

Interacting with mathematics in Year 8:

key messages

This leaflet is for mathematics teachers who were unable to attend the national training. It summarises the main points and is best used in conjunction with the school file for *Interacting with mathematics in Key Stage 3* (ref: DfES 0216/2002).

Aims and purpose of the materials

These materials have been developed to support mathematics departments in:

- planning for teaching that engages and challenges pupils;
- developing mathematical reasoning in pupils.

The materials provide guidance and support for:

- planning for mathematics teaching as a whole department;
- discussing key aspects of mathematics in the department;
- trying out innovative ideas in teaching and evaluating them as a department.

The materials centre on two Year 8 units of work; the first on [handling data](#), the second on [multiplicative relationships](#). For each of these units, there is a mini-pack containing:

- the teaching objectives;
- a detailed plan for the unit;
- resources to support the teaching of the unit.

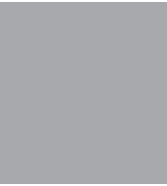
Structured [notes for departmental meetings](#) are provided to support you and other teachers in the mathematics department in exploring the mathematics and the suggested teaching approaches.

Handling data mini-pack: key messages

The handling data cycle permeates all the work in this unit, but the main focus is on pupils interpreting and discussing data. A variety of stimulating activities is included in the mini-pack, drawing on the mathematics Framework supplement of examples and a data library provided on CD-ROM. The data in this library are chosen to be relevant and interesting to Year 8 pupils.

Handling data video

The video includes two sequences from a handling data lesson drawn from the unit plan, and a sequence of pupils discussing their approaches to handling data questions in the 2001 Key Stage 3 tests. Copies of the relevant pages from the pupils' test papers are included in the school file, with the notes for departmental meetings, along with some prompts for analysing the written responses and pupils' verbal explanations.



Teachers are encouraged to:

- answer the questions, thinking about the likely approaches by pupils;
- consider the pupils' written responses, focusing on the correctness of explanations and quality of expression;
- watch the video clip of pupils discussing their approaches;
- consider ways of changing the test questions to help pupils develop their interpretive skills.

The video of the lesson is organised into three sections: making conjectures, facilitating group work, and reflecting on learning. It shows the teacher:

- using sequences of questions to foster conjecture;
- using an open questioning style;
- allowing thinking time, sometimes through paired discussion;
- encouraging challenge and debate;
- encouraging collaboration;
- allowing risk taking;
- allowing pupils to repeat and reprocess responses, including using key vocabulary.

Multiplicative relationships mini-pack: key messages

Many Key Stage 3 pupils have difficulty in using and understanding proportional relationships. Yet these are at the heart of mathematical thinking. This unit focuses on teaching pupils to move from additive to multiplicative thinking. The mini-pack contains detailed prompts for teaching the unit, including teaching approaches to help pupils build mental images of multiplicative relationships and develop strategies to solve proportional problems. Teachers are encouraged to try these out and evaluate the impact on pupils' learning.

The first phase of the unit is focused on moving from additive to multiplicative thinking. The second phase involves identifying practical examples of proportions. The third phase examines proportional problems and approaches to solving them.

The problem-solving strategies taught in this unit are:

- translating the problem into a form that helps with the solution, e.g. extracting appropriate data and putting them into tabular form;
- estimating the answer by using knowledge of the effect of multiplying or dividing by numbers greater than or less than 1;
- considering scaling methods by finding a multiplier between two relevant items of data.



Teaching approaches include:

- getting pupils to explore alternative methods when solving proportional problems;
- encouraging pupils to change the numbers in the problem (e.g. make them more difficult) and consider how the methods can be adapted.

Multiplicative relationships video

The video includes a sequence of pupils discussing their approaches to multiplication, division, ratio and proportion questions in the 2001 Key Stage 3 tests. Copies of the relevant pages from the pupils' test papers are included in the school file with the notes for departmental meetings, along with prompts for analysing the written responses and pupils' verbal explanations (the same as the handling data prompts).

How might you use these materials?

It is recommended that, following the training in the summer term 2002, heads of department and key teachers choose one of the mini-packs as a basis for collaborative planning in the department. Some departments may choose to work on both units over time, and then perhaps extend to other units.

The notes for meetings can be used flexibly. You and your colleagues may prefer to focus on one section of a unit, for example developing strategies to solve proportional problems. When using the materials in this way, it is a good idea to start by using the identified sections in the notes for your departmental discussion, agreeing what will be tried with teaching groups, then coming back to discuss outcomes and implications for future work.

What's included in the materials?

Your head of department or the teacher who attended the course will have received a school pack (ref: DfES 0220/2002), which contains a range of supporting materials for use in schools:

- two school files, *Interacting with mathematics in Key Stage 3*, each containing a Year 8 pack (see below);
- a video;
- two copies of a CD-ROM data library;
- five additional copies of each of the mini-packs for handling data and multiplicative relationships;
- seven copies of a poster of the handling data cycle;
- overhead transparencies of charts used on the video.



Each of the school files contains a [Year 8 pack](#), comprising:

- guide to the Year 8 pack;
- a mini-pack on handling data;
- a mini-pack on multiplicative relationships;
- notes for two departmental meetings on each mini-pack;
- resource sheets for each mini-pack.

The contents of the school file and Word versions of each of the unit plans can be found on the Key Stage 3 Strategy website at www.standards.dfes.gov.uk/keystage3