



هيئة التعليم

EDUCATION INSTITUTE

Sample lesson plans for the State of Qatar

Mathematics: Grades 1 to 12

Developed for the Education Institute by CfBT

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The examples that illustrate the sample mathematics lessons include some that are based on or are adapted from:

- examples from the Mathematics for Education and Industry (MEI) syllabus of the General Certificate of Education Advanced Level examinations administered by Oxford Cambridge and RSA Examinations (OCR);
- examples drawn from the National Curriculum tests for England.

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Introduction

Background to this document

The new curriculum standards for Arabic, English, mathematics and science lie at the heart of Qatar's education reforms. The standards draw on international expectations for what students should know, understand and be able to do at each stage of their schooling.

The sample lesson plans in this publication have been developed for the Supreme Education Council by the same team of curriculum experts that developed the standards, guided by the staff of the Education Institute. Working groups of local teachers and curriculum specialists have helped to ensure that the lesson plans reflect Qatari values and culture and are relevant to the needs and interests of Qatari students.

The sample lesson plans for mathematics and science are offered in English and Arabic versions. The Arabic lesson plans are provided in Arabic, and the English lessons plans in English.

Conventions

The spelling conventions adopted in the English versions of the lesson plans are based on standard British English.

The units of measurement and abbreviations used are the *Système Internationale* (SI) units. They are written in their internationally recognised form: for example, the word *centimetre* and its abbreviation *cm* are used in both the Arabic and English language versions of the lesson plans.

In both the Arabic and English versions of the lesson plans, numbers and symbols are written using Roman or Greek script. Mathematical equations and formulae are presented from left to right. Thin spaces, not commas, are used to separate groups of three digits in numbers with more than four digits: for example, 48 746, not 48,746.

Schools will need to make their own decisions about the spelling conventions to use in lessons. They will also need to decide how to present numbers, symbols, equations and formulae to students, taking account of the language of instruction and the age of the students.

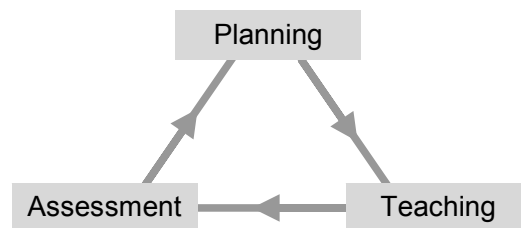
Planning, teaching and assessment

Decisions about how teachers might best teach the curriculum standards are left to schools. With the help of its School Support Organisation, each school can develop its own policies for lesson planning, teaching and learning, and assessment, so that as many students as possible achieve the standards expected for their grade.

This introductory section is intended to give some guidance about how schools might interpret and use the standards. It discusses the teacher's three main responsibilities: planning, teaching and learning, and assessment.

Planning

The cycle of planning, teaching and assessment is a continuous one. Good teaching is based on good planning, and good planning is informed by effective assessment.



Plans that are well constructed and informative are not necessarily written in full prose or elegantly word-processed, but they do need to be accessible to others. Their prime purpose is to outline what teachers should teach, when and how.

Long-term planning: a scheme of work

The first step in using the standards is to create a long-term plan or scheme of work. The scheme of work will then guide teachers when they create their short-term lesson plans.

There is no right or wrong way to set out a scheme of work. The main criterion is that teachers in the school find it helpful and can base their short-term or day-to-day lesson plans upon it. Creating it involves, for each grade:

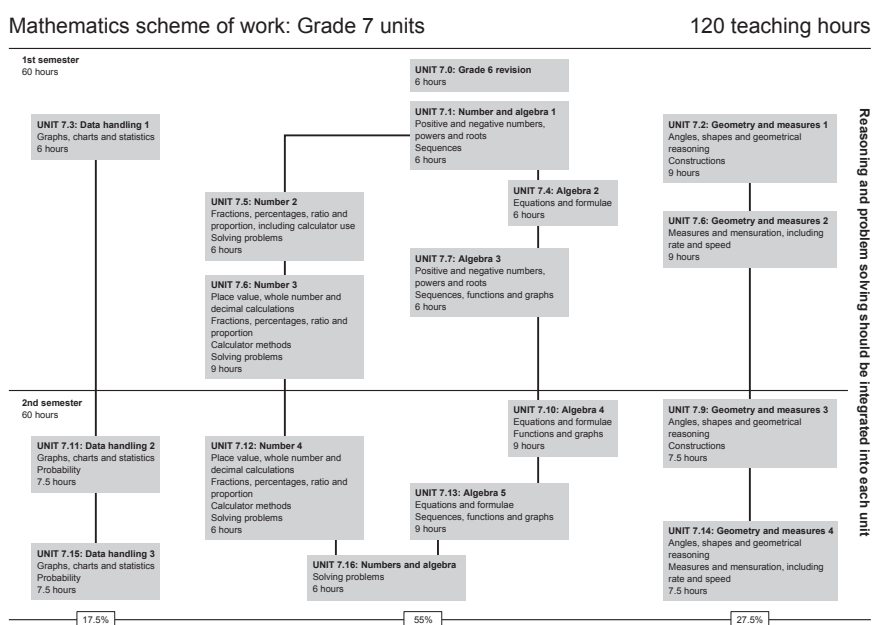
- drawing the standards together into coherent, manageable teaching units;
- identifying any additional content that the school may wish to incorporate into the units;
- indicating the number of teaching hours or lessons for each unit;
- ordering the units across the two semesters of the school year so that they build on preceding work, link with other units and prepare students for the next grade;

- developing sufficient detail in each unit for teachers to be able to create their lesson plans from it.

The flow of the units reflects continuity and progression in students' learning throughout the school year. The sequence usually provides one or more opportunities to revisit particular standards or groups of standards throughout the course of the year. This gives students the chance to consolidate their learning in a range of contexts and to make connections between different aspects of the subject.

In creating the sequence of units, there may be practical matters to consider, such as ensuring that units for different grades involving the same sets of books or equipment do not coincide with each other. In science, schools will also need to take into account work that can only be done at particular seasons.

The example below is an extract from a long-term plan for mathematics. It shows how units of work in mathematics could be organised and sequenced throughout Grade 7.



Once the flow of the units has been decided, each unit will need to be developed. Typically, the objectives for the unit, drawn from the standards, will be stated in a way that shows what different groups of students should be taught and what they might be expected to achieve over the course of the unit.

The unit will also need to describe briefly:

- how topics can be approached by teachers;
- suitable activities for students;
- the key vocabulary or technical terms that students need to know and use;
- which of the school's learning resources can best support students' work during the unit, including relevant parts of textbooks and any special arrangements, facilities or equipment that may be needed;
- any long-term advance planning required.

As teachers use and refine their scheme of work, they sometimes choose to add further details to it, such as:

- notes that will help teachers to interpret the scheme of work: for example, teaching points, references to ICT, common misunderstandings, suggestions for extension activities and for homework;
- how activities can be differentiated to cater for students who are very able or who need extra support;
- how teachers can assess students' success with the work in the unit and whether students are ready to move on to the next unit;
- ways in which units can build on preceding work, link with other units and prepare students for the next grade;
- the links that can be made across subjects such as Arabic and English, or science and mathematics;
- the out-of-school activities that can enhance learning in school.

Short-term or lesson plans

The activities described in the unit go some way to helping teachers set out short-term plans or lesson plans. Lesson plans are teaching notes for a block of lessons or individual lessons, showing how the work will unfold to achieve its intended objectives. They are developed to match individual class requirements, for example, students' differing abilities and the resources available. The best lesson plans will also take account of the formative assessments that teachers have been making. They therefore cannot be finalised too much in advance of the lesson.

Each unit of work is likely to consist of several lessons, some of which may be grouped around a theme: for example, an 8-hour unit may be planned in blocks of 3, 2 and 3 one-hour lessons.

The objectives for the lessons are drawn from the standards, as indicated in the scheme of work. It is important not to have too many objectives in a particular lesson or block of lessons, so that the teacher and students can remember them. Lessons may also have subsidiary objectives that do not need to be written down.

As with the scheme of work, there is no right or wrong way to set out a lesson plan. The main criterion is that it helps a teacher to teach the lesson.

Typically, lesson plans will:

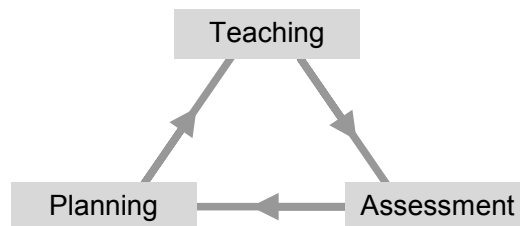
- indicate the objectives for the lesson or block of lessons;
- stress the relevant vocabulary and technical terms associated with the work in the unit;
- outline how the lesson will start;
- show how work will be developed through teaching input and student activities, with suggestions for differentiation where appropriate;
- indicate how lessons will be summarised and rounded off;
- where appropriate, suggest what homework will be set (the sample lesson plans in this booklet do not suggest homework because they are single examples taken out of sequence);
- identify links with other subjects;
- refer to relevant resources, such as textbooks and ICT applications.

Teaching and learning

Each school can develop its own policies for lesson planning, teaching and learning, and assessment, so that as many of its students as possible achieve the standards expected for their grade.

Similarly, there are no prescribed textbooks or other teaching and learning resources. Each school can select from the very best that exist to suit the needs of its students.

Effective teaching results from careful planning and use of assessment information.



One of the purposes of the sample lesson plans in this document is to illustrate ways of teaching the standards effectively. Many of the characteristics of effective teaching are the same for all subjects. For example, an effective teacher:

- has clear objectives for each lesson and explains them to students;
- conveys to students an interest in and enthusiasm for the subject, and gives them confidence that they can succeed;
- introduces new topics in well-planned stages, using a combination of demonstration, modelling, instruction, explanation and discussion;
- interacts with students, questions them effectively, gives them time to think, and expects them to explain and justify their answers;
- offers students stimulating tasks that interest and involve them, including:
 - practical work and problem solving to develop students' investigative and enquiry skills and ability to think for themselves;
 - oral and mental work to develop and secure students' speaking and listening skills, their use of technical terms, their recall skills, and their abilities to imagine, visualise and predict;
 - varied reading and writing activities to consolidate and extend the teaching and to further students' communication skills;
- ensures that students have balanced opportunities to work as a whole class, collaboratively in small groups or pairs, or independently as individuals;
- gives extension tasks or extra support to students who need them;
- makes effective use of a range of resources to support teaching and learning, including regular use of information and communication technology (ICT);
- makes links within mathematics, to other school subjects and to the real world, to show students how ideas are often dependent on each other;
- gives all students time to reflect on their learning.

Interactive teaching

One of the most important features of effective teaching is the interaction that takes place between the teacher and the class. It is vital that students engage actively with their learning, otherwise learning becomes superficial and is easily forgotten. The sample lesson plans in this document show how teachers can lead a variety of interactive activities in which students play an active part.

Organising students as a ‘whole class’ helps to maximise their contact with the teacher so that every student benefits from direct teaching for sustained periods. But intervention, direct teaching and interaction are just as crucial during individual, paired and group work as they are in whole-class work.

High quality interactive teaching is oral, collaborative and lively. It is not achieved by lecturing the class, or by expecting students to teach themselves indirectly from books. It is a two-way process. Students play an active part by answering questions and expanding on their answers, contributing points to discussions, and explaining and demonstrating their work to others in the class.

Good interactive teaching will also involve creating opportunities for students to interact with each other through group problem solving, sharing their observations, justifying their arguments or methods to each other, debating the meaning of what they observe, discussing, sharing thoughts about what they are ultimately going to report back, and so on.

Effective interactive teaching is achieved by balancing a range of teaching approaches:

- **Directing and telling:** sharing teaching objectives with the class, ensuring that students know what to do, and drawing attention to points over which they should take particular care, such as how to ensure that one step follows from another in a mathematical argument, the degree of accuracy to adopt when making a measurement, how to set out work, how to label axes correctly or plot a smooth curve ...
- **Demonstrating and modelling:** giving clear demonstrations using appropriate resources and visual displays: for example, showing how to subtract one number from another on a number line or how to solve an algebraic equation; using blackboard instruments to demonstrate a geometric construction or a thermometer to model the use of negative numbers; using a graphics calculator to find the solution to equations or dynamic geometry software to reflect a shape in a mirror line ...
- **Explaining and illustrating:** giving accurate, well-paced explanations, and referring to previous work or methods: for example, explaining a method of calculation and discussing why it works, giving the meaning of a mathematical term, symbol or form of notation, explaining the steps in the solution to a problem, giving examples that satisfy a general statement, illustrating how the equation $y = 2x$ can represent different situations ...
- **Questioning and discussing:** questioning students in ways to ensure that they all take part; using open and closed questions, skilfully framed, adjusted and targeted to make sure that students of all abilities are involved and contribute to discussions; asking for explanations; giving students time to think before inviting an answer; listening carefully to students’ responses and responding constructively in order to take forward their learning; challenging students’ assumptions and making them think ...
- **Exploring and investigating:** asking students to pose problems or suggest a line of enquiry, to identify anomalous results, seek counter-examples or identify exceptional cases; encouraging them to consider alternative ways of

representing mathematics in algebraic, graphical or diagrammatic form, and to move from one form to another to gain a different perspective on a problem; teaching students the skills required to plan and carry out investigations, including extending the range of ICT applications that they can use successfully in their work ...

- **Consolidating and embedding:** providing varied opportunities for students to practise and develop newly learned skills, through a variety of activities in class and, where appropriate, well-focused homework; asking students either with a partner or as a group to reflect on and talk through a process; inviting them to expand their ideas and reasoning, or to compare and then refine their methods and ways of recording their work, using a display board to support their explanation; encouraging them to apply their mathematical skills to solve problems that they meet in other subjects, and to use their knowledge of science and language skills in mathematics ...
- **Reflecting and evaluating:** identifying students' errors, using them as positive teaching points by talking about them and any misconceptions that led to them; discussing students' justifications of the methods or resources they have chosen; evaluating students' presentations of their work to the class; giving them oral feedback on their written work; encouraging them to make self-assessments of their work ...
- **Summarising and reminding:** reviewing during and towards the end of a lesson or series of lessons the mathematics that has been taught and what students have learned; identifying and correcting misunderstandings; inviting students to present their work and picking out key points and ideas; sometimes listing the main points where everyone can see them; making links to other topics in mathematics and work in other subjects; giving students an insight into the next stage of their learning ...

Structuring lessons

Effective lessons have clear objectives so that students are clear about what is expected of them. They will also be structured so that they flow smoothly from beginning to end. The pace may vary as a lesson develops, perhaps brisk at first then modifying to allow more time for reflection, or reflective at first working up to a faster pace at the end.

Schools have different timetables so the structure and timing of lessons will differ. In some schools, the timetable arrangements may make it necessary to plan double-period lessons for older students.

Most lessons will provide a beginning, a middle and an end in which the teacher prepares students for what they are to learn, teaches them, then helps them to consolidate their learning and to recognise what they have achieved. This structure allows a variety of patterns of teaching methodology and organisation, depending on a lesson's objectives and its position in a series of lessons.

For example, with four 50-minute lessons each week, the first lesson might begin with a starter activity of 12 to 15 minutes, with brisk two- or three-minute starters on the remaining days. In the longer starter, students might start to work on a problem or puzzle posed on the board, giving feedback on their initial thoughts on the problem after five or ten minutes.

In the main part of the lesson, in particular, there is scope for considerable variety and creativity, with a different interplay of work with the whole class, groups, pairs and individuals on different days, although each lesson is likely to

include some direct teaching and interaction with the students, and activities in which students play an active part.

For example, at the start of a new unit of work you might need more time for demonstration, explanation and discussion with the whole class, interspersed with short tasks for students; the consolidation phase of the lesson may be very short. On the other hand, when you have identified general errors or misunderstandings during the main part of a lesson, you may need several mini-plenaries during the lesson to sort them out, as well as a final summing-up.

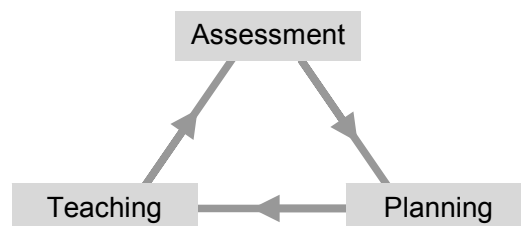
Later in a unit of work, students might start the main part of a lesson by continuing to work in pairs on a previous problem; once they have re-focused on it, you might hold a mini-plenary with the whole class to share ideas, highlight important results and structure work from there on.

At the end of a unit of work it can be useful to use the consolidation phase to look back with the whole class over a number of lessons to draw together what has been learned and to identify key points and methods that you want students to remember and use in the future. For this kind of plenary, you may need a much longer time than usual.

Assessment

As with planning and teaching, the standards do not prescribe how schools should assess and record students' progress. Each school can develop its own assessment policy to help teachers to plan and improve teaching and learning through good assessment. The only requirement is that every student participates in the annual national tests based on the standards.

Assessment and recording of students' progress have to be manageable if the information they yield is to be useful. The best assessment has an immediate impact on teaching and learning. It alerts teachers when students are falling behind or exceeding expectations. It helps them to maintain the pace of learning by informing teaching plans, in a continuous cycle of planning, teaching and assessment. The feedback that teachers give students, and the self-assessments that students are encouraged to make, are crucial in helping students to know how to improve their work.



Formative assessments

Formative assessments are part of day-to-day lessons. They include informal observations, oral questioning and occasional tests or special activities designed to judge students' progress. Their purposes are:

- to check that students have grasped the main teaching points in a particular lesson or unit of work, whether they have any misunderstandings or

misconceptions that you need to put right, and whether they are ready to move on;

- to help you to give students feedback, set targets for them to achieve, plan the next stage of work and brief any support staff about which students to assist;
- to help students to learn how to evaluate their own work and how to improve it.

The main elements of formative assessments are:

- using a range of questions during lessons to assess students' understanding, the extent to which they are able to engage in the work, and whether they can use and apply what they have learned in new contexts;
- making conscious observations of particular students during teaching or while they work on activities to assess their responses and progress;
- holding brief impromptu or planned discussions with students to follow up any surprises in their responses when they were being taught;
- discussing with students their response to oral work, assignments and practical tasks to identify and correct any errors and misconceptions, to assess their level of skill, and to make sure that they understand what they need to do to improve their performance;
- analysing and marking students' written work, to identify any common errors or misconceptions, and giving comments orally and in writing to guide students on how they can improve their work and make progress;
- conducting occasional short recall tests with planned questions, to assess quickly with the students their knowledge and speed of recall, involving, for example, recall of facts or spellings;
- organising brief review tests that draw upon what has been taught previously to assess what might need revision or re-teaching;
- encouraging students to evaluate their own work, to review their own achievements and progress and to think about what they need to do to improve their work or to plug any gaps;
- asking pairs or small groups of students, with or without the teacher, to determine what they know and can do, what they still find challenging and what the targets for their learning should be.

These elements of formative assessment should be part of day-to-day teaching. Some of the lesson plans in this document show how formative assessment, or assessment for learning, can happen in practice. For example, in some of the concluding plenaries of lessons, students reflect on and evaluate their learning. In other plenaries, one or two students explain their methods and solutions to their classmates, allowing the teacher to judge how effectively the students have tackled the work. In others, the teacher presents the students with a new problem to see whether they can apply the skills they have been developing in the lesson.

The crucial feature of formative assessment is that it helps to inform and improve teaching and learning. The overarching purpose is to determine what students have learned so that informed decisions can be taken about teaching and the next steps in students' learning.

Targets for individual students

Setting students personal targets helps them to focus on what they need to learn to meet the standards. Have regular discussions with students to review their targets and set new ones where appropriate. You may want to arrange your discussion with some students on an individual basis – for example, students who would benefit from a degree of privacy – but for most of them you can organise the discussion in groups as part of an ordinary lesson. Ask students to suggest two or three improvements to work on over the next few weeks, and make a note of these for future checking. You could also offer students some practical advice on the steps they might take to achieve their targets, and give them an occasional opportunity to work on their targets as part of one or more homework tasks.

Individual targets will usually be linked to the objectives for your teaching over the next few weeks. They may be very specific: for example, to become proficient at adding and subtracting a pair of fractions. For some students a target may need to be broken down into stages: for example, to learn to add a pair of fractions where one denominator is a multiple of the other. For a few students, it may be appropriate to choose a target linked to the standards for the grade below or above to help them to consolidate or extend their learning. Whatever the targets, they need to be straightforward and few in number, so that students understand them and can focus on them.

Summative assessments

Summative assessments are long-term. They are made at the end of a grade and, if schools wish, at the end of the first semester. The purposes of summative assessments are:

- to assess individual students' work against the key performance standards;
- to help schools and the Supreme Education Council to review students' overall progress and attainment against the performance standards;
- to give supplementary information about individual students' attainment and progress for schools to report to parents and the next teacher or the next school.

Summative assessments include end-of-year tests or examinations and teacher assessments. They also include assessments by teachers of aspects of the standards that cannot be assessed in written tests, such as oral and mental skills, practical skills, and students' use of ICT.

Before teacher assessments are made, it is helpful if all staff teaching the subject in a school assess a sample of students' work from each grade. This helps to make sure that judgements against the performance standards are consistent throughout the school

Using the sample lesson plans for mathematics

This section is addressed to teachers who intend to make use of the lesson plans.

The aims of the mathematics standards

Between them, the sample lesson plans are designed to show you how effective teaching and use of resources can achieve the aims of the mathematics standards. These are that students should:

- become mathematical problem solvers capable of solving familiar and unfamiliar problems in mathematical, real-world and other subjects' settings;
- develop proficiency in mental and written calculations, algebraic manipulation and other techniques, including visualisation and geometric imagery;
- use calculators and computers to support and develop their mathematical work;
- communicate mathematical ideas accurately and precisely through natural and mathematical language such as numbers, signs, symbols, diagrams, graphs and mathematical terms;
- select and use different types of reasoning, including different kinds of proof;
- make connections between different mathematical ideas and between mathematics and other subjects;
- appreciate the variety of ways that mathematical ideas are applied and used in modern society;
- appreciate the contribution of mathematicians to the history and development of mathematics.

The purposes of the sample lesson plans

The sample lesson plans for mathematics are intended to illustrate:

- some ways in which lessons can be structured;
- different ways of organising a class so that students have balanced opportunities to work as a whole class, in small groups, as pairs or individually;
- how teaching can include exposition, demonstration and explanation, accompanied by whole-class discussion and questioning;
- the range of activities that can motivate students' learning, including problem solving, critical evaluation, research, enquiry and practical work (nearly every lesson will include at least one activity of this type);
- how learning is achieved through a balance of reading, writing, speaking and listening activities, and how most lessons can include a mix of these activities;

- the range of activities that can help students to consolidate and practise their developing skills, including games and puzzles, practical and written tasks, and occasional textbook exercises;
- how some activities can be differentiated to cater for the differing learning needs of the students in the class;
- the use of different kinds of teaching and learning resources, including information and communication technology (ICT).

The mathematics lessons are single examples to illustrate different teaching and learning activities. There is no intention that they should be taught as a sequence, one after the other. They are drawn from different topics and points in the teaching year to show spread rather than sequence.

What the lesson plans include

The sample lesson plans in this document include most of the details listed on page 9 of this document:

- the lesson's objectives, drawn from the standards for the relevant grade (occasionally, a standard from an earlier grade is included for revision purposes);
- relevant vocabulary and technical terms;
- an outline of how the lesson will start, how it will developed through teaching input and student activities, and how it will be consolidated and rounded off;
- relevant resources, such as textbooks and ICT applications.

The sample lesson plans do not refer to specific texts or textbooks, or to homework tasks, since these will vary from school to school according to each school's policies.

How the mathematics lesson plans are structured

In general, the sample lessons include one or more short activities to start the lesson, one or more main activities, and a consolidation and reflection phase. The notes that follow amplify the purpose of each part of the lesson to guide you should you choose to teach one of the lessons.

Starter activities (about 5 to 10 minutes)

Most of the lessons start with setting the scene and a short activity to help students to tune in, interest them and engage their attention.

Setting the scene involves clarifying the objectives and explaining the purpose of the lesson in words that students understand (not the wording of the standards). You might want to look back, discuss homework and, when the main activity spans more than one lesson, consider how a lesson develops from the previous one. You might outline the flow of the lesson so that students know what to expect, and say why a certain problem is to be tackled or a particular activity is to be done. All this helps students to understand why they are learning these new ideas and to make connections.

Short, stimulating starter activities, either before or after the scene setting, help to get the lesson off to a brisk start and prepare students for the main activity. Between them, the sample lessons illustrate a range of starter activities. These include:

- using a visualisation activity to describe shapes, movements or constructions;
- tackling a number puzzle;
- chanting rhythmically as a whole class, sometimes with actions;
- focusing on numeric or algebraic relationships through a loop card game or dominoes;
- developing students' mental calculation strategies by getting them to figure out new facts from facts that they already know, to substitute numbers in algebraic expressions, or to solve simple algebraic equations;
- developing students' estimation skills by asking students to estimate measurements or the outcomes of calculations;
- considering different types of short open-ended problems that require students to provide alternative answers;
- trying 'What if...?' questions to find out what students think and to elicit their ideas;
- presenting and discussing some 'amazing facts' in which numbers are used;
- carrying out short data handling activities, using an OHP to display a graph, chart or table and asking questions such as: 'What event or "story" could the graph illustrate?', 'What questions could this chart help to answer?', 'What do the data in the table show you?', 'What conclusion would you write if this graph represented your results?'

The main activity (about 25 to 40 minutes)

Building on the starter, the main activities in the lesson plans are characterised by high levels of direct, interactive teaching and probing questioning, regardless of whether students are working as a whole class, in groups or individually, or whether the lesson consists of practical tasks, problem solving or written work.

The main part of the lesson provides time to introduce a new topic, or consolidate previous work and develop it further. Highlight the meaning of any new mathematical terms or notation, and encourage students to use these in their discussions and written work. Teach specific skills in this part of the lesson. Demonstrate and explain using a board, flipchart, overhead projector or computer linked to a data projector. Involve students through carefully planned questioning, and mini-tasks that they work on in pairs before answering.

Match tasks and activities for students to do to their previous attainment and your objectives for the lesson. You may want to allow some choice here. Ensure that over time students have opportunities to work in small groups, in pairs or individually. Encourage discussion and cooperation between students. Ensure that students with particular needs are supported effectively.

Effective lessons can have several cycles of main activity and mini-plenaries to allow misconceptions to be identified and dealt with at the appropriate time, or to provide further teaching. Throughout the main activity, encourage students to make predictions. Look for gains in their understanding. Use opportunities to report back, review and clarify. Ask students to offer their methods and solutions to the whole class for discussion. Check whether errors are merely careless mistakes or are the result of fundamental misconceptions.

Consolidation and reflection (about 5 to 10 minutes)

Short plenaries may take place during the main activity. The consolidation and reflection at the end of a lesson is far more than ‘clearing up’ after a practical session and should be just as dynamic as the starter. It is an opportunity to round off or summarise the lesson, so that students reflect on the lesson, say what was important about it and consider the progress they have made. Draw out from them and highlight the key learning points, such as facts, ideas and vocabulary. This part of the lesson is also a time to look forward to the next stage of learning.

Get students to think about how they might apply new ideas, by showing them how the ideas can be used and where they fit in. This is also a time when you can relate mathematics to work in other subjects.

Any homework that you set should help students to consolidate or apply what they have learned, or to prepare for the next lesson.

Teaching time for the lessons

Each lesson plan has enough material to support at least 45 minutes of teaching, and longer in Grades 10 to 12. You may need to supplement the activities with simpler or more challenging tasks if the students in your class have a range of attainment. You could choose from activities in textbooks or from your own resources. If you wish, different tasks can be given to different groups of students, according to their needs.

There may be too much material in the lesson plan, since this will depend on the class. In this case, you could designate one of the activities in the lesson as homework, or carry it forward to the next lesson. Be selective about which activity to cut – it does not have to be the last one merely because it comes at the end.

Other uses for the lesson plans

An alternative use for the lesson plans is to use them to stimulate ideas about your own teaching. An individual teacher could read and reflect on them, or a group of teachers could choose to read one or more of the lessons and then discuss them together.

You may decide to start with the lessons for the grade that you teach. As you read through them, think about these questions.

- Most of the lessons have more than one objective. Would students ‘learn’ what is intended in a single lesson, or would the objective need to be part of other lessons during the year?
- How do I normally structure my lessons? How do they start? How do they develop? To what extent is my practice the same or different from what is described in the lesson plans? Do I need to modify my practice in any way?
- What kind of activities are offered to students in the lesson plans? Are any of these activities collaborative, in which students are expected to do things together? Do any of the activities require them to discuss with a partner? Do the tasks that I normally give my students require collaboration? Do I need to include a wider range of activities in the future?
- What kinds of questions do teachers ask in the lessons? Are they open questions, for which a range of answers is possible, or closed questions, for

which only one answer is possible? Are students expected to give one-word answers, or to explain and justify their arguments and reasons in a sustained way? Do I need to think more carefully about the questions that I put to students during my lessons?

- How much practice do students do during the lesson plans? How many examples do students need to do to convince them and you that they know how to do them? Do all students need to do all the examples in a textbook exercise? Could some students be directed towards the last four examples, and some to every third example?
- How do the lessons described in the plans end? What happens? What discussions take place? What activities do students do? What kinds of questions are they asked? How do my own lessons normally end? Do I allow time for students to reflect on what was important? Do I help them to crystallise the key learning points? Do I need to adapt the way that my lessons end?

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Sample lesson plans for mathematics

Grades 1 to 12

