



هيئة التعليم

EDUCATION INSTITUTE

Mathematics workshop 2

for teachers of Grades 1 to 6

Trainer's notes

Developed for the Education Institute by CfBT

Acknowledgements

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The mental test used in Session 5 was the national test given to 11-year-olds in England in 2001. It is reproduced here with the permission of the Qualifications and Curriculum Authority.

The video material recommended for use as part of this workshop was produced in the UK by the Department for Education and Skills. Extracts from this video may be reproduced for non-commercial or training purposes on condition that the source is acknowledged.

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Introduction

These materials are intended to help School Support Organisations (SSOs) and other trainers to plan and run the second of five workshops for subject leaders and teachers of mathematics in Qatar's Independent Schools. This workshop is for teachers in Grades 1 to 6. The third workshop, designed to run in parallel with this workshop, is for teachers of Grades 7 to 12. The complete pack of materials for this workshop consists of *Trainer's notes*, Parts 1 and 2 of the *Teacher's pack* and a CD-ROM with a set of PowerPoint presentations.

The purpose of the workshops is to introduce the curriculum standards for mathematics and to discuss the implications for planning the curriculum, teaching, learning and assessment. It is recommended that at least two teachers from each school attend the workshops and that the same teachers attend throughout.

This workshop consists of 16 sessions over five taught days. On the first day, there are four sessions of 90 minutes. Other days have three sessions, usually of 80 minutes each. On the third day, there are separate sessions for teachers of Grades 1 to 4 (three sessions of 80 minutes) and teachers of Grades 5 to 9 (two sessions of 120 minutes). The last session on the final day is 70 minutes.

It is assumed that the sessions will be taught in a language that all teachers understand. If interpretation is required, you may need to reduce the material in each session by up to one third, or allow longer for each session.

Before the workshop starts

You will need to prepare a programme for the workshop, making sure that enough time is allowed for prayers and refreshments.

You will also need to prepare a letter of invitation to send with the programme to each teacher attending, giving details of the venue and the times of the sessions. This letter should be agreed in advance with the Education Institute.

With your letter and the programme, you should send a copy of Part 1 of the *Teacher's pack*. Your letter should ask teachers to study this pack carefully before coming to the workshop.

You should either provide at the workshop or ask teachers to bring with them on each day their copy of *Curriculum Standards for mathematics: Grades K to 12* and *Sample lesson plans for mathematics: Grades 1 to 12*. Other materials that they need to bring are indicated in Part 1 of the *Teacher's pack*.

Your letter should mention that there will be tasks to do to follow up the workshop.

Aims of the workshop

The purpose of the five-day mathematics workshops is to consider the curriculum standards for mathematics and to discuss the implications for planning the curriculum, teaching, learning and assessment.

The workshops aim to help subject leaders and teachers to:

- become more familiar with the new curriculum standards;
- consider the implications of the standards for planning, teaching and assessment;
- start or refine the planning of a mathematics scheme of work based on the standards, and related lesson plans;
- support colleagues as they implement the standards.

The third day of the second workshop has different sessions, depending on the age range of students in the school.

Sample programme

Day 1: Developing number sense 1

08:00	Registration	
Session 1 08:30–10:00	Place value	90 minutes
Session 2 10:30–12:00	Mental calculation 1	90 minutes
Session 3 13:00–14:30	Mental calculation 2	90 minutes
Session 4 15:00–16:30	Working with measures	90 minutes

Day 2: Developing number sense 2

10:45	Registration	
Session 5 11:10–12:30	Mental activities and assessment	80 minutes
Session 6 13:30–14:50	Written calculations 1: addition and subtraction	80 minutes
Session 7 15:10–16:30	Written calculation 2: multiplication and division	80 minutes

Day 3: Developing number sense 3

10:45	Registration	
Session 8a 11:10–12:30	Grades 1 to 4: Early number work 1	80 minutes
Session 9a 13:30–14:50	Grades 1 to 4: Early number work 2	80 minutes
Session 10a 15:10–16:30	Grades 1 to 4: Number games and puzzles	80 minutes
Session 8b 11:10–12:30 and 13:30–14:10	Grades 5 to 9: Fractions, decimals and percentages	120 minutes
Session 9b 14:20–16:20	Grades 5 to 9: Calculators	120 minutes

Day 4: Geometry and word problems

10:45	Registration	
Session 11 11:10–12:30	Geometry 1	80 minutes
Session 12 13:30–14:50	Geometry 2	80 minutes
Session 13 15:10–16:30	Solving word problems	80 minutes

Day 5: Problem solving

10:45	Registration	
Session 14 11:10–12:30	Problems and investigations 1	80 minutes
Session 15 13:30–14:50	Problems and investigations 2	80 minutes
Session 16 15:10–16:20	The interactive whiteboard Summing up	70 minutes

Objectives of each session

Day 1: Developing number sense 1

Session 1: Place value

By the end of the session teachers will:

- have explored a range of place value activities they could use in their lessons;
- have identified activities to remedy students' misconceptions of and problems with place value.

Sessions 2 and 3: Mental calculation 1 and 2

By the end of Sessions 2 and 3 teachers will:

- have identified and discussed strategies for calculating mentally;
- have considered the role of recording in mental work.

Session 4: Working with measures

By the end of the session teachers will:

- have considered activities to teach aspects of work on measures: choosing appropriate units, estimating measures, reading scales, converting and comparing measures;
- have considered some ICT resources for supporting work on measures.

Day 2: Developing number sense 2

Session 5: Mental activities and assessment

By the end of the session teachers will:

- have discussed some activities to keep mental skills sharp;
- have considered the assessment of mental skills.

Session 6: Written calculations 1: addition and subtraction

By the end of the session teachers will:

- have considered approaches to written methods for addition and subtraction.

Session 7: Written calculations 2: multiplication and division

By the end of the session teachers will:

- have considered approaches to written methods for multiplication and division.

Day 3 (Grades 1 to 4): Developing number sense 3

Session 8a: Early number work 1

By the end of the session teachers will:

- understand what is involved in helping young children to count and calculate.

Session 9a: Early number work 2

By the end of the session teachers will:

- know which are the most important areas in early number work;
- have considered models and images that help children to understand and develop skills in these areas.

Session 10a: Number games and puzzles

By the end of the session teachers will:

- have considered a range of games and puzzles to develop and practise number skills in Grades 1 to 4.

Day 3 (Grades 5 to 9): Developing number sense 3

Session 8b: Fractions, decimals and percentages

By the end of the session teachers will:

- have discussed how students learn;
- have seen how visualisation is a key component in teaching fractions;
- have considered some strategies for teaching that are consistent across grades.

Session 9b: Calculators

By the end of the session teachers will:

- have considered how to teach students to use a calculator, and some of the difficulties that they can have;
- have tried out some calculator activities to use in lessons.

Day 4: Geometry and word problems

Session 11 and 12: Geometry 1 and 2

By the end of Sessions 11 and 12 teachers will:

- have explored activities involving angles and shapes;
- have considered how to help students to understand angle;
- have considered how practical work underpins more advanced analytical work in later grades.

Session 13: Solving word problems

By the end of the session teachers will:

- be familiar with the range of skills students need to solve word problems;
- have considered how to teach these skills.

Day 5: Problem solving

Session 14: Problems and investigations 1

By the end of the session teachers will:

- have considered different kinds of mathematical problems and puzzles;
- have considered the strategies that students can use to solve these problems.

Session 15: Problems and investigations 2

By the end of the session teachers will:

- have considered what is important about investigation work in mathematics;
- have tried out some investigation activities to use in lessons;
- have considered some strategies to get students started on an investigation.

Session 16: The interactive whiteboard

By the end of the session teachers will:

- have viewed and discussed some ICT resources;
- have considered how the workshop should be followed up in school.

Preparing for the workshop

Before the workshop, you will need to check out practical matters such as:

- the venue, including car parking and arrangements for coffee, lunch and tea;
- workshop numbers and participating schools;
- resources needed every day, including a computer equipped with Microsoft PowerPoint, a video recorder and projection facilities (full details of the resources needed are on pages 11–13);
- furniture arrangements (preferably workshop style with tables);
- any displays that you may wish to have;
- interpretation and translation facilities.

You will also need to prepare a workshop register, with names of schools and details of whether teachers are mathematics subject leaders or other teachers.

Other preparation consists mainly of making sure that you are familiar with the workshop materials and other publications.

Teacher's pack: Parts 1 and 2

You will need to prepare one copy of the *Teacher's pack* for each teacher attending the workshop.

Part 1 should be sent to teachers in advance of the workshop together with your letter of invitation and the workshop programme.

Part 2 should be given out at the start of the first day. This contains:

- handouts for particular sessions;
- the gap tasks to be completed before the next workshop;
- reduced copies of all the slides used on the workshop.

Video clips

The recommended video for Session 2 is 'Monitoring children calculating', from Shropshire Education Services: telephone (044) 1743 254321.

Other video material recommended for this workshop is produced in the UK by the Department for Education and Skills (DfES), Sanctuary Buildings, Great Smith Street, London SW1P 3BT. One of the DfES videos includes a clip from a BBC Horizon programme first broadcast in 1985. Extracts from these videos may be reproduced for non-commercial or training purposes on condition that the source is acknowledged.

Teachers attending the workshop will need to understand English to gain the maximum benefit from the video clips. Alternatively, ask an interpreter to provide simultaneous translation.

The video extracts are not examples of ‘perfect’ teaching. They are recommended as good materials for teachers to discuss as part of their professional development.

Resources needed

On all five days

For the trainer

- *Trainer’s notes*
- Copy of the *Teacher’s pack*
- Computer and data projector, with Microsoft PowerPoint
- Video recorder linked to large screen
- Whiteboard or flipchart
- Overhead projector (OHP) and blank acetate sheets
- *Curriculum Standards for mathematics: Grades K to 12*
- *Sample lesson plans for mathematics: Grades 1 to 12*

For each teacher

- *Teacher’s pack*

Either provide or ask teachers to bring each day

- *Curriculum Standards for mathematics: Grades K to 12*
- *Sample lesson plans for mathematics: Grades 1 to 12*

Day 1

For the trainer

- The PowerPoint slides for Day 1: Presentation 1.ppt, Presentation 2.ppt, Presentation 3.ppt, Presentation 4.ppt
- Video clips:
 - Session 1: Primary students learning about place value
 - Session 2: Monitoring children calculating (Shropshire Education Services: telephone (044) 1743 254321)
 - Session 3: Students working with a blank number line, e.g. on subtraction
 - Session 4: Students working on measures
- Selection of activities for the workshop in Session 1, including four computers with *Monty* and *Counter*
- A computer mouse, a tea cup, a paperclip, a kitchen bucket, a piece of string 65 cm long, a small sauce pan, a roll of tin foil, a piece of A4 paper
- A counting stick
- Interactive teaching programs: *Measuring cylinder*, *Measuring scales*, *Ruler*, *Thermometer*, *Time*, *Angles* (download free from www.standards.dfes.gov.uk/primary/mathematics)
- Copies of the evaluation form for Day 1 (see back of *Trainer’s notes*)

Day 2

For the trainer

- The PowerPoint slides for Day 2: Presentation 5.ppt, Presentation 6.ppt, Presentation 7.ppt
- Audio cassette recorder
- Audio tape of a typical UK mental test
- Video clip:
Session 7: Students being taught the grid method of multiplication
- Copies of the evaluation form for Day 2 (see back of *Trainer's notes*)

Day 3 (Grades 1 to 4)

For the trainer

- The PowerPoint slides for Day 3: Presentation 8a.ppt, Presentation 9a.ppt, Presentation 10a.ppt
- Video clips:
Session 8a: Extract from BBC Horizon programme (1985)
Session 9a: Use of resources (optional)
- Counting stick
- Resources to demonstrate: flip-flop, bead string with 100 beads, wire coat hanger with 10 pegs of one colour and 10 pegs of another colour, 'slidy box' number sentence
- Interactive teaching programs: *Place value, Ordering numbers, Counting on and back, Number facts, Difference, Grouping* (download free from www.standards.dfes.gov.uk/primary/mathematics/)
- Two dice (or the interactive teaching program *Spinners*)
- Selection of games and puzzles suitable for Grades 1 to 4, preferably on A4 cards
- Copies of the evaluation form for Day 3 (Grades 1 to 4) (see back of *Trainer's notes*)

For each small group

- Pile of small objects to count (e.g. counters, coins, paper clips)

Day 3 (Grades 5 to 9)

For the trainer

- The PowerPoint slides for Day 3: Presentation 8b.ppt, Presentation 9b.ppt
- Cups, fractions of cups and number cards (for demonstration and for each small group)
- Overhead projector calculator
- Calculators for teachers
- Copies of the evaluation form for Day 3 (Grades 5 to 9) (see back of *Trainer's notes*)

Day 4

For the trainer

- The PowerPoint slides for Day 4: Presentation 11.ppt, Presentation 12.ppt, Presentation 13.ppt
- Video clip:
Session 13: Primary students solving word problems
- Overhead projector and acetate sheets, and a black arrow made from card
- Selection of geometric activities for the workshop in Session 11, including four computers with identified software
- Smile programs: *Symmetry and transformations*, *Angles* (see www.smilemathematics.co.uk)
- Interactive teaching program: *Angle* (download free from www.standards.dfes.gov.uk/primary/mathematics)
- Centimetre squared paper, dotted squared paper and isometric paper
- Pinboards (or paper showing pinboards)
- Large paper triangle and large paper quadrilateral
- Copies of the evaluation form for Day 4 (see back of *Trainer's notes*)

For each group

- Masking tape

Day 5

For the trainer

- The PowerPoint slides for Day 5: Presentation 14.ppt, Presentation 15.ppt, Presentation 16.ppt
- Interactive whiteboard and a range of software
- Copies of both evaluation forms for Day 5 (see back of *Trainer's notes*)

Tips for new trainers

Some tips are provided here for trainers who are relatively new to the training role.

- If you are teaching the workshop with a colleague, you will need to agree how to manage your contributions. For example, you could allocate particular sessions to particular trainers, alternate contributions within a session, divide into separate groups for some or all sessions, and so on.
- If your workshop will involve interpreters, you will need to reduce the amount of material in each session by about one third, particularly if the translation is consecutive rather than simultaneous. If possible, try to brief the interpreters on key points of the training in advance. Discuss how you and the interpreter will work during presentations to the whole group and during group work.
- When you are giving a presentation, make sure that you are familiar with the notes and don't have to pause constantly in order to refer to them. Remember to leave time for any interpreter to translate. If you are sharing the teaching of a

session, your partner can then check against the workshop notes while you are leading, and can mention any omitted points before they take their own turn.

- Don't read out PowerPoint slides to your audience. Instead, refer to the accompanying workshop notes to explain, elaborate or make supplementary points. It sometimes helps to annotate a photocopy of the slide to help to do this.
- If you are using video clips, practise using the video recorder before you start running the workshop, so that you are familiar with the controls.
- If you are setting individual or small group tasks, make sure that you have a suitable arrangement of tables, make the task clear and set time limits. With longer tasks, warn the groups when there are only 5 minutes left.
- For tasks that involve study of the standards, it may help to put the numbers of the pages to be studied on a flipchart before the session begins.
- When you are taking feedback from group tasks, use the workshop notes to check that all the necessary points have been mentioned. If an opinion is expressed that you think may be an isolated or minority views, it may help to check whether other teachers share that view to create debate about it.
- Work flexibly to the indicative times for each session. Without making it obvious, keep a watchful eye on the clock.
- If time for questions runs out, or if you are asked a question to which you don't know the answer, make a note of the question on a flipchart, or on a wall poster put up for the purpose, so that you can deal with it later.
- You will be working from prepared notes because it is important that all workshop members are given the same information and an opportunity to consider the same range of issues. However, there are opportunities to draw on your own and local experience as well. This will help you to feel that it is your workshop and thus make it more effective for all teachers.
- If you are likely to repeat the workshop, the evaluation forms completed by trainees should help you to make suitable adjustments.