional development materials

Teaching for mastery

Although a relatively new phrase, teaching for mastery does not represent a new idea.

Teaching for mastery is teaching which aims for **deep and sustainable learning** that is:

- rooted in an appreciation of the connectedness of mathematical ideas and concepts
- based on an understanding of the underlying mathematical structures.

Such deep and sustainable learning removes the need for continual revisiting and repeating. It supports an approach where existing concepts and skills are used, extended, built upon and firmly connected to new ideas as students progress.

Teaching for mastery emphasises the need to go beyond being able to memorise facts and practise procedures and routines. What is required of all learners is to see the mathematical structures involved and make full use of their powers, to enable them to make sense of mathematical ideas and processes.[†]

Such teaching requires us to 'look through' the national curriculum statements of content and descriptions of **what students need to be able to do**. We must discern **what students need to be aware of and understand** in order to do these things fluently, in a variety of problem-solving situations and contexts, and with a confidence that comes from being able to reason with the ideas.[‡]

The Key Stage 3 mathematics programme of study

The KS3 programme of study for mathematics does not specify year-by-year content. Indeed, there is no suggestion or prescription that any particular content has to be addressed in any specific year group; only that it is to be addressed by the end of the Key Stage.

The mastery professional development materials reflect this 'whole Key Stage' approach. They also offer a more 'fine grained' description of the key themes and big ideas of the curriculum by detailing:

- six broad mathematical **themes**
- a number of **core concepts** within each theme
- a set of '**knowledge, skills and understanding**' **statements** within each core concept
- a collection of focused **key ideas** within each statement of knowledge, skills and understanding.

This detailed breakdown will help you to map out a coherent learning journey for students and a related teaching programme.

[†] For an overview of the principles and practices associated with teaching for mastery, you may find useful the discussion paper *Secondary Mathematics Teaching for Mastery: Some themes and key principles* (NCETM, 2017), www.ncetm.org.uk/resources/49450

[‡] The three key aims of the national curriculum for mathematics are that all students:

- become fluent in the fundamentals of mathematics
- reason mathematically
- can solve problems.

Focused key ideas and making connections

One aspect of the professional development materials is to help you see the learning journey that students need to go on: what comes first, next and so on. They are designed to support you in 'homing in' on the key idea and avoiding the confusion that results in mixing up too many ideas and skills in the early stages of learning.

However, as making connections between mathematical ideas is vital to deep understanding, clearly laying out these key ideas and teaching them sequentially is not sufficient when teaching for mastery. Each idea must build on and connect with previous ideas. It is the unifying core concepts within topics that helps you to do this. Hence of equal importance to the key ideas is the awareness of these core concepts, which are another central element of the materials.

A teaching handbook, not a teaching script

The materials are intended to support you in understanding the important mathematical themes in the Key Stage 3 curriculum. As such, they represent a **handbook of subject knowledge and subject-specific pedagogy**.

While the materials support the designing of curriculum plans, schemes of work and lesson plans, they do not provide these directly. Many of the features of teaching for mastery are to do with **how ideas are taught**. We hope that you will be able to use existing curriculum plans and schemes of work alongside this handbook to help you evaluate, critique, refine and develop them.

How these materials might be used

The materials are best worked on with others as part of a **collaborative professional development** activity based around planning lessons and sequences of lessons.

It is important to stress that they are not intended as a lesson-by-lesson scheme of work. In particular, we make no suggestion that each key idea represents a lesson. Rather, the fine-grained distinctions we offer in the key ideas are intended to help you think about the learning journey irrespective of the number of lessons taught.

Not all key ideas are of equal weight. The amount of classroom time required for them to be mastered will vary, but each step is a noteworthy contribution to the statement of knowledge, skills and understanding with which it is associated.

Some of the key ideas have been extensively exemplified in the guidance documents. These exemplifications are provided so that you can use them directly in your own teaching but also so that you can critique, modify and add to them as part of any collaborative planning that you do as a department.

A number of different scenarios are possible:

- Consider a collection of key ideas within a core concept and how the teaching of these translates into lessons. Discuss what range of examples you will want to include within each lesson to ensure that enough attention is paid to each step, but also that the connections between them and the overall concepts binding them are not lost.
- Choose a topic you are going to teach and, together with colleagues, discuss the suggested examples and guidance. Then plan a lesson or sequence of lessons together.
- Look at a section of your scheme of work that you wish to develop and use the materials to re-draft it.

- Try some of the examples together in a departmental meeting. Discuss the guidance and use the PD prompts where they are given to support your own professional development.
- Take a key idea that is not exemplified and plan your own examples and guidance using the template available at www.ncetm.org.uk/secondarymasterypd.