

Unit 6

Developing curricular target setting in mathematics

Following the training in the generic unit *Curricular target setting*, it is important to consider how the key messages of the training apply to mathematics. As part of the whole-school focus on Assessment for learning, the following subject development material is intended to help you consider the key messages of the training unit and identify any areas requiring development in your department.

The following is a brief summary of the training unit.

Objectives

- To define what is meant by curricular target setting.
- To explain and exemplify the principles of curricular target setting.
- To outline the process of setting curricular targets.

Key messages

- A curricular target expresses in words, supported by data, a specific aspect of the curriculum as a focus for improvement. It may be focused by numeric outcomes. It is identified from a range of sources of evidence as an area of weakness in pupils' learning.
Curricular targets can be:
 - for a whole class, a group of pupils, an individual pupil
 - long-term (e.g. term or year), medium-term (e.g. few weeks), short-term (e.g. few lessons).
- The target should detail specific cohorts, classes or groups of pupils who need more effective provision, intervention, support or monitoring in order to make better progress.
- It will need to be matched to year groups and classes to ensure progression towards achieving the planned improvement. This is known as a layered curricular target.
- Teaching objectives in medium-term plans or schemes of work will need to directly address the curricular targets. This will be further refined in learning objectives within lessons to ensure the target is being addressed. A target may be revisited several times in a unit, in a year and across the key stage to ensure there is progression towards the target.
- Curricular targets are established through an analysis of available information about what has and has not been learned. An appropriate target ensures that pupils' prior attainment and achievements are built on throughout the key stage. It will often focus teaching on areas of underperformance, supporting improved learning outcomes for underachieving groups of pupils.

- Curricular targets are established through a process of:
 - information gathering
 - information analysis
 - identification of issues
 - planned actions and related success criteria.

The following material builds on the tasks outlined in the 'Ready for more?' section of the *Curricular target setting* training unit and it is intended for all those who teach mathematics.

Reviewing existing practice in curricular target setting

The table on page 3 provides a tool for the department to self-review current practice and to help identify an appropriate starting point.

As a department, agree and highlight the statements below that best reflect the practice of the whole department. At the bottom of each column is a reference to the tasks that will support your current practice and provide the appropriate material to develop from this point.

Having completed this review you should read 'Making effective use of the subject development material' on page 4.

	Focusing	Developing	Establishing	Enhancing
Teachers	<p>The subject leader has identified that:</p> <ul style="list-style-type: none"> although teachers are provided with prior attainment data and targets for individual pupils expressed as expected levels, this is rarely used to inform curricular targets target setting is left mainly to individual teachers with their own classes there is little or no link made between the numeric data and the teaching and learning objectives needed to achieve them. 	<p>Assessment data (information) in the subject is used to help identify the progress of individuals and groups of pupils.</p> <p>Teachers within a department have begun to identify and use curricular targets to focus their teaching on areas of underperformance and raise standards. However, this is not yet coordinated across the department.</p> <p>Some identification of gaps in pupils' learning is used to inform short-term planning.</p>	<p>Assessment data (information) is gathered and analysed on a regular basis. It is used to track progress and identify next steps for individuals and groups of pupils.</p> <p>At departmental level, some planning is informed through a review and identification of weaknesses in pupils' learning.</p> <p>Teaching objectives are derived from this and gaps in pupils' learning are addressed through this.</p> <p>Target setting is more established in some year groups or key stages than others.</p>	<p>There is a rigorous target-setting process in place as part of school and departmental improvement planning.</p> <p>Curricular targets are established through a process of information gathering, analysis, and identification of issues. This leads to planned actions and related success criteria.</p> <p>Pupil level data and complementary qualitative information is used on a regular basis in all year groups to identify individuals and groups of pupils with specific learning gaps. These are expressed as subject-specific curricular targets and are addressed in planning through focused learning objectives.</p>
Pupils	<p>The subject leader has identified that:</p> <ul style="list-style-type: none"> pupils typically know their numeric targets expressed in terms of levels pupils make little link between these targets and the feedback about their work. 	<p>Some pupils are aware of the most immediate target to address in their subject work.</p>	<p>In many instances, pupils are aware of their targets in the subject that will help them to improve their achievement in the subject.</p> <p>Pupils are aware of the linkage between the objectives for the lesson and the opportunity for them to address their targets.</p>	<p>Pupils take an active part in the target-setting and target-getting process.</p> <p>They understand their targets in terms of what they are doing, how well they have done and how they can improve their work.</p>
	Start with Task 6A	Start with Task 6A	Start with Task 6B	Start with Task 6B

Making effective use of the subject development material

The tasks you have been referred to are intended to support the development or extension of curricular targets in mathematics and provide guidance on how to embed this into regular practice in mathematics lessons.

The results of the self-review will have suggested the appropriate task(s) that will support your department's development needs.

To make best use of the supporting material the following sequence will be helpful.

1 Read the task and the supporting exemplification.

This describes how a department has approached the task and worked through each of its stages. It is given as an *example* of how the task might be addressed. It is not intended that you follow this approach, which is given as a guide to the process that will support improvements in your subject.

2 Identify what the department did and the impact it had on pupils.

Discuss as a team the example provided and establish the key areas that helped to develop this practice and the impact it had on pupils. It will be helpful to identify the changes in teachers' practice and how these impacted on pupils' learning.

3 Agree and plan the actions that will develop your practice.

As a department, agree how you intend to approach this task. Clarify what you are focusing on and why. The example given will act as a guide, but be specific about which classes, which lessons and which aspects of the curriculum will be your points of focus.

4 Identify when and how you will evaluate its impact on pupils.

The purpose of focusing on this is to improve pupils' achievement and attainment in mathematics. You will need to be clear on what has helped pupils to learn more effectively in your subject. Part of this will be how your practice has adapted to allow this. You should jointly identify what has worked well and which areas require further attention.

5 Having evaluated these strategies, consider what steps are required to embed this practice.

You will need to undertake an honest evaluation of what you have tried and the impact it has had on your teaching and on pupils' learning. One outcome might be that you need to spend longer on improving this area or you may be in a position to consider the next task.

Other departments in the school will have been focusing on this area and you should find out about the progress they have made.

You may find that some teachers in the department will require further time to develop and consolidate new practice, while others will be ready to progress further through the tasks in this area (while continuing to support their colleagues). Practice across a department will need to be consolidated before focusing on a new area of Assessment for learning.

The subject development tasks

Task 6A

Identify a curricular target from the outcomes of an end of unit or end of year assessment.

For core subjects you may wish to refer to the relevant QCA *Implications for teaching and learning* document to stimulate discussion and inform relevant curricular targets for your subject.

Use **handouts 6.4** and **6.5** (see **appendices 6A.1** and **6A.2**) in the generic unit to assist in layering the target for each year group.

Consider how these targets might need to be modified for the most and least able in the year group, while remaining challenging for all groups of pupils.

Task 6B

In pairs, carry out a scrutiny of pupils' work from a particular topic in a year group.

Identify areas of weakness in pupils' understanding and compare these outcomes with the *intended* learning outcomes.

Agree a relevant curricular target that matches this evidence and plan the teaching necessary to address it.

Evaluate the impact of this focus on pupils' learning.

The following pages provide exemplification of each task.

Task 6A

Identify a curricular target from the outcomes of an end of unit or end of year assessment.

For core subjects you may wish to refer to the relevant QCA *Implications for teaching and learning* document to stimulate discussion and inform relevant curricular targets for your subject.

Use handouts 6.4 and 6.5 (see appendices 6A.1 and 6A.2) in the generic unit to assist in layering the target for each year group.

Consider how these targets might need to be modified for the most and least able in the year group, while remaining challenging for all groups of pupils.

Context

Following the whole-school Assessment for learning training, the mathematics department decided to analyse the mock test scripts of the Year 9 pupils who achieved level 4 with the aim of identifying curricular targets to help them achieve level 5. The department had used the 2003 test papers for the mock in January 2004.

Process

To help focus the analysis of the 32 pupil scripts, the department used the QCA *Implications for teaching and learning from the 2003 tests*. Sections of the QCA document were allocated to pairs of teachers. The pairs considered each bullet point in turn, looking for evidence in the pupils' scripts to judge whether it was an area in need of improvement.

The department agreed on two curricular targets.

- All pupils to develop further their understanding of percentages of quantities and express one quantity as a percentage of another.
- All pupils to develop further their ability to apply proportional reasoning when solving problems involving multiplicative relationships.

From these targets, they constructed layered curricular targets for Years 7, 8 and 9 (see **appendix 6A.3**).

The department prioritised a review of the Year 9 number unit to be taught in the first half of the spring term to ensure they were teaching explicitly to the curricular targets identified. They scrutinised their resources and recognised that, although there was plenty of opportunity for pupils to practise specific routines, there was little to help them understand how percentages are used in a range of contexts. They looked for supplementary materials to help address this and used the Year 9 proportional reasoning mini-pack as a basis for this work. They also identified a series of oral and mental starters focused on percentages and proportional thinking, and integrated these into other units during the term.

Later in the term, they planned to review the Year 7 and Year 8 medium-term plans to ensure curricular targets for these year groups will be met. They also planned to use the *Year 7 fractions and ratio mini-pack* and the *Year 8 multiplicative relationships mini-pack* to support this development.

Evaluation

At the department meeting following the teaching of the Year 9 number unit, teachers discussed how the targets might be modified for the most-able and least-able pupils. It was agreed that all pupils needed to be taught explicit problem-solving strategies, but that the target for Year 8 was applicable for the least able in Year 9.

Task 6B

In pairs, carry out a scrutiny of pupils' work from a particular topic in a year group.

Identify areas of weakness in pupils' understanding and compare these outcomes with the *intended* learning outcomes.

Agree a relevant curricular target that matches this evidence and plan the teaching necessary to address it.

Evaluate the impact of this focus on pupils' learning.

Context

Following an Ofsted inspection that identified weaknesses in pupils' skills in interpreting data, the head of mathematics decided that the department needed to look more closely at the learning outcomes from the planned work. The department decided to focus on Year 9 groups based on the handling data unit they had taught in the autumn term.

Process

Work was collected for three pupils in each Year 9 set and the department used a scheduled meeting to work in pairs to scrutinise the work. Teachers focused on the following learning objectives.

- Interpret graphs and diagrams and draw inferences to support or cast doubt on initial conjectures.
- Compare two or more distributions and make inferences, using the shape of the distributions, the range of data and appropriate statistics.
- Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support.

Teachers used the Framework supplement of examples (pages 268–275) as a guide to the expected outcomes from the learning objectives.

The scrutiny of work revealed a number of gaps between the intended learning outcomes and the observed learning outcomes.

- Pupils could answer given questions using data represented in charts but were not being given opportunities to support or cast doubt on given conjectures.
- Pupils could calculate statistics from data but had limited skills in using the statistics to compare two distributions.
- Pupils could draw conclusions when comparing and contrasting two sets of data represented in charts but had difficulty explaining and justifying their conclusions.

As a result of the scrutiny of work, the department agreed the following curricular target.

- All pupils to communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams in support.

To address this target, the department reviewed the handling data unit scheduled for early in the summer term. One teacher had recently attended the course *Securing progression in handling data*. She introduced the 'Revising explanations (Year 9): Prompts' tasks to the department as a strategy to focus the teaching of interpreting charts and writing explanations (see **appendix 6B.1**). They decided to devote three lessons to this work in the second half of the spring term. Pupils targeted for booster lessons were taught lesson 14: 'Handling data' prior to the three additional lessons.

Evaluation

The department did a further scrutiny of the same pupils' work based on the same objectives following this additional teaching. They found that most pupils were able to explain and justify their conclusions using appropriate diagrams and graphs to support their findings. They discussed further modifications for the handling data unit scheduled for early in the summer term and also allocated time to review the schemes of work for these aspects of handling data in Years 7 and 8.

Subject-specific references

Referenced strategy materials

Framework for teaching mathematics: Years 7, 8 and 9 (DfEE 0020/2001)

Interacting with mathematics in Key Stage 3: Year 9 proportional reasoning mini-pack (DfES 0588/2002)

Interacting with mathematics in Key Stage 3: Year 7 fractions and ratio mini-pack (DfES 0093/2003)

Interacting with mathematics in Key Stage 3: Year 8 multiplicative relationships mini-pack (DfES 0220/2002)

Interacting with mathematics in Key Stage 3: Securing progression in handling data (DfES 0658/2003)

Year 9 booster kit: mathematics (DfES 0015/2002)

Other strategy materials of interest

Using teacher assessment to track pupils' progress in mathematics. These materials have been produced by the mathematics strand to support targeted assessment of intervention groups in Year 7. They include a set of key indicators to help track pupils' progress towards level 4, with associated probing questions that can be used in normal lessons and plenaries. The materials also include suggestions on identifying curricular targets.

Bridging plans from Key Stage 3 to Key Stage 4: mathematics, Project 1, 'Pupil self-assessment' offers another approach towards curricular targets that involves pupils in the analysis. This approach can be used across Key Stage 3 using, for example, QCA optional tests for the analysis.

All the above materials can be found at www.standards.dfes.gov.uk/keystage3 by selecting 'mathematics' and then 'mathematics publications'.

QCA materials

Implications for teaching and learning from the 2003 tests (QCA, www.qca.org.uk)

Handout 6.4 – Principles for layering curricular targets

Group or pupil target

- Generally applicable to all pupils in a class but may be modified for specific groups
- Can be discussed explicitly with pupils, particularly during the plenary where pupils are encouraged to reflect on what they have learned and what they need to do next

Term 1 target for Class 8AB

- Drawn from the termly objectives of the subject framework or the learning objectives in a scheme of work incorporated into teachers' planning
- May be given a particular emphasis in teachers' medium-term plans (i.e. more time to cover the objective, specific opportunities to apply this)

Year group target

- How a specific year group contributes to the overall key stage target. There may be a target for each year group to ensure progression across the key stage. This reinforces that all teachers across the key stage contribute towards the achievement of the target
- This can be monitored over the course of the year, e.g. 'How many pupils in the cohort can do this at the start of the year/at the midpoint/at the end of the year?'

Key Stage 3 curricular target

- Usually arrived at by audit, data analysis, scrutiny of pupils' scripts or work samples – an overall area of weakness which needs to be targeted
- Can be openly identified and discussed with pupils as an aspect of work, which everyone will be particularly focusing on this year

Handout 6.5 – Examples of layering a curricular target

Subject	Key stage target	Year group target	Class target	Group/pupil target
Science	Pupils need to make progress in their investigative skills.	In an investigation pupils are able to identify the key variables that they can and cannot control.	Pupils can use the science department's planning posters to plan their own investigations. (Year 8)	I can plan my own investigation and say what I will change, what I will measure and what I think will happen.
MFL	Promote pupils' independence as language learners.	In spoken work pupils can sustain short unscripted discussions and exchanges building on scripted (Year 8) supported work started in Year 7.	Pupils can read aloud from a simple written text of familiar language, using correct pronunciation and expression.	I can understand, and speak some simple sentences describing what I have done and what I'm going to do.
English	Ensure that pupils can use paragraphs appropriately.	When writing, pupils will use topic sentences to begin their paragraphs. (Year 8)	Pupils can explore and compare different methods of grouping sentences into paragraphs of continuous text that are clearly focused and well-developed, e.g. by chronology, comparison or through adding exemplification.	I can write a paragraph using a topic sentence and group all the following points, so they are clear and support the topic sentence.
Mathematics	Pupils should be able to use proportional reasoning to solve a problem, choosing the correct numbers to take as 100%, or as a whole.	Pupils will be able to use the unitary method to solve simple word problems involving ratio and direct proportion.	Pupils will consolidate understanding of the relationship between ratio and proportion.	I can identify when proportional reasoning is needed to solve a problem.
Geography	Pupils need to improve the extent to which they can describe and explain the physical and human features contributing to the distinctive character of places.	In written work, pupils should be able to explain how (Year 7) physical processes change a landscape.	Pupils can explain the development of a landscape as a series of sequential events and processes.	I can explain how landscapes are changed by putting events in order.
Music	Practise, rehearse and give performances demonstrating awareness of different parts, the contribution of the different group members and the audience and venue.	Perform significant parts from memory and from notations with awareness of their own contribution such as leading others, taking a solo part and/or providing rhythmic support.	Within a small group, pupils can perform a standard 12-bar blues from memory using internalised rhythm in time with others in the group.	I can perform a standard 12-bar blues from memory and keep in time with the other people in my group.
ICT	Improve pupils' visual literacy, i.e. their ability to select, acquire, extract, deploy information from a variety of visual resources.	In communicating information, make appropriate use of different categories of still imagery, in particular, clip art and photographic quality images.	Pupils can make a presentation fit for audience and purpose, sequenced appropriately, and deploying appropriate clip art and photographic images from a limited collection.	I can make a presentation describing what makes a website good, choosing clip art and detailed images to make a point.

Layering a curricular target in mathematics

Key Stage 3 curricular target <i>All pupils to develop further their understanding of percentages of quantities and express one quantity as a percentage of another.</i>		
In Year 7	In Year 8	In Year 9
Pupils understand percentage as the 'number of parts per 100'; recognise the equivalence of percentages, fractions and decimals; calculate simple percentages and use percentages to compare simple proportions.	Pupils interpret percentage as the operator 'so many hundredths of' and express one given number as a percentage of another; use the equivalence of fractions, decimals and percentages to compare proportions; calculate percentages and find the outcome of a given percentage increase or decrease.	Pupils recognise when fractions or percentages are needed to compare proportions and solve problems involving percentage changes.

Key Stage 3 curricular target <i>All pupils to develop further their ability to apply proportional reasoning when solving problems involving multiplicative relationships.</i>		
In Year 7	In Year 8	In Year 9
Pupils understand the relationship between ratio and proportion; use direct proportion in simple contexts; use ratio notation, reduce a ratio to its simplest form and divide a quantity into two parts in a given ratio; solve simple problems about ratio and proportion using informal strategies.	Pupils consolidate understanding of the relationship between ratio and proportion; reduce a ratio to its simplest form, including a ratio expressed in different units, recognising links with fraction notation; divide a quantity into two or more parts in a given ratio; use the unitary method to solve simple word problems involving ratio and direct proportion.	Pupils use proportional reasoning to solve a problem choosing the correct numbers to take as 100%, or as a whole: compare two ratios; interpret and use ratio in a range of contexts, including solving word problems.

Revising explanations (Year 9): prompts

These following tasks use resources available from the Year 9 folder on the Securing progression in handling data CD-ROM. Select from these according to the needs of your class.

- Handling data question bank provides a set of ten questions ranging from level 4 to level 7 drawn from previous Key Stage 3 tests.
- Responses gives examples of pupils' responses to the 'explaining' part of each question.

Task 1 (whole class): Developing explanations

The teacher leads the class through the process of composing an explanation to a selected question.

Preliminary step

In some questions the 'explain' part is presented towards the end. Where this is the case it would be useful to work through the preceding parts, dealing with any misunderstandings, before starting this activity on composing explanations. This might be done in an earlier lesson.

Explaining stage

Focus on the 'explain' part of the selected question. Emphasise that pupils should not think of this as a test question. They are to imagine that they are putting the chart and the requested explanation into a magazine article. The explanation should be about three or four sentences long.

The following steps may be ordered differently to suit a particular class.

- 1 Model how to compose a written explanation, explaining your thinking aloud and pointing out key features such as correct use of technical vocabulary or appropriate use of words such as *whereas*, *though*, *while*, *unless*, *however*, *equally* and *also*.¹
- 2 Ask pupils to work in pairs to compose one written explanation (perhaps on a whiteboard).
- 3 Select a response to the chosen question (either from your class or from the CD-ROM). Show it to the class and together with the pupils, analyse, annotate and perhaps revise the response. (Examples of annotated scripts are available on the CD-ROM to illustrate what this step might look like.)
- 4 Ask pairs to review their own explanation in light of the whole-class discussion.

¹ For more guidance on the use of connectives for contrast or comparison, see *Literacy across the curriculum* module 2, *Literacy in mathematics* (available on the Key Stage 3 website from January 2004).

Task 2 (groups): Discussing and revising

Pupils evaluate each others' explanations.

- Select an appropriate question. Ask pairs of pupils to write their joint explanation on whiteboards, then join with another pair to discuss and evaluate the two responses. Guidance on *The role of the review partner* (CD-ROM) will help here.
- Tell the four to agree a final form of the explanation in the light of their discussion.
- Select one or two examples, discuss the explanations with the class and ask pupils to explain how their discussions improved their writing.

Task 3 (whole class): Assessing explanations

Pupils assess other people's answers in test conditions.

- Select a question and six brief explanations written under test conditions (available on the CD-ROM). Display or distribute these to the class. Explain that three answers would gain full marks and three would not. One of each is already identified.
- Together with the pupils, 'mark' the remaining answers, showing why some are deficient and how they should be improved. Correct and incorrect responses are identified for teacher use on the *Test answer summary sheet* (CD-ROM).