

# Key Stage 3 National Strategy: Mathematics study modules

## Introduction for teachers

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### ABOUT THE KEY STAGE 3 NATIONAL STRATEGY

The Key Stage 3 Strategy was founded in 2001. It focuses on four important principles:

- **Expectations**  
Establishing high expectations for all pupils and setting challenging targets for them to achieve
  - **Progression**  
Strengthening the transition from Key Stage 2 to Key Stage 3 and ensuring progression in teaching and learning across Key Stage 3
  - **Engagement**  
Promoting approaches to teaching and learning that engage and motivate pupils and demand their active participation
  - **Transformation**  
Strengthening teaching through a programme of professional development and practical support
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### AIMS OF THESE STUDY MODULES

These ten *Mathematics study modules*, designed for an individual teacher or group of teachers, have been produced by the mathematics strand of the Key Stage 3 Strategy. They are intended for teachers who would like to reinforce, confirm and extend their knowledge of the Key Stage 3 mathematics curriculum and to develop their teaching skills. They are suitable for all teachers of mathematics in Key Stage 3, including supply teachers, trainee teachers, and those who would like to return to teaching.

The modules are based on a successful two-part course, *Planning and teaching mathematics*, that has been offered to practising teachers in all LEAs.

The aims of the modules are to:

- develop teachers' understanding of important aspects of the mathematics curriculum in Key Stage 3;
- strengthen teachers' planning and teaching of mathematics in Key Stage 3.

This guidance and introduction to the modules is intended for teachers who are planning to study them. Separate guidance is available for mentors.

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### CHOOSING WHICH MODULES TO STUDY

There is no need to study all the modules unless you want to. Each is designed as a self-contained unit of work. Choose those that most interest you and that will give you the most help. Descriptions of the ten modules are as follows:

### **Module 1 Approaches to calculation**

- Discusses the development of calculation strategies from Key Stage 2 to Key Stage 3 to build on pupils' knowledge, skills and understanding
- Considers teaching methods to support the development of calculation strategies, using subtraction as a focus

### **Module 2 Using calculators**

- Discusses when it is and when it is not appropriate for pupils to use a calculator
- Considers the skills that pupils need to use a calculator effectively and efficiently
- Discusses the progression of calculator skills and the implications for teaching

### **Module 3 Thinking about algebra**

- Considers some stimulating activities for teaching an aspect of algebra, the simplification of algebraic expressions
- Discusses how the activities can also help to develop algebraic reasoning
- Considers how the activities might be incorporated in mathematics lessons

### **Module 4 Making links in algebra**

- Considers the development of work on sequences, functions and graphs in Key Stage 3
- Considers links across different aspects of algebra and links with other strands of the mathematics curriculum
- Discusses the use of challenging activities to develop pupils' algebraic reasoning and the use of algebra in solving problems

### **Module 5 Geometrical reasoning 1**

- Looks at approaches to developing pupils' visualisation and geometrical reasoning skills
- Considers progression towards geometric proof

### **Module 6 Geometrical reasoning 2**

- Considers the connections between loci and constructions
- Discusses activities and resources to develop pupils' visual and geometrical reasoning skills

### **Module 7 Ratio and proportion 1**

- Discusses ratio and proportion as a key mathematical idea, with applications across many aspects of Key Stage 3 mathematics and in other subjects
- Analyses a lesson on ratio and proportion

### **Module 8 Ratio and proportion 2**

- Considers methods for solving problems involving ratio and proportion
- Discusses how mathematical problems and methods can be simplified or made more challenging to meet the needs of different pupils
- Highlights links between ratio and proportion and enlargement and similarity

## Module 9 Using and applying mathematics

- Considers the nature of problem solving in Key Stage 3 and the implications for planning and teaching
- Discusses examples of using and applying mathematics from the *Framework for teaching mathematics: Years 7, 8 and 9*
- Considers types of questions that will engage pupils in problem solving and probe their understanding

## Module 10 Effective oral and mental work

- Considers the importance of oral and mental work in all parts of mathematics lessons
- Discusses how to develop a programme of oral and mental starters

In general, the modules may be studied in any order, but if you choose to study Module 4, it would be best to study Module 3 first, since Modules 3 and 4 relate to the same theme. Similarly, study Module 5 before Module 6, and Module 7 before Module 8.

### PLANNING YOUR STUDY TIME

On average, each module will take about 90 minutes of study time. For Module 9, you will need to allow about 2.5 hours.

‘Doing’ the modules by reading through them is not enough. You will gain much more from them if you try out and evaluate ideas in the classroom, and incorporate successful aspects into your teaching plans. If you are intending to study more than one module, make sure that you leave space between them so that you can try out and refine ideas in class.

Try to get some support or mentoring for your study, perhaps from your head of department or another experienced mathematics teacher who will act as a subject mentor. There may be points that you are unsure about and it is useful to have someone to ask or talk to. It also helps if you study the modules at the same time as another colleague so that you can discuss what you are learning as you go along.

Before you begin your study, make sure that you are familiar with:

- section 1, Guide to the Framework, of the *Framework for teaching mathematics: Years 7, 8 and 9*;
- the general layout of the yearly teaching programmes, section 3 of the Framework, and how they link to the examples in section 4, the supplement of examples.

In each module, time is allowed for you to reflect on your stage of development, to study sections of the *Framework for teaching mathematics: Years 7, 8 and 9*, and to think about and make a note of action points arising from your reflections.

Aim to build up your own learning file as you study. You can then refer back to it to gauge your progress. You can also have it by your side when you are later planning, trying and refining your teaching approaches.

### RESOURCES YOU WILL NEED

Each module identifies for you the essential and desirable resources that you will require. The desirable resources can often be downloaded as PDF files from the Internet. Most are available via the mathematics publications list on the Key Stage 3 website ([www.standards.dfes.gov.uk/keystage3](http://www.standards.dfes.gov.uk/keystage3)). Detailed web references are given, where available, in each module.

In all the modules, you will need to equip yourself with:

- a personal file for inserting resource sheets and making notes as you work through the activities in the modules;
- the *Framework for teaching mathematics: Years 7, 8 and 9* (DfES 0020/2001).

In some of the modules, you will need:

- a scientific calculator;
- a pencil, ruler, compasses and plain paper;
- a DVD player.

## THE VIDEO

Six of the modules make use of video excerpts. These are available on a DVD called *Mathematics study modules* which you can borrow from your LEA Key Stage 3 mathematics consultant. Alternatively, contact the Mathematics team at the Centre for School Standards, Reading (tel: 0118 902 1001) for details of how to order one.

The lesson extracts shown in the video illustrate how mathematics teaching is developing in the schools that were filmed. The extracts are not intended as examples of 'perfect' lessons but have been chosen so that you can reflect on them as part of your professional development. When you are watching the video, you will be asked to focus on particular aspects of teaching and learning.

Sequence	Module	Duration	Title	Description
1	1	13 min	A Year 7 subtraction lesson	Catherine explores subtraction strategies with a Year 7 class
2	4	11 min	A Year 8 algebra lesson	Julie teaches her Year 8 middle set a lesson on using algebraic notation
3	5	5 min	A Year 8 geometry lesson	Bola uses dynamic geometry to develop ideas of geometrical proof with a Year 8 mixed-ability group
4	7	13 min	A Year 7 lesson on ratio and proportion	Walt teaches one of a sequence of lessons on ratio and proportion to a Year 7 top set
5	8	9 min	Year 6 pupils discussing test questions	Year 6 pupils talk about the approaches they used in questions on ratio and proportion in Key Stage 2 National Curriculum tests
6	10	8 min	Oral and mental starters	Excerpts from oral and mental starters in Year 7 and Year 8 lessons

*The Key Stage 3 Strategy is grateful to all the teachers and pupils of the schools that feature in the video.*

## FURTHER STUDY

You may also be interested in using the DfES study guides *Teaching and learning in secondary schools*. Twenty study units exploring many aspects of the teaching repertoire, together with supporting videos, are being sent to all maintained secondary schools in England during 2004.

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