

The National Strategies' Programmes of Support for the National Challenge

National Challenge Core Plus mathematics programme

Element 4: Tracking pupils' progress using Assessing Pupils' Progress and the underpinning principles of Assessment for Learning

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Rationale

In-class assessment and monitoring of students' understanding is often a weakness in mathematics lessons. Mathematics teachers rely too much on tests and examinations to know whether pupils are making progress. Too often, questioning in lessons seeks correct answers rather than probing whether pupils understand the ideas and teachers make too little use of incorrect answers to identify and deal with pupils' errors and misconceptions.

Some departments have placed an emphasis on pupils knowing their target grades or levels. Where this has been the focus it has not, in itself, improved progress because pupils may still express confusion about whether they are on track to reach that target. In addition, those pupils not on track rarely know what strategies to use to help make the next steps, other than 'work harder'.

The approaches described below will support subject leaders (SLs) and teachers working together to develop better Assessment for Learning (AfL) approaches in the mathematics classroom. The aim is to raise pupil and teacher awareness of progress and identification of next steps by:

- improving teachers' understanding of what is required in order for pupils to attain a grade C
- developing teaching and learning strategies for improving awareness of progress during, and at the end of, sequences of lessons
- promoting meaningful and manageable recording of tracking information so that underperformance can be identified and tackled.

As a significant external examination approaches, planning and teaching becomes more tightly focused on the exact requirements of specific grades. Strategies to support formative assessment can help to build pupils' confidence about the progress they are making and so build emotional resilience. These strategies will also generate evidence of aspects of the curriculum which require further work. Planning of the next lessons for the whole class can then be 'fine tuned' to include work for small groups and individuals to address misconceptions or curriculum gaps. Well-informed ongoing assessment will also drive strategic intervention provision for small groups and individual pupils. For details of this approach, see Element 5: Intervention and personalisation in mathematics. (See Element 1b.)

Quality standards

SLs who track progress effectively in mathematics will establish a manageable yet robust approach to ongoing teacher assessment by:

- integrating ongoing teacher assessment within everyday mathematics teaching and learning
- assessing strategically a selected subset of objectives in each unit – those that are the key to progress towards a grade C
- focusing on those pupils about whose progress they are not sure, using rich tasks and probing questions to initiate dialogue. Involving pupils in the tracking process so they can see for themselves that they are making progress
- reviewing progress regularly and capturing this using simple recording systems:
 - in a broadly successful unit it is sufficient to take note of those pupils who have not made progress at the end of a unit. These pupils would then be identified for Wave 2 intervention to support an identified curricular target
 - in a unit where a large numbers of pupils have significant problems then the next relevant unit of work needs to be reviewed and developed to address the issues.

Teachers who use formative assessment effectively in the classroom will:

- watch and listen before intervening
- assess groups as well as individual learners
- use open questions and rich collaborative tasks
- share objectives and encourage self- and peer-assessment
- give useful and constructive feedback
- change teaching to take account of assessment
- create opportunities for regular reviews of progress on curricular targets.

Exemplification

Supporting teachers to develop better AfL techniques

Schools where Assessing Pupils' Progress (APP) in mathematics has been established, or is being developed, for Key Stage 3 will be familiar with the principles described below. For example, using the focused assessment materials to support AfL against levels in Key Stage 3 helps teachers to gain a clear view of standards and to use ongoing assessment.

The suggestions below make use of the principles of APP and AfL and are specifically directed towards Key Stage 4 to focus on grades rather than levels.

1. **A clear view of standards:** teachers who understand what is required in order for pupils to attain a grade C are then in a position to communicate to pupils a clear view of the standard for which they are aiming. This helps pupils and teacher to identify next steps. To support teachers to develop this understanding it is helpful to work together considering the characteristics of a grade. This can be done using the *Key Stage 4 subject network follow-up booklet, Focus 2 What do QCA and examiners' analysis tell us?* Useful follow-up to this could be:
 - examination and discussion of the objectives in 'level 5 to grade C' tables available on the *Secondary mathematics planning toolkit*, 'Curriculum information' folder
 - further collaborative work on examination papers, mark schemes and exam board analysis and feedback.

2. **The big picture of progression:** as important as the features of a grade is an understanding of progression in a particular curriculum strand or sub-strand. Working together on progression can be done by selecting a strand or sub-strand and scrutinising the horizontal alignment of objectives on the *Framework for secondary mathematics*. This could be done online or using a hard copy of the PDF downloads of objectives.

As teachers identify how the objectives progress for a sub-strand, it is also useful to think about the points at which pupils are likely to have problems making progress towards grade C. These 'problem points' are identified in the *Progression maps*. There is a map for each sub-strand, identifying ten steps or predictable 'problem points' in the journey from level 3 to grade C. The upper few steps can help teachers to pinpoint and address specific 'grade C obstacles'. The maps also link to questions, examples and suggestions for resources to use if pupils are having difficulties. Details of the role of progression maps as part of intervention is described in Element 5, *Intervention and personalisation in mathematics*.

3. **Ongoing teacher assessment:** teachers who confidently use a repertoire of strategies for formative assessment in the mathematics classroom are in the best position to make accurate judgements about ongoing assessment. Working together to develop these strategies in the classroom can be done as part of a plan-teach-review cycle. A direct, simple and effective start could be made by using the professional development session written to as part of the Standards Unit: Success for all resources – *SU PD6 Using formative assessment*. Although the notes here are relatively short, the practical strategies could inform a sustained piece of work for a group of mathematics teachers. The session notes can be found in the *Secondary mathematics planning toolkit*, 'pedagogy and subject knowledge' folder, 'Standards Unit: Improving Learning in mathematics' folder.

As a significant external examination approaches, a more rapid and responsive approach will be needed. At this point, much of the teaching is revision and ongoing assessment of understanding is even more important. By definition, these sessions include areas which have been 'covered' many times before and, for too many pupils, involve endless exam question practice. In order to maintain motivation and improve understanding, it is helpful to approach an old topic using new pedagogies. This will involve choosing different activities to revisit a topic and looking for opportunities to open up a dialogue with small groups of pupils. For examples of activities which provide good examination preparation and provide scope for discussion – see Help sheet 4, *HS4: Creative ideas for examination question practice*.

(See Element 1b.)

Making a departmental contribution to the whole-school tracking system

Schools where APP in mathematics has been established, or is being developed, for Key Stage 3 will be familiar with the principles and approaches described below.

Monitoring and tracking progress alone will not raise standards in mathematics. It is the specific actions made by the SL and teachers in response to the outcomes of tracking that will make a difference to pupils' learning and achievement. An effective review of aspects of existing systems will place a senior leader and SL in a good position to consider improvements so that tracking of pupils' progress includes:

- pupils' progress which is monitored and tracked over time, using a range of performance measures including ongoing teacher assessments and test results
- staff working collaboratively to gather, share and use information about pupils' progress. Identification of pupils' underperformance which is early, rapid and accurate

- data which is collected, analysed and shared with the pupils. Pupils' achievements benchmarked against local and national data and compared to progress in other subjects
- pupils being given regular opportunities to discuss progress. Teachers involving pupils in setting their own targets: annual and key stage targets shared with the pupil, teachers and support staff
- teaching, intervention and revision programmes which are informed by regular monitoring of progress and adjusted in the light of pupils' needs
- parents and carers being informed of pupils' achievements and taking part in supporting them
- performance data being managed through a school-wide system. All mathematics teachers having ready access to data they need, with new data entered and processed easily.

Included in the guidance on APP in mathematics is a booklet which offers detailed support to help develop and refine the mathematics element of whole-school pupil tracking procedures. This is a mathematics version of the generic booklet. Each booklet describes underlying principles, setting out the responsibilities of senior leaders, middle leaders and teachers. The booklets are:

- *Tracking for success*
- *Tracking for success in mathematics.*

In general, targets will be ambitious and include aspects of the curriculum at, and slightly beyond, the criteria for the grade. In this way, learning becomes secure at the target grade as pupils see interconnections and appreciate some of the big ideas in mathematics. As teachers tactically support pupils in the final run up to the examination, it becomes necessary to home in on the specific elements of, say, grade C and to check that some of the grade D criteria are refreshed and practised. In this way curricular targets become more tightly focused.

(See Element 1b.)

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: senior leadership team (SLT), SL, key teacher, advanced skills teacher (AST), consultant	Specify how this will inform the Raising Attainment Plan (RAP) and next steps
Pupils are meeting curricular targets and are on track to target grade or level.		
Pupils are aware of the progress in their learning and know what to do to help make the next step towards their targets.		
Pupils are expressing confidence in their progress in mathematics.		
Teachers are using a greater variety of formative assessment strategies.		
Teachers' ongoing assessment is more accurate.		
Teachers' collaboration is leading to effective departmental assessment of progress and this is informing unit planning, intervention and tracking.		
Teachers' collaboration reveals raised expectations of pupil progress and engagement.		

Case studies

Case study A: finding out first steps

This school worked on strategies for 'Finding out' where the pupils were in their prior learning so that the teaching in a unit could accurately build on the knowledge pupils brought to the sequence of lessons. They used the following strategies just before a unit, at the start of a unit or part way through an early lesson sequence in the unit:

- starter activities, open questioning and the use of mini-whiteboards
- mini-plenaries for rapid response assessment techniques; for example, 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

- ‘Show what you know’ activities – pairs summarising, on a poster, what they already know about a topic, illustrating connections between ideas or showing different ways of solving a type of problem
- classifying activities – ‘odd one out’, ‘true or false’, ‘always, sometimes or never’ – (using examples drawn from *Teaching Mental Mathematics* and *Standards Unit: Success for All* resources)
- probing questions used with small groups of pupils whose progress is uncertain (drawn from progression steps leading to grade C in the *Progression maps*).

Case study B: sorting out next steps

This school worked on strategies to improve the evidence of progress. They found that these strategies provided stronger evidence to inform planning for progression in subsequent units and helped to identify next steps for pupils. They paid attention to gathering evidence at the end of a phase of the unit and in some cases at the end of the unit, using strategies such as:

- encouraging self-assessment. For example, ‘Make up an example to show me that you know and understand Pythagoras’ theorem’
- encouraging peer assessment. For example, pupils to read through each other’s work and comment on how it could be improved
- pairing pupils to devise a test question and mark scheme, all pupils doing a range of questions and marking a partner’s work using the mark scheme. They evaluate the quality of questions and mark schemes and work in pairs to identify personal next steps
- pupils producing a revision guide for an aspect of the curriculum, filing their own guide and those voted best being stored electronically to inform Year 11 revision workshops.

The strategies in both case studies are suitable for Year 11 revision and exam preparation. They keep the teachers’ and pupils’ attention on where pupils are, where they need to be and what are good ways of closing that gap.

(See Element 1b.)

Resources

For ideas of activities like those referenced in the case studies see the *Secondary mathematics planning toolkit* (DCSF ref: 00342-2008CDO-EN): Rich tasks folder – TMM from level 5 (Teaching Mental Mathematics in algebra) and SU improving learning in mathematics (Mostly algebra)

A copy of this DVD can be obtained from the LA mathematics consultant or ordered from DCSF Publications T: 0845 60 222 60, email: dcsf@prolog.uk.com

Progression maps

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

Framework for secondary mathematics

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

The following additional resource can be found under ‘Core Plus’ in the mathematics ‘Subject leadership’ area at

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

- *Key Stage 4 subject network follow-up booklet, Focus 2: What do QCA and examiners’ analysis tell us?*

Help sheet available as optional download from the same source as this paper: *HS4: Creative ideas for examination question practice*

Continuing Professional Development (CPD)

The following additional resources can be found under 'Core Plus' in the mathematics 'Subject leadership' area at:

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

- For guidance on tracking see *Tracking for success* (DCSF ref: 1545-2005FLR-EN)
Tracking for success in mathematics (DCSF ref: 00007-2007BKT-EN).
A copy of this publication can be ordered from DCSF Publications T: 0845 60 222 60, email: dcsf@prolog.uk.com
- For the professional development session suggested in the text above see the *Secondary mathematics planning toolkit* (DCSF ref: 00342-2008CDO-EN), Pedagogy and subject knowledge folder, SU Improving Learning in mathematics folder, PD6 Using formative assessment.
A copy of this DVD can be obtained from the LA mathematics consultant or ordered from DCSF Publications T: 0845 60 222 60, email: dcsf@prolog.uk.com

The following additional resources can be found under 'Core Plus' in the mathematics 'Subject leadership' area at:

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

- For joint working of across subjects use *Unit 12 Assessment for learning* (DCSF ref: 0435-2004). This is one of 20 guidance booklets which form part of the 'ped pack', official title Pedagogy and practice: *Teaching and learning in Secondary schools*.
Using this guide, a teacher or pair of teachers from any subject could build their teaching repertoire step by step. Starting with strategies that are easy to implement and moving on to those that will help pupils develop their skills still further. The unit contains 'reflections', practical tips and tasks, case studies, a summary of the research and some suggestions for 'next steps' and further reading.
- For an extensive set of AfL training developed as part of the Strategy's support for whole-school improvement see the AfL area at:
www.nationalstrategies.standards.dcsf.gov.uk/secondary/assessment
The AfL training provides a coherent and accessible platform for schools relatively new to AfL and, for others, materials to help teachers refocus on some of the more challenging areas of AfL.
- *Unit 7 Questioning and dialogue* of the AfL training described above illustrates the principles using a mathematics lesson where pupils are learning to develop strategies to determine which lines are parallel when given equations are expressed both explicitly and implicitly. The video would be an inspirational source of CPD for mathematics teachers. It was made during research, carried out by Kings College London, which informed the writing of the unit. Mathematics was identified to be an area of particular strength in the research and the teacher in this lesson was one of the participants in the research project.