

The National Strategies' Programmes of Support for the National Challenge

National Challenge Core Plus mathematics programme

Element 2: Planning for progression in mathematics
Raising expectations by developing sequences of
learning in Years 10 and 11

National Challenge Core Plus mathematics programme

Element 2: Planning for progression in mathematics Raising expectations by developing sequences of learning in Years 10 and 11

Rationale

Where pupils make insufficient progress this is often a result of:

- planning and teaching without taking sufficient account of prior learning, perhaps resulting from an over-reliance on text books
- planning and teaching lesson-by-lesson rather than in extended sequences
- using teaching strategies that do not fully engage pupils in learning
- assuming that pupils are able to use social and emotional skills effectively to support their learning.

The approaches described below will support teachers working together to develop sequences of learning through unit planning. The aim is to raise expectations of what the pupils are able to do by planning and teaching mathematics as a coherent set of ideas, focusing on understanding mathematical concepts and developing critical thinking and reasoning. To do this the unit plan will contain:

- strategically chosen clusters of objectives crucial to helping pupils make progress towards identified curricular targets
- an emphasis on selected teaching and learning approaches designed around rich tasks so that pupils are engaged in their learning and make more progress
- guidance on how to gather day-to-day evidence of pupils' progress so that ongoing assessment is strengthened.

Within each six-week block, teachers will work together to plan a unit of work, teach the unit and review progress, the 'plan-teach-review cycle'. This approach will strengthen progression as part of regular teaching for the key groups in Years 10 and 11.

As a significant external examination approaches, a more rapid and responsive approach will be needed. This will include an increased emphasis on 'fine tuning' the lessons towards grade criteria and working with small groups and individuals to address misconceptions or curriculum gaps. Teachers need to be sensitive to pupils' emotional resilience at this time. For details of this approach, see Element 5: Intervention and personalisation in mathematics.

Quality standards

The following principles have been drawn out from the research on the factors that underlie effective teaching. As teachers work together to plan units, they should seek to include sequences of learning designed around these principles:

- build on the knowledge pupils bring to a sequence of lessons
- expose and discuss common misconceptions
- develop effective questioning
- use cooperative small group work
- emphasise methods rather than answers
- use rich collaborative tasks
- create connections between mathematical topics
- use technology in appropriate ways.

For a fuller description see the Appendix: Some underlying principles, pp. 32–6 of the Key Stage 4 planning handbook, *Mathematics at KS4: developing your scheme of work (summer 2007)*. These principles are further elaborated in the Standards Unit publication *Improving learning in mathematics: challenges and strategies*.

Each unit plan will have a clear structure to show how the learning develops. It will provide strategies to help pupils and teachers identify when progress is made. Although the plan may take a number of formats and can include varying levels of detail, the basic ingredients are:

- objectives
- the sequencing and organisation of activities
- teaching strategies that maximise pupil engagement
- assessment opportunities, including probing questions
- resources and references.

For further details refer to the Key Stage 4 planning handbook, *Mathematics at KS4: developing your scheme of work (summer 2007)*, pp. 24–9.

Exemplification

Before starting the plan-teach-review cycle, it is important to be clear about the areas of the curriculum that are a priority for planning. At the beginning of Year 10, for example, it is important to offer the challenge of some new mathematics and to extend familiar topics in fresh ways rather than repeating earlier work. Teacher assessment and item analysis of the most recent summative assessment will yield much of the information needed (Key Stage 3 test, Year 10 internal examination or modular GCSE examination). For each group, identify and prioritise objectives which address:

- those areas of the curriculum which the majority of the pupils have not understood
- those areas of the curriculum which the pupils have yet to experience.

This information will inform the choice of objectives. The *Framework for secondary mathematics* shows the progression of objectives across all the years. However, for Year 10 or Year 11 the tighter focus shown in the tables giving ‘level 5 to grade C’ objectives will be more useful. These are available in the ‘curriculum information folder’ of the *Secondary mathematics planning toolkit, summer 2008*.

In the final preparations towards examinations, lessons will increasingly address realistic and attainable criteria aimed at securing grade C. In addition, some lesson sequences may focus on small aspects of grade B work which offer accessible marks in the examination and refresh aspects of grade D work which may not have been practised for some time. (See Element 1b.)

It will be helpful to agree specific aspects of development in teaching and learning approaches so that evidence of improvement can be gathered in lessons and through pupils' discussions. To support this process, the teaching and learning review templates are available in the 'adaptable templates folder' of the *Secondary mathematics planning toolkit, summer 2008*.

The focus of the planning cycle will need to be revisited from time to time, for example the clusters of objectives may need to be refocused after mock or practice examinations. (See Element 1b.)

Implementing the plan-teach-review cycle:

<p>Actions for the mathematics department</p> <p>Weeks 1 and 2: plan</p>	<p>Related leadership and support: senior leadership team (SLT), subject leader (SL), key teacher, advanced skills teacher (AST), consultant</p>
<p>Use the identified curriculum areas as a focus and become familiar with the recommended resources:</p> <ul style="list-style-type: none"> – <i>Secondary mathematics planning toolkit</i> – Curriculum information folder, level 5 to grade C objectives – Guidance on planning folder, Mathematics at KS4 Planning handbook, Secondary mathematics guidance papers, pp. 19–26 – Rich tasks folder – Adaptable templates folder, teaching and learning review templates, unit planning examples and templates. <p>Shaping the plan</p> <p>Unit planning and using rich tasks are described in more detail in the <i>Key Stage 4 planning handbook</i>. Below is a summary of the steps involved:</p> <ol style="list-style-type: none"> 1. Based on an analysis of prior learning, select a cluster of linked objectives that can be addressed through appropriate rich tasks. 2. It is not possible to assess all the objectives so prioritise which of these objectives will be the focus for ongoing assessment. Use the highlighted objectives in the level 5 to grade C tables. 3. Use the clusters of objectives to decide on how many sequences of learning the unit will 	<p>Decide who is providing the strategic lead at each stage and for each activity.</p> <p>Identify curriculum priorities and agree teaching and learning approaches for development.</p> <p>Lead a department meeting to share the curriculum priorities and explore the resources as part of the preparation for planning.</p> <p>Organise the joint planning and teaching, securing sufficient time for groups of teachers and teaching assistants (TAs) to meet and plan (part of a regular cycle).</p> <p>Lead the planning; ensure that templates are prepared using the <i>Teaching and learning review templates: lessons/unit and pupils' views</i> available from the <i>Secondary mathematics planning toolkit</i>, 'adaptable templates' folder. Adapt the templates to suit the development focus. They can then be used by a senior leader to gather information to feed into the review of impact.</p> <p>Agree and facilitate the delivery requirements, expected outcomes and</p>

<p>contain (these will be the phases of the unit; each phase may be a few lessons).</p> <ol style="list-style-type: none"> 4. Select appropriate rich tasks and starter activities. Describe how pupils will work on the tasks and how the teacher will enable this to happen. (Use the principles for effective teaching.) 5. Plan specific strategies in order to find out whether the pupils understand the mathematics as the learning sequences develop. For more detailed support about developing Assessment for Learning (AfL), see Element 4. Examples of planned strategies could include: <ul style="list-style-type: none"> – rapid response assessment techniques such as mini whiteboards, thumbs up/thumbs down, traffic lights, smiley faces – open tasks which reveal understanding through discussion and from what the pupils are seen to be doing or recording; for example, card sorts, posters, practical equipment, visualisations – mini plenaries – use probing questions with small groups of pupils whose progress is uncertain. The probing questions are described against progression steps leading to grade C in the <i>Progression maps</i>. 6. Specify resources, classes to be taught, dates and times of paired/peer working. 7. Agree support and partnerships for team teaching, coaching and the role of TAs. 	<p>review date.</p> <p>Consider those social and emotional skills underpinning the activities, how these will be planned into the units and how pupils will be supported in the classroom.</p> <p>Establish the focus for support in the classroom and ensure effective partnerships are agreed.</p> <p>Arrange for administrative or technician support to capture the plans electronically and to organise resources.</p>
<p>Actions for the mathematics department</p> <p>Weeks 3 and 4: teach</p>	<p>Related leadership and support (SLT, SL, key teacher, AST, consultant)</p>
<p>Teach the unit; work together making full use of planned support such as coaching partnerships, team teaching, TA support for focused/guided group work.</p> <p>Liaise on planning so that each lesson builds on the learning emerging from the previous lesson, within the overall structure of the unit.</p> <p>Keep note of reflections upon teacher's own or a colleague's lessons using the Teaching and Learning review template: lesson/unit from the <i>Secondary mathematics planning toolkit</i>. The template will be adapted to match the chosen priorities for the unit.</p>	<p>Organise in-class support, including support for behaviour for learning.</p> <p>Ensure non-specialists feel supported. This should include provision of additional preparation time working on the mathematics of the task.</p> <p>Gather evidence of impact through observations using the Teaching and Learning review template: lesson/unit.</p> <p>Gather evidence of impact through discussion with small groups of pupils using Teaching and Learning review template: pupils' views. The template will be adapted to match the chosen</p>

	<p>priorities, including questions to prompt the pupil discussion.</p> <p>Include observation of pupil punctuality, attendance and improved social and emotional outcomes such as greater resilience.</p> <p>Support and encourage teachers as they try new strategies, offering constructive practical solutions for improvement.</p> <p>Ensure that observation of pupil progress feeds back and informs planning of next lesson.</p>
<p>Actions for the mathematics department</p>	<p>Related leadership and support (SLT, SL, key teacher, AST, consultant)</p>
<p>Weeks 5 and 6: review</p>	
<p>Review and revise the plan. Capture and store in electronic scheme of work.</p> <p>Provide evidence of pupils' work, pupil peer and self-assessment, teacher assessment and note exceptions to overall progress, that is, pupils needing further small group or individual support. Record ongoing assessments against curricular targets, using traffic lighting.</p> <p>Use assessment information to identify:</p> <ul style="list-style-type: none"> – the curriculum focus of support for small groups and individuals – the focus of linked units for the whole class. <p>Establish next steps for teachers' personal development in planning, teaching or assessing.</p> <p>Decide how this cycle of development can be used more broadly to make immediate improvements in teaching.</p>	<p>Organise and lead the review.</p> <p>Arrange for administrative or technician support to capture the adapted plans electronically and to organise and store resources for next time this unit is taught.</p> <p>Gather pupils' and teachers' views using the <i>Teaching and learning review templates – pupil views and lesson/unit</i>.</p> <p>Feed into review meeting evidence of impact on progress, engagement and perceptions.</p> <p>Arrange appropriate small group or individual support for pupils not making progress in this area of mathematics.</p> <ul style="list-style-type: none"> – Study the evidence of impact in terms of pupil outcomes, pupil progress and teaching and learning developments. – Summarise the review findings to inform the evaluation of the Raising Attainment Plan (RAP). – Discuss improvements to be made to the process before embarking on the next cycle. – Agree ongoing support for teachers' professional development. – Consider the impact of attendance patterns on likelihood of progression. <p>Decide the objectives and teaching and learning focus for the next 'critical' unit.</p>

Review

Review against quality standards.

After six weeks of implementation make a judgement about the extent to which:	Specify exactly who will make the judgement – choose from: SLT, SL, key teacher, AST, consultant	Specify how this will inform the RAP and next steps
Pupils are meeting curricular targets and are on track to a target grade or level.		
Pupils are actively engaged in their learning, making more connections in mathematics and expressing confidence in their progress.		
Pupils are expressing interest and enthusiasm for mathematics.		
Teachers are using a greater variety of teaching strategies.		
Teachers are improving their use of ongoing assessment.		
Teachers' collaboration is leading to effective departmental planning.		
Teachers' collaboration reveals raised expectations of pupil progress and engagement.		

Case studies

An example of how a department could work in a structured way on a plan-teach-review cycle is detailed as a series of tasks in the *Key Stage 4 planning handbook*. There are specific chapters on unit planning and rich tasks, *Secondary mathematics planning toolkit, summer 2008* Curriculum planning folder, Mathematics at KS4 Planning handbook, pp. 19–29. In addition there are unit planning templates and some case studies of prepared unit plans in *Secondary mathematics planning toolkit, summer 2008*, Adaptable templates folder.

Resources

The Framework for secondary mathematics

www.nationalstrategies.standards.dcsf.gov.uk/secondary/mathematics/framework

The Secondary mathematics planning toolkit (DCSF ref: 00342-2008CDO-EN). In particular:

- Guidance on planning folder – Key Stage 4 planning handbook
- Adaptable templates folder – unit planning templates, teaching and learning review templates
- Pedagogy folder – The Standards Unit improving learning in mathematics: Improving learning in mathematics: challenges and strategies.

A copy of this CD-ROM can be obtained from the LA mathematics consultant or ordered from DCSF Publications T: 0845 60222 60, email: dcsf@prolog.uk.com

The progression maps at:

www.nationalstrategies.standards.dcsf.gov.uk/secondary/mathematics/intervention

Continuing Professional Development (CPD)

- *The Key Stage 4 planning handbook* contains a series of tasks designed to support SLs as they work with their departments to develop an effective scheme of work in mathematics. It consists of a collection of linked tasks to help SLs prioritise, plan and implement a manageable development programme that involves the department working collaboratively. *Secondary mathematics planning toolkit* (see above), *summer 2008*, Curriculum planning folder, *Mathematics at Key Stage 4 Planning handbook*, pp. 19–29.
- The SL development meeting in autumn 2007 focused on the process of departmental unit planning. It was supported by an interactive DVD (the ‘Ruth and Lizzie’ video) which contains a sequence showing a department working together on unit planning and pupils working on the planned activities. It also contains a Word version of the emerging unit plan, details below: *Mathematics subject leader development materials autumn 2007* (DCSF ref: CD-ROM 00653-2007CDO-EN) A copy of this CD-ROM can be obtained from the LA mathematics consultant or ordered from DCSF Publications T: 0845 60222 60, email: dcsf@prolog.uk.com
- The Standards Unit ‘*Improving learning in mathematics: challenges and strategies*’ and ‘*A professional development guide*’ are excellent sources of guidance relevant to this element. Particularly relevant are PD2 Learning from mistakes and misconceptions and PD6 Using formative assessment. These are available on the *Secondary mathematics planning toolkit, summer 2008* (see above), Pedagogy and subject knowledge folder, SU improving learning in mathematics.