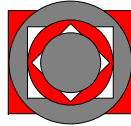


Mathematics workshop 1

Session 1: The mathematics standards



Objectives



By the end of this session you will:

- know the aims of the workshop and the programme for the five days
- be familiar with the main features of the new curriculum standards for mathematics

1.1

What are curriculum standards?



- Most countries state what students should be taught in a set of standards or national curriculum
- The curriculum includes:
 - what students should be taught in each grade (a programme of study, or **content standards**)
 - what students should achieve by the end of each grade (levels of attainment, or **performance standards**)
- The curriculum usually states how much time is needed to teach the standards successfully

1.2

What are curriculum standards?



- Some but not all countries provide or recommend textbooks to help teachers to teach the standards
- Other countries leave it to teachers to plan a scheme of work to teach the standards
- Most countries set national tests based on their performance standards

1.3

Purposes of new standards



- To set clear expectations for teaching and learning in Independent Schools in line with international standards
- To illustrate the pace and progression across grades needed to achieve high levels of attainment
- To provide a framework for developing:
 - schemes of work and related teaching resources, such as lesson plans
 - new national tests to measure and promote achievement

1.4

The new standards: key features



The new standards for Independent Schools:

- involve four core subjects: Arabic, mathematics, science and English
- are set out for each grade, from Kindergarten to Grade 12
- have been aligned to international expectations

1.5

Benchmarking involved:



- preliminary international research, looking at curriculum documents in a range of countries and in Qatar
- in each subject, identifying 'key' standards that are crucial in the development of the subject
- developing a profile of the grades to which key standards apply in different countries, using the country's national curriculum and textbooks
- comparing higher grades with public examination assessment criteria, e.g. for the IB
- proposing a grade for Qatar for each key standard

1.6

Example: mathematics



State and apply Pythagoras' theorem	■ BRITISH COLUMBIA	8
	■ CALIFORNIA	7
	■ ENGLAND	9
	■ JAPAN	9
	■ SINGAPORE	9
	■ QATAR	9
	■ W. AUSTRALIA	9
	■ NEW STANDARDS	9

1.7

Example: mathematics



Begin to use a basic calculator	■ BRITISH COLUMBIA	1
	■ CALIFORNIA	–
	■ ENGLAND	4
	■ JAPAN	5
	■ SINGAPORE	7
	■ QATAR	10
	■ W. AUSTRALIA	1
	■ NEW STANDARDS	5

1.8

Consultations



- There have been regular consultations with EI, test developers and working groups
- The working groups included teachers, university representatives and subject specialists from the MoE
- The groups have helped to ensure that the standards reflect Qatari values and culture, and are relevant to the needs and interests of Qatari students

1.9

Standards and strands



The new standards are organised in strands

- **Arabic and English**
word knowledge, speaking and listening, reading and writing
- **Mathematics**
reasoning and problem solving, number and algebra, geometry and measures, data handling
- **Science**
scientific enquiry, physical processes, life science, materials, Earth and space

1.10

The balance between strands



- Some strands cut across and are integrated in others, e.g. the reasoning and problem solving strand in mathematics and enquiry in science are part of each of the other strands
- The balance between strands is specified, e.g. for Grade 7 mathematics, the proportions of teaching time should be:

Number and algebra	Geometry and measures	Data handling
55%	27.5%	17.5%

1.11

Standards for Grades 10 to 12



- There are two pathways, foundation and advanced
- **Foundation standards** include review of important topics in Grades 7 to 9
- **Advanced standards for mathematics:**
 - include foundation standards and new topics
 - prepare students for international qualifying examinations for universities
 - offer two options in Grade 12: quantitative methods or mathematics for science

1.12

The introduction includes:



- background to the development of the standards
- structure of the standards
- performance standards
- using the standards
- a subject section, including:
 - aims
 - recommended teaching time for the subject
 - recommended proportion of teaching time for each strand
 - the scope of each strand
 - the place of ICT in the standards for the subject

1.13

The standards:



- describe what pupils in each grade should be taught
- are grouped into topics
- include both basic and higher order skills
- incorporate the use of ICT
- are illustrated with examples
- are numbered in order in each grade, e.g. 1.1, 1.2, 1.3, ...

1.14

Key performance standards:



- have numbers in shaded rectangles, e.g. 1.2
- are the standards that could be tested in the national tests
- can be used by teachers to assess students' progress
- are summarised in a shaded panel at the beginning of each grade and strand:
 - to give an overview of what students should learn by the end of the grade
 - to help teachers report to parents

1.15

The scope and sequence charts:



- provide an overview
- should help teachers to identify in which grade topics are introduced
- should help teachers to see the progression in the standards and how they develop from one grade to the next
- do not provide detail – for this, you need to look at the standards themselves

1.16

So what is new?



- Greater autonomy and responsibilities for teachers
- A greater learning challenge for students:
 - an increased expectation of what can be taught and achieved in each grade, in line with international expectations
 - a strong focus on critical thinking, reasoning and enquiry so that students learn to solve problems and to think for themselves

1.17

So what is new?



- The existing mathematics curriculum drills students thoroughly in arithmetic, algebraic and geometric routines
- The new standards stress reasoning and problem solving so that students learn from an early age to:
 - apply their mathematical skills to solve a wide range of familiar and unfamiliar problems
 - explain and justify their mathematics

This strand has considerable implications for teaching methods

1.18

Grades 1 to 9



- New to Grades 1 to 6 are:
 - mental calculation skills
 - calculator use from Grade 5
 - data handling from Grade 1
 - geometric visualisation and reasoning
- New to Grades 7 to 9 are:
 - further mental calculation skills
 - use of scientific and graphics calculators, and other ICT
 - probability and statistics from Grade 7
 - greater emphasis on algebraic and geometric reasoning

1.19

Grades 10 to 12

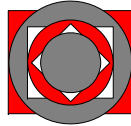


- In Grades 10 to 12:
 - overall, the content of the advanced standards is broadly similar to the existing curriculum but is not necessarily in the same order
 - in addition, a wider range of applications is included, in both mathematical and real situations
 - the use of ICT as a tool for doing mathematics, as in commerce and industry, is a major element

1.20

Mathematics workshop 1

Session 2: Teaching and learning 1



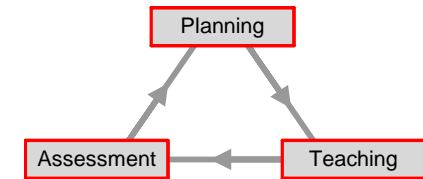
Objectives

By the end of this session you will:

- understand some of the implications of the standards for teaching and learning
- be able to identify some features of effective teaching and learning
- be familiar with the purposes of the sample lesson plans for mathematics

2.1

Planning, teaching and assessment



2.2

Effective teachers:

- instruct, direct and tell
- demonstrate, model and 'show how'
- explain, clarify and illustrate
- interact, question and lead discussion
- summarise key teaching points
- review progress, assess and give feedback

2.3

Students of effective teachers:

- explore, investigate and experiment
- create, invent and use imagination
- enquire and research
- analyse and process information
- explain and reason
- recount and recall
- practise and consolidate
- reflect, criticise and evaluate

2.4

Key features of the video lesson

- High expectations
- Making clear what has to be learned
- Collaborative group work
- Activities that involve students and require them to think
- Interactive questioning and discussion, with encouragement for students to respond and use intuition
- Immediate feedback and support for students at a point of difficulty
- Extra challenge for the most able
- Prompts to support students' independent work

2.5

A typical mathematics lesson



A starter activity (5 to 10 minutes)

- Whole class work to develop oral and mental skills: recall, calculation, visualisation, thinking skills

The main teaching activity (35 to 45 minutes)

- Combinations of teaching input and student activities
- Whole class work, groups or pairs, or individual work
- Interventions to identify and remedy misconceptions, clarify points and give immediate feedback

A consolidation phase (5 to 15 minutes)

- Whole class work to summarise key points, assess extent of learning, make links to other work, set homework

2.6

The sample plans show ways of:

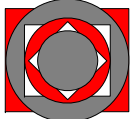


- structuring lessons
- giving students opportunities to work as a whole class, in small groups, as pairs or individually
- demonstrating, explaining and questioning
- motivating learning through:
 - providing stimulating active tasks
 - balancing speaking, listening, reading, writing
 - varying ways to practise a skill
 - differentiating to provide extra support or challenge
 - using varied learning resources, including ICT

2.7

Mathematics workshop 1

Session 3: Planning 1



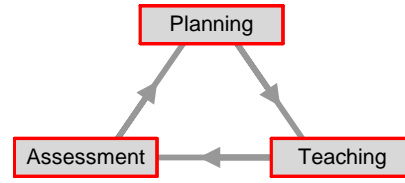
Objectives

By the end of this session you will:

- understand how the curriculum standards, a scheme of work, lesson plans and published materials are complementary parts of a new approach to teaching
- be able to use the standards and scope and sequence charts to plan an overview of a year's teaching for a grade in your school

3.1

Planning, teaching and assessment



3.2

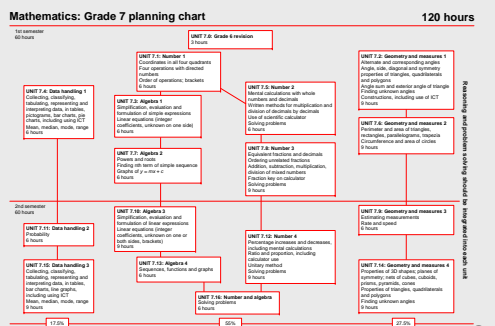
Connected levels of planning

The standards	A scheme of work: long-term planning	Lesson plans: short-term planning
<ul style="list-style-type: none"> objectives for each grade, providing breadth, balance and progression for all students 	<ul style="list-style-type: none"> grouping objectives together to form units identifying objectives for higher and lower attainers allocating teaching time to units making links across and ordering the units outlining how to teach each unit to meet the objectives 	<ul style="list-style-type: none"> deciding in detail how to teach the objectives planning day-to-day lessons

3.3

Example of overview: Grade 7

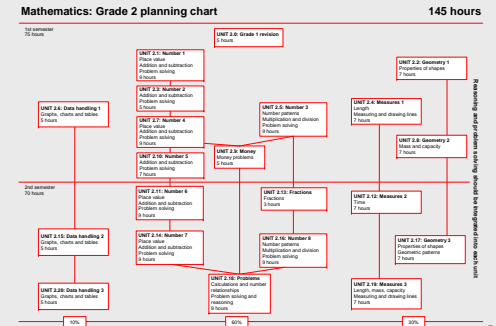
120 hours



3.4

Example of overview: Grade 2

145 hours



3.5

Example: data handling in Grade 4



Unit	Title	Topics	Hours	Lessons
4.6	Data handling 1	Simple two-way tables Bar charts with scales (intervals of 2 and 10)	5	
4.14	Data handling 2	Carroll diagrams (two criteria) Bar charts with scales (intervals of 5 and 10)	5	
4.19	Data handling 3	Simple two-way tables Bar charts with scales (intervals of 4, 20 and 100)	5	

3.6

A scheme of work identifies:

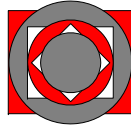


- teaching time for each strand of the standards
- units of work to be taught in each semester to ensure an appropriate balance across the strands
- teaching time for each unit
- teaching objectives for each unit, with all key performance standards for the grade covered over the year
- the reasoning and problem solving skills to be incorporated
- opportunities to link different aspects of mathematics and to revisit topics
- time for regular assessment and review

3.7

Mathematics workshop 1

Session 4: The reasoning and problem solving strand



Objectives



By the end of this session you will:

- understand the nature of the reasoning and problem solving strand of the mathematics standards and how it relates to the other three strands
- have begun to consider the implications of the reasoning and problem solving strand for teaching and learning

4.1

The strand includes:



- problem solving
- communication
- reasoning

4.2

Discussion points



- To what extent did the 'Sixes are banned' activity fulfil the expectations of the standards?
- What mathematical knowledge and skills had to be applied to solve the problems?
- Where would problems like 'Sixes are banned' fit into the mathematics curriculum?

4.3

Types of problem



- **Closed problems** of a non-routine nature with a definite answer, e.g. 'Abdul's cats'
- **Open problems** include:
 - those with alternative solutions where the method may be more important than the answer, e.g. 'Sixes are banned'
 - those with open approaches where finding a pattern or relationship is required, or making a generalisation, e.g. 'Perimeter dots'

4.4

This problem:

Find the answer to this calculation:

$$324 \div 4$$

can become:

Use the digits 0, 1, 2, 3, 4, 4.
Make three-digit numbers that have no remainder when divided by 4.

(e.g. $324 \div 4$, $124 \div 4$)

4.5

This problem:

Find the perimeter of this rectangle:



can become:

Construct some rectangles with the same perimeter as this one.



4.6

This problem:

Complete this multiplication table.

x	40	3
20		
2		

can become:

Investigate the possible ways of completing this multiplication table.

x		
		60
	80	6

4.7

Problems in the curriculum:



- can be 'bolt-on'
- can be 'built-in'

4.8

'Building in' problems:



- should be part of everyday teaching
- can be achieved by:
 - asking more open questions
 - using problems to motivate the learning of skills and concepts (e.g. introducing the teaching of a new skill in the context of a problem)
 - following the learning of skills and concepts with chances to apply them in varied contexts

4.9

A good problem:

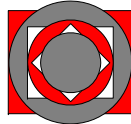


- may be open or closed
- will include all three aspects of the strand, since problems are unlikely to be solved without reasoning and communicating
- is likely to fulfil many of the expectations of the standards for the strand
- will provide opportunities to apply specific mathematical knowledge and skills in new contexts, and to link different areas of mathematics

4.10

Mathematics workshop 1

Session 5: Teaching and learning 2



Objectives



By the end of this session you will:

- have considered some ways to begin and end lessons
- be able to identify features of effective oral and mental work in mathematics
- have developed some ideas for oral and mental starters

5.1

Use oral and mental starters to:



- ensure the lesson gets off to a purposeful start and sets a brisk pace
- rehearse previously taught skills in a variety of lively ways
- focus on skills needed in the main part of the lesson
- enable informal assessment of students' progress to inform the next part of the lesson

5.2

Types of oral and mental starters



- Recalling mathematical facts
- Explaining mental calculation strategies
- Using approximations to estimate
- Applying number facts and calculation skills in real-world situations
- Estimating or converting measurements
- Linking the laws of number and algebra
- Visualising shapes, movements and constructions
- Drawing inferences from data in a variety of forms
- Using correct mathematical terms
- Generalising, reasoning and proving

5.3

Good oral and mental work:

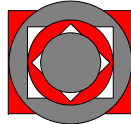


- is lively and challenging, engaging all students throughout
- is interactive, drawing responses with a skilful mix of open and closed questions
- uses these responses to assess students' learning
- uses resources effectively to illustrate and model ideas
- consolidates students' knowledge, skills and understanding and moves them on, building on what they know to derive new facts or introduce new ideas
- expects students to explain how they arrive at their solutions, and to use mathematical terms correctly

5.4

Mathematics workshop 1

Session 6: Teaching and learning 3



Objectives



By the end of this session you will:

- have considered some ways in which effective teaching can be developed in main teaching activities
- have considered some strategies for catering for the most and least able students in the class

6.1

A typical mathematics lesson



A starter (5 to 10 minutes)

- Development of oral and mental skills

The main teaching activity (35 to 45 minutes)

- Combinations of teaching input and student activities
- Whole class work, groups or pairs, or individual work
- Interventions to identify and remedy misconceptions, clarify points and give immediate feedback

A consolidation phase (5 to 15 minutes)

- Summary of key points, assessment, links to other work, homework

6.2

Effective main teaching involves:



- shared objectives to set expectations and make connections
- clear explanations, illustrations and demonstrations, with resources used effectively to help students to visualise
- involving students through discussion and questioning, and opportunities for them to demonstrate, explain and justify methods and solutions, orally and in writing
- pitching work at an appropriate level, ensuring challenge and success
- addressing errors and misunderstandings as they arise
- promoting problem solving and reasoning skills
- good lesson management, including pace and purpose

6.3

Differentiation: whole class work



- Using open questions, with wait-time for students to think or discuss in pairs before answering
- Using closed questions targeted at individuals or groups
- Using learning resources to support particular students
- Teaching half the class while the other half works independently

6.4

Differentiation: group work



- Giving different but linked tasks to groups or pairs – no more than three levels of difficulty across the class
- Using open-ended tasks – investigations or problems that have a range of possible answers
- Giving extension tasks to challenge more able students while others are consolidating their learning
- Using learning resources to support particular students
- Focusing the help of a teacher or support teacher on selected individuals/groups as others work independently
- Giving differentiated homework

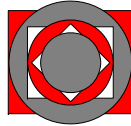
6.5

Further action



- What features of effective teaching would you want to introduce or develop further in your school?
- How will you go about it?

6.6



Objectives



By the end of this session you will:

- have considered the purposes of a consolidation phase in a lesson
- have developed some strategies for rounding off lessons effectively

7.1

A plenary:



- draws together the whole class, usually after group or individual work
- occurs at strategic moments in the teaching sequence
- often occurs at the end of a lesson in a consolidation phase
- can occur at other points of a lesson

7.2

Plenaries allow teachers to:



- review the learning so far in a task or sequence
- recognise the achievement of individuals and the class
- discuss and correct any common misconceptions or errors
- draw attention to key learning points
- draw out applications of the learning
- direct students to the next phase of learning

7.3

Plenaries allow students to:



- crystallise and remember what has been learned
- communicate what has been learned
- feel a sense of achievement, progress and completion
- reflect on and evaluate their own learning

7.4

A consolidation phase is time to:



- review the lesson's objectives and summarise key learning points
- consolidate, reinforce and extend earlier work
- discuss and correct errors and misconceptions
- assess the extent of students' learning
- make links to other work, look ahead to the next lesson and set homework

7.5

Possible action

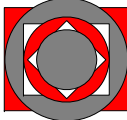


- At a meeting of the mathematics team, look at the video sequence from this session and use it with Handout 7.3 as an agenda for discussion to share ideas
- Discuss how starter activities might also be used to help consolidate learning at the end of a lesson
- Agree on five strategies that you will trial, and introduce them over a four-week period
- Share student responses to these strategies at a further meeting of the mathematics team

7.6

Mathematics workshop 1

Sessions 8 and 9: Planning 2



Objective

By the end of Sessions 8 and 9 you will:

- have planned a detailed unit of work to cover several hours of teaching (e.g. 9 hours)

8.1

Connected levels of planning

The standards	A scheme of work: long-term planning	Lesson plans: short-term planning
<ul style="list-style-type: none"> objectives for each grade, providing breadth, balance and progression for all students 	<ul style="list-style-type: none"> grouping objectives together to form units identifying objectives for higher and lower attainers allocating teaching time to units making links across and ordering the units outlining how to teach each unit to meet the objectives 	<ul style="list-style-type: none"> deciding in detail how to teach the objectives planning day-to-day lessons

8.2

Factors to consider

- Make sure that the units of work in each semester have an appropriate balance across the strands
- Include all the key performance standards for the grade at least once during the year
- Incorporate reasoning and problem solving skills
- If possible, revisit key performance standards at least once during the course of the year
- Provide opportunities to link different aspects of mathematics
- Consider the time needed for regular assessment and review

8.3

Describe briefly:

- what the unit is about: the topics covered, where the unit links to other units, and so on
- the learning outcomes, a summary of what students might be expected to achieve, drawn from the standards
- vocabulary or technical terms that students need to learn
- the main resources that will be needed for work in the unit
- the teaching objectives for the unit, drawn from the standards, showing what students should be taught

8.4

Describe briefly:

- how topics can be approached by teachers
- suitable activities for students
- suitable assessment activities
- further notes for teachers
- which of the school's learning resources can best support students' work during the unit, including relevant parts of textbooks

8.5

Further notes:

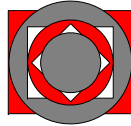


- teaching points
- common misunderstandings and errors
- how activities can be differentiated
- references to ICT
- links to other subjects
- homework
- out-of-school activities

8.6

Mathematics workshop 1

Session 10: Assessment



Objectives



By the end of this session you will:

- understand the nature of formative and summative assessments
- have begun to plan assessment activities to incorporate into day-to-day lessons

10.1

Purposes of assessment



- diagnostic
- formative
- summative
- evaluative

10.2

Evidence from research



Improving learning depends on **five key factors**:

- provision of effective feedback to students
- the active involvement of students in their own learning
- adjusting teaching to take account of results of assessment
- a recognition of the profound influence assessment has on students' motivation and self-esteem
- the need for students to be able to assess themselves and understand how to improve

10.3

Points to consider



- How will you measure achievement?
- How will you record achievement?
- How will you involve your students in self-assessment?
- How will you use assessment records to help set targets for learning for individual students or classes?

10.4

Recording assessment



- **Green:**
understands and can do the work without help
- **Amber:**
understands and can do the work with some help
- **Red:**
has poor understanding and needs a lot of help

10.5

Study the lesson plan and ...

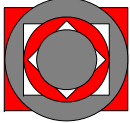


- use the **standards** to decide what students should already know
- study the **starter activity** to see how it is used to assess prior knowledge
- study the **main activity** and consider how the teacher can assess as they teach
- look at how the **consolidation section** checks whether the objectives have been met

10.6

Mathematics workshop 1

Sessions 11 and 12: Planning 3



Objective

By the end of Sessions 11 and 12 you will:

- have planned lessons to fit into a unit of work

11.1

Connected levels of planning

The standards	A scheme of work: long-term planning	Lesson plans: short-term planning
<ul style="list-style-type: none"> objectives for each grade, providing breadth, balance and progression for all students 	<ul style="list-style-type: none"> grouping objectives together to form units identifying objectives for higher and lower attainers allocating teaching time to units making links across and ordering the units outlining how to teach each unit to meet the objectives 	<ul style="list-style-type: none"> deciding in detail how to teach the objectives planning day-to-day lessons

11.2

Elements of a good lesson plan:

- lesson objectives that can be shared with students
- a clear structure that helps the teacher to manage time
- references to relevant resources
- key vocabulary that students need to learn
- brief notes on:
 - teaching input and key questions
 - specific activities for students
 - how to assess what students achieve in the lesson
 - key learning points
- notes on how any support teacher will be used
- homework to be set

11.3

Effective lesson structures include:

- a crisp start
- exposition and explanation of the main points of the lesson
- activities that introduce or build on the exposition
- opportunities for students to consolidate and apply their learning
- bringing the whole class together to discuss points:
 - during group or individual work
 - at the end of a lesson

11.4

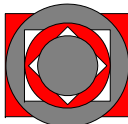
Typically, lesson plans:

- show the title and the unit on which the lesson is based
- list the lesson's objectives
- identify key vocabulary
- list resources such as apparatus, textbooks, ICT applications
- outline how the lesson will start
- show how the lesson will develop through teaching input and student activities, including key questions
- indicate how the lessons will be consolidated, summarised and rounded off and students' responses assessed
- where appropriate, suggest homework

11.5

Mathematics workshop 1

Session 13: Selecting and using resources



Objectives



By the end of this session you will:

- have developed criteria for evaluating textbooks
- have matched specific objectives to units and pages in selected textbooks and vice versa
- have begun to consider objectives for which no materials exist

13.1

Using resources



- As reference and support for the teacher
- For exercises for students
- For students to read and research
- For student use in private study and consolidation
- For incorporation into schemes of work and lesson plans

13.2

Choosing resources – general



- Will they be useful to students?
- Will they be useful to teachers?

13.3

Choosing resources – general



- Is the language of communication clear and easy to understand?
- Is the layout of the text helpful?
- Do illustrations and diagrams enhance or detract from the text?
- How quickly will the resources become out of date?
- Will they survive wear and tear for long?
- Is the expense worthwhile?

13.4

Criteria – content



- Is the content well-matched to the mathematics standards? Are all the key standards covered?
- Are there ICT activities?
- Are the contexts suitable for use in Qatar?

13.5

Criteria – content



- Is there the equivalent of a grade-by-grade progression to provide an overview?
- Is the progression sensible? Does it link to the progression in the standards? Are there opportunities to revisit topics?
- Is the pace of progression appropriate? Is the degree of challenge appropriate for all students?

13.6

Criteria – support for the teacher



- Are there teachers' books to supplement books for students?
- Will the books help teachers to:
 - develop students' mathematical awareness and ability to reason and solve problems?
 - make connections within mathematics and with other subjects?
- Are there references to other resources, including other published materials, software and Internet sites?

13.7

Criteria – support for the teacher



- Are there sections on pedagogy and classroom organisation? On differentiation at work in the classroom?
- Are there detailed worked answers, including pictures of graphs and relevant charts or diagrams?

13.8

Criteria – support for the student



- Will students find the books stimulating, understandable and accurate?
- Do illustrations and diagrams enhance the learning of mathematics or are they merely decorative?
- Do the exercises provide a sufficient range of example types and at appropriate levels of difficulty to meet the needs of all students?
- Are there activities with ICT and graphics calculators?
- Is there a range of word problems?
- For older students, are there substantial problems set in realistic contexts, using real data?

13.9

Criteria – support for the student



- Are homework tasks suggested?
- Will students be able to use the book for personal study?
- Are there assessment tasks to help students to know how they are progressing?
- Are there hints and model solutions to exercises and assessments?
- Is there a glossary of technical terms?

13.10

Supplementing resources

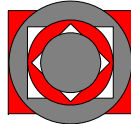


- Identify gaps in provision
 - Find other relevant resource material to fill these gaps
- AND/OR**
- With colleagues, establish criteria for the production of relevant materials
 - With colleagues, produce these materials
 - Share the experience and the perceived difficulties
 - Incorporate all relevant resources into lesson plans
 - Modify resources with use

13.11

Mathematics workshop 1

Session 14: Leading developments 1



Objectives



By the end of this session you will:

- have considered the role of the subject leader in implementing the standards
- have identified ways to encourage colleagues to work collaboratively

14.1

Establishing a role



- What is the key purpose of my job?
- What are the main components?
- For what am I responsible?
- To whom am I responsible?
- What authority do I have?

14.2

Successful curriculum change 1



- Who makes the decisions about curriculum changes in your school?
- If you have ideas about how teaching and learning could be improved, how do you share these ideas?

14.3

Successful curriculum change 2



Give examples to show:

- how your work has been influenced by other people in the school
- how you have influenced others

14.4

Six key factors



Successful change depends on:

- a shared sense of purpose
- a willingness to change
- enthusiasm and excitement
- energy and sustainability
- high-quality personal relationships
- recognition and celebration of success

14.5

A subject leader's role



- **Curriculum leadership**
 - briefing teachers on the standards
 - building a subject teaching team and delegating tasks
 - leading the development of a scheme of work and lesson plans
 - matching resources to the scheme and identifying gaps
 - supporting teachers' professional development
- **Monitoring** teachers' planning, teaching and assessment
- **Evaluating** progress with the implementation of the standards and producing an annual action plan
- **Establishing links** and keeping everyone informed

14.6

A subject leader's role



- What could you do to fulfil the curriculum leadership responsibilities? How and when would you do it?
- What could you do to fulfil the responsibilities for monitoring?

14.7

Views on change



- I think there is a world market for about 5 computers.

Thomas J. Watson, Chairman of IBM, in 1943

- There is no reason for any individual to have a computer in their home.

Ken Olson, President of Digital Equipment, in 1977

14.8

Strategies for success



- Modelling
- Monitoring
- Discussion

14.9

Task



- Choose part of a lesson for demonstration
- Take turns to describe to your partner what you intend to do and why you are doing it
- Discuss how you will manage the demonstration and the meeting for joint analysis

15.6

Example agenda

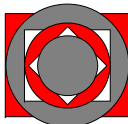


- I will remind students to write their answers clearly on the mini-whiteboards
- I will tell them that they are not allowed to hold up their whiteboards until I say 'show'
- I will look at their answers. If there are several incorrect responses, I will ask a student with the correct answer to explain how they did the calculation
- I will then ask another question, check the answers of those who could not do the previous question, and ask one of them to explain how they did the calculation
- I will continue like this until I am sure that all the students are confident

15.7

Mathematics workshop 1

Session 16: Leading developments 3



Objectives



By the end of this session you will:

- have considered some ways of supporting colleagues
- have identified some of the action needed to implement the standards successfully in your school

16.1

Supporting individual teachers



- Involve teachers in planning a scheme of work
- Study and discuss sample lesson plans
- Help a teacher to plan a lesson or unit of work
- Watch and discuss a video of a lesson
- Do some 'micro-teaching' using colleagues as 'the class'
- Invite a teacher to watch you teach a lesson in which you will focus on a particular aspect of teaching
- Make paired lesson observations and discuss them
- Plan and team-teach a lesson or series of lessons
- Discuss a teacher's planning, observe a lesson and give constructive feedback

16.2

Preparing for the standards



The first tasks are to:

- familiarise teachers with the **standards and their purpose**
- use the standards to **produce an outline scheme of work** and some **sample lesson plans** for each grade
- begin to select a **range of resources** to support the scheme of work and **familiarise teachers with how best to use them**

16.3

Preparing a scheme of work



- In each grade, the standards need to be grouped into **units**
- Each unit needs to be allocated a given number of **teaching hours or lessons**
- The units should then be **sequenced** in the order that they will be taught throughout the school year
- Each unit then needs to be translated into an appropriate number of **lesson plans**

16.4

Support for teachers



Longer term, the task is to help teachers to:

- continue to become familiar with the standards, particularly new subject matter
- refine and develop the scheme of work and lesson plans
- strengthen teaching methodology and assessment
- select and become confident with the use of a wide range of teaching and learning resources, including ICT
- become familiar with the new national tests and how to use results to improve teaching and learning

16.5