Mathematics Curriculum
Form 1
MATHEMATICS CURRICULUM UNITS – FORM 1

MTH 7.1  Properties of Whole Numbers
MTH 7.2  Angles
MTH 7.3  Number Patterns & Coordinates
MTH 7.4  Decimal Numbers and Money
MTH 7.5  Fractions
MTH 7.6  Metric Measures and Time
MTH 7.7  Constructions and Scale Drawing
MTH 7.8  Accuracy, Number Machines and Patterns
MTH 7.9  Polygons
MTH 7.10 Statistics and Probability
MTH 7.11 Using Letters instead of Numbers
MTH 7.12 Directed Numbers and Expressions
MTH 7.13 Straight Line Graphs
MTH 7.14 Perimeter and Area
MTH 7.15 Solid Shapes and Volume
**Subject:** MATHEMATICS  
**Strand:** Number  
**Unit code and title:** MTH 7.1 Properties of Whole Numbers *(Levels 7.1 – 8.1)*

**Form 1**

**Duration:** 9 sessions

### Objectives

The teacher will teach the students to:

1. Read and write whole numbers in figures and words; Write ten, hundred, thousand,..., billion as powers of 10.
2. Multiply and divide whole numbers by 10, 100, 1000 and multiples of these. Multiply and divide large numbers that end in noughts.
3. Add natural numbers up to 1000 and subtract numbers less than 1000.
4. Know the multiplication facts up to $10 \times 10$. Multiply and divide natural numbers by a single-digit number.
5. Multiply natural numbers by a two-digit number using the partitioning method and the standard written method; Divide natural numbers by a two-digit number using the repeated subtraction method.

### Key Words

- Digits, figures, whole numbers, place value, units, tens, hundreds, thousands, millions, billions.
- Addition, subtraction, multiplication, division, multiples of 10, powers of 10.

### Points to note

Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

### Resources

- FOM A2, Students’ Book, Practice Book, Resource Pack - Chapters 1 and 3
- From Teachers’ laptop:
  - C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons
    - Numbers in words.xls
    - Multiplication tables.xls
    - Place value.xls
- Internet Links:
  - [www.funbrain.com/numwords/index.html](http://www.funbrain.com/numwords/index.html)
- Number Grid 10 × 10
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<th>Examples of Teaching Experiences and Activities</th>
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<td>Bingo activity – in groups students read randomly selected numbers in words and mark corresponding numbers in figures on given handout. Excel worksheet - in pairs students work Numbers in words.xls <a href="http://www.funbrain.com/numwords/index.html">www.funbrain.com/numwords/index.html</a> An interactive site that is designed to test writing words from numbers and the reverse. Matching Flashcards – in pairs students choose cards from two batches, one with ordinary numbers and the other in powers of 10.</td>
<td>8.1 Students will be able to interchange between the three forms of the main powers of ten, namely the written, ordinary and index form. 7.3 Students will be able to read and write whole numbers up to one billion. 7.2 Students will be able to read and write whole numbers up to one million. 7.1 Students will be able to put large numbers in order.</td>
</tr>
<tr>
<td>2. Multiply and divide whole numbers by 10, 100 and 1000 and multiples of these. Multiply and divide large numbers that end in noughts.</td>
<td>The teacher starts with a mental/oral warm up of simple multiplication and division by 10 and 100 for the students to get familiarized with the idea of adding or removing noughts respectively. Board Game: Students are divided in groups and take turns to roll dice and move their groups’ counter on the board game...until a group reaches the finish. Along the way students would work calculations in multiplication and division by powers of 10 and by large numbers that end in noughts. The total of all their correct answers would then be their scores. The group with the highest score wins.</td>
<td>8.1 Students will divide large numbers that end in noughts by numbers that end in noughts. Eg: 64000 ÷ 80 7.3 Students will multiply large numbers that end in noughts. Eg: 5000 × 400 7.2 Students will multiply whole numbers by numbers that end in noughts. Eg: 14 × 200 7.1 Students will divide by powers of 10. Eg: 700 ÷ 10</td>
</tr>
</tbody>
</table>
3. Add natural numbers up to 1000 and subtract numbers less than 1000.

The teacher writes calculation in two single-digit, two-digit and/or three-digit numbers on the board and the students in pairs work out the calculation and show their answer on the Show-Me board.

Investigation Activity - Teacher explain how scores in a darts game are calculated and students practice addition and subtraction of such scores in practical situations.

Students use the Excel Formula to predict and practice the answer of random generated numbers.

Problem Solving Task - FOM A2 – Page 16 Task 1 (Students work in groups to find the best solution for the real life situation)

<table>
<thead>
<tr>
<th>4. Know the multiplication facts up to 10 × 10. Multiply and divide natural numbers by a single-digit number.</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Teachers’ laptop: C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons: Multiplication tables.xls</td>
</tr>
<tr>
<td>In pairs, students write numbers from 2 to 9 in any order along the two sides of a given 4 by 4 grid. Each grid is given to a different pair of students and students have a race in filling it in as fast as they can.</td>
</tr>
<tr>
<td>In groups students are given cards with ‘Links. Chains and Loops’ to fill in, as per example below. Eg.</td>
</tr>
</tbody>
</table>

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<tr>
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</table>

8.1 Students will solve problems leading to the addition and/or subtraction of more than two three-digit numbers.

7.3 Students will solve problems leading to the addition and/or subtraction of two-digit numbers.

7.2 Students will work out addition and subtraction of three-digit numbers. E.g.: 365 + 437 – 154

7.1 Students will work out subtraction of three-digit numbers. E.g.: 437 – 154

8.1 Students will solve problems leading to multiplication and division of three digit numbers.

7.3 Students will solve problems leading to multiplication and division of two digit numbers.

7.2 Students will work out multiplication and division of three digit numbers.

7.1 Students will know the multiplication tables up to 10 × 10 and work out the multiplication and division of two digit numbers.
5. Multiply natural numbers by a two-digit number using the partitioning method and the standard written method. Divide natural numbers by a two-digit number using the repeated subtraction method.

In pairs, students use the Show-Me board to work multiplications of two digit numbers ending in noughts, provided by the teacher. Eg: 400 \times 20 After various examples the teacher presents the students with a more challenging example (Eg. 197 \times 85) requiring the partitioning method. This will help the teacher assess whether the students’ recall the method and starts a discussion about how to apply the method and encourages the students to use it for other examples.

Eg. 197 \times 85

\[
\begin{array}{ccc}
\times & 100 & 90 & 7 \\
80 & 8000 & 7200 & 560 \\
5 & 500 & 450 & 35 \\
\end{array}
\]

= 8000 + 7200 + 500 + 450 + 560 + 35

= 16745

Teacher explains the meaning of multiplying by a two-digit number using the notion of place value.

Example: 197 \times 85 means (197 \times 80) + (197 \times 5)

Hence the teacher guides the students into the standard written method.

\[
\begin{align*}
197 \\
\times 85 \\
985 & \quad (197 \times 5) \\
15760 & \quad (197 \times 80) \\
\hline
16745
\end{align*}
\]

Investigative Activity: Use four consecutive digit cards - 3, 4, 5, 6. Create two 2-digit numbers, using each digit only once. Multiply them together using the standard written method. Investigate which two numbers give the largest possible answer, and which give the smallest possible answer.

Chunky Method: The teacher starts off with an example requiring the repeated subtraction and explains the method as "How many chunks of 29
can you take off from 786?" Teacher then guides the students into the method.

Eg: \(786 \div 29\)

\[
\begin{array}{c}
786 \\
-290 \\
496 \\
-290 \\
206 \\
-145 \\
61 \\
-58 \\
3
\end{array}
\begin{array}{c}
10 \\
10 \\
5 \\
2 \\
\times 29 \\
\times 29 \\
\times 29 \\
\times 29
\end{array}
\]

Ans: 27 rem 3

Division Puzzle on Instruction cards.

Students are given an instruction card as below to work out in pairs the calculation and shade their answers on the diagram to create a path from S to F. Example of cards:

\[
\begin{array}{c}
208 \\
322 \\
522 \\
622 \\
\div 13 \\
\div 14 \\
\div 24 \\
\div 17
\end{array}
\begin{array}{c}
272 \\
500 \\
600 \\
561 \\
\div 16 \\
\div 24 \\
\div 17
\end{array}
\begin{array}{c}
414 \\
285 \\
61 \\
\div 23 \\
\div 15 \\
\div 17
\end{array}
\begin{array}{c}
285 \\
322 \\
600 \\
561 \\
\div 15 \\
\div 14 \\
\div 17
\end{array}
\]

Consolidation Task - FOM A2 – Page 20 Task (Students work individually or in pairs)
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit 7.1 Properties of Whole Numbers

The computer often provides fast and reliable non-judgemental and impartial feedback. This feedback can be a fundamental way in which technology can support the learning of mathematics. Through feedback learners may notice patterns and see connections, explore, make mistakes and modify their ideas. Learners can also work with dynamic images, explore data and teach the computer through the design of algorithms. The suggested software is either free or licensed by the CMeLD. The category is indicated at the end of every URL.

To supplement the URLs suggested in this unit, students can get more practice by going through http://www.dositey.com/2008/addsub/Mystery10.htm#. Another exercise where students are required to write numbers as in a cheque book can be found at http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/writingbignumbers/activity.shtml#. Throughout this unit students can also create their own games at http://resources.oswego.org/games/#Matching Game Directions#.

http://www.bbc.co.uk/skillswise/numbers/wholenumbers/multiplication/multiply10and100/index.shtml# Skillswise offers the students practice at three different levels and presents factsheets, worksheets and quizzes to multiply and divide by 10, 100, 1000.

http://www.bbc.co.uk/skillswise/numbers/wholenumbers/addsubtract/mental/# is one of 3 modules (accessed from http://www.bbc.co.uk/skillswise/numbers/wholenumbers/) the three modules to choose from are: mental, written methods and problem solving.

http://www.sumdog.com/ offers free maths games that cover numeracy topics at 10 different levels. Students need to select the level and topic from the training tab, then select the game and finally choose an opponent who can be a classmate, an online student or the computer. For the 4th objective, students will need to select level 7 where they can play with numbers up to 1000. The games vary in interest level from bunny hopping to teenage talent shows.

Level 8 at http://www.sumdog.com/ caters for the 5th objective.

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS

Strand: Number

Unit code and title: MTH 7.1 Properties of Whole Numbers (Levels 6.3 – 7.3)  
Duration: 9 sessions

Objectives

The teacher will teach the students to:

1. Read and write whole numbers in figures and words; Write ten, hundred, thousand,…, billion as powers of 10.
2. Multiply and divide whole numbers by 10, 100, 1000 and multiples of these; Multiply and divide large numbers that end in noughts.
3. Add natural numbers up to 1000 and subtract numbers less than 1000.
4. Know the multiplication facts up to 10 × 10; Multiply and divide natural numbers by a single-digit number.
5. Multiply natural numbers by a two–digit number using the partitioning method and the standard written method; Divide natural numbers by a two-digit number using the repeated subtraction method.

Key Words

Digits, figures, whole numbers, place value, units, tens, hundreds, thousands, millions, billions.

Addition, subtraction, multiplication, division, multiples of 10, powers of 10.

Points to note

Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources

FOM A1, Students’ Book, Practice Book, Resource Pack - Chapters 1 and 3

From Teachers’ laptop:
C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons
- Numbers in words.xls
- Multiplication tables.xls
- Place value.xls

Internet Links:
www.funbrain.com/numwords/index.html

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<td>7.3 Students will be able to read and write whole numbers up to one billion. 7.2 Students will be able to read and write whole numbers up to one million. 7.1 Students will be able to put large numbers in order. 6.3 Students will know the place value of any digit in a large number.</td>
</tr>
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<td>1. Read and write whole numbers in figures and words.</td>
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<td>Write ten, hundred, thousand ... billion as powers of 10.</td>
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<td>The teacher starts with a mental/oral warm up of simple multiplication and division by 10 and 100 for the students to get familiarized with the idea of adding or removing noughts respectively. Board Game: Students are divided in groups and take turns to roll dice and move their groups' counter on the board game...until a group reaches the finish. Along the way students would work calculations in multiplication and division by powers of 10 and by large numbers that end in noughts. The total of all their correct answers would then be their scores. The group with the highest score wins.</td>
<td>7.3 Students will multiply large numbers that end in noughts. Eg: 5000 × 400 7.2 Students will multiply whole numbers by numbers that end in noughts. Eg: 14 × 200 7.1 Students will divide by powers of 10. Eg: 700 ÷ 10 6.3 Students will multiply by powers of 10. Eg: 8 × 1000</td>
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<td>3. Add natural numbers up to 1000 and subtract numbers less than 1000.</td>
<td>The teacher writes calculation in two single-digit, two-digit and/or three-digit numbers on the board and the students in pairs work out the calculation and show their answer on the ShowMe board. Investigation Activity - Teacher explain how scores in a darts game are calculated and students practice addition and subtraction of such scores in practical situations. Students use the Excel Formula to predict and practice the answer of random generated numbers. Problem Solving Task - FOM A2 – Page 16 Task 1 (Students work in groups to find the best solution for the real life situation)</td>
<td>7.3 Students will solve problems leading to the addition and/or subtraction of two-digit numbers. 7.2 Students will work out addition and subtraction of three-digit numbers. E.g.: 365 + 437 – 154 7.1 Students will work out subtraction of three-digit numbers. E.g.: 437 – 154 6.3 Students will work out addition of three-digit numbers. E.g.: 365 + 437</td>
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4. Know the multiplication facts up to $10 \times 10$.
   Multiply and divide natural numbers by a single-digit number.

From Teachers’ laptop:
C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons
   - Multiplication tables.xls
In pairs, students write numbers from 2 to 9 in any order along the two sides
   of a given 4 by 4 grid. Each grid is given to a different pair of students and
   students have a race in filling it in as fast as they can.

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In groups students are given cards with ‘Links. Chains and Loops’ to fill in, as
per example below.

Eg.  

[Diagram of a grid with numbers and a question mark]

Problem Solving Cards from FOM A2 Resource Pack Page 32

7.3 Students will solve problems leading to multiplication and division of two digit
   numbers.

7.2 Students will work out multiplication and division of three digit numbers.

7.1 Students will know the multiplication tables up to $10 \times 10$ and work out the
   multiplication and division of two digit numbers.

6.3 Students will know the multiplication tables up to $10 \times 10$. 
5. Multiply natural numbers by a two-digit number using the partitioning method and the standard written method.

Divide natural numbers by a two-digit number using the repeated subtraction method.

In pairs, students use the Show-Me board to work multiplications of two digit numbers ending in noughts, provided by the teacher. Eg: 400 \times 20 After various examples the teacher presents the students with a more challenging example (Eg. 197 \times 85) requiring the partitioning method. This will help the teacher assess whether the students’ recall the method and starts a discussion about how to apply the method and encourages the students to use it for other examples.

Eg. 197 \times 85

\[
\begin{array}{c|c|c|c}
\times & 100 & 90 & 7 \\
\hline
80 & 8000 & 7200 & 560 \\
5 & 500 & 450 & 35 \\
\end{array}
\]

\[
= 8000 + 7200 + 500 + 450 + 560 + 35 = 16745
\]

Teacher explains the meaning of multiplying by a two-digit number using the notion of place value.

Example: 197 \times 85 means (197 \times 80) + (197 \times 5)

Hence the teacher guides the students into the standard written method.

\[
\begin{array}{c}
197 \\
\times 85 \\
985 \quad (197 \times 5) \\
15760 \quad (197 \times 80) \\
16745
\end{array}
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Investigative Activity: Use four consecutive digit cards: 3, 4, 5, 6. Create two 2-digit numbers, using each digit only once. Multiply them together using the standard written method. Investigate which two numbers give the largest possible answer, and which give the smallest possible answer.

Chunky Method: The teacher starts off with an example requiring the repeated subtraction and explains the method as “How many chunks of 29 can you take off from 786?” Teacher then guides the students into the method.

Eg: 786 ÷ 29

7.3 Students will divide natural numbers by two digit numbers.

7.2 Students will solve problems involving multiplication by two digit numbers.

7.1 Students will know how to multiply an integer by a two digit number.

6.3 Students will know how to multiply an integer by a single digit number.
Division Puzzle on Instruction cards.
Students are given an instruction card as below to work out in pairs the
calculation and shade their answers on the diagram to create a path from S to F.
Example of cards:
\[ \frac{208}{13}, \frac{272}{16}, \frac{414}{23}, \frac{285}{15}, \frac{322}{14}, \frac{600}{24}, \frac{561}{17} \]

Consolidation Task - FOM A2 – Page 20 Task (Students work individually or in pairs)
Subject: MATHEMATICS
Strand: Number
Unit code and title: MTH 7.1 Properties of Whole Numbers (Levels 5.3 – 7.1)
Form: 1
Duration: 9 sessions

Objectives
The teacher will teach the students to:
1. Understand place value and read and write whole numbers in figures and words.
2. Add natural numbers up to 1000 and subtract numbers less than 1000.
3. Know the multiplication facts up to $10 \times 10$ and multiply natural numbers by a single-digit number.
4. Multiply and divide natural numbers by 10, 100 or 1000.
5. Order a set of numbers and find a number which lies between two given whole numbers.

Key Words
- Digits, figures, whole numbers, place value, units, tens, hundreds, thousand, add, subtract, multiply, divide, order.

Points to Note
- Three main teaching approaches are being recommended.
  - **Exposition**: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.
  - **Discovery**: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.
  - **Exploration**: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
- FOM Gold A, Students’ Book, Resource Pack – Chapters 1 and 3
- Internet Links:
  - [http://www.ictgames.com/sharkNumbers/sharkNumbers_v5.html](http://www.ictgames.com/sharkNumbers/sharkNumbers_v5.html)
  - [http://www.teachingandlearningresources.co.uk/numbers.shtml](http://www.teachingandlearningresources.co.uk/numbers.shtml)
  - [http://www.ictgames.com/caterpillar_slider.html](http://www.ictgames.com/caterpillar_slider.html)
  - [http://www.bbc.co.uk/schools/ks2bitesize/maths/number/addition/play.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/number/addition/play.shtml)

Interactive CD for Form 1 Levels 5-7

Number Grid $10 \times 10$
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<tbody>
<tr>
<td>The teacher will teach the students to:</td>
<td>Students are placed in groups of four. One student claps his/her hands to signify hundreds, stamps his/her foot to signify tens and knocks on the desk to signify units. The rest of the group has to say what the number is. Alternatively, one child calls out the number and the others have to clap, stamp and knock. The teacher sets the students in groups and provides each group with a set of number cards. The students will be asked to match the number card in figures with the number card in words. (e.g. 7, 12, seven, twelve) limited to numbers less than 1000. Alternatively the teacher projects this site: <a href="http://www.teachingandlearningresources.co.uk/numbers.shtml">http://www.teachingandlearningresources.co.uk/numbers.shtml</a> and the students go out on the interactive whiteboard and take turns. Then they will work in groups on the computer. Another activity is found at <a href="http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/853/PlaceValueChartv4.swf">http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/853/PlaceValueChartv4.swf</a>. The students work in groups of four and take turns. They copy the work on their copybooks. Students are divided in four groups. Each group is given a dartboard game with 2-digit numbers written on them. Each student of the group, in turn, throws the dart (or dice). He/she should write the number landed on, in words, on the mini-whiteboard. Students work in pairs on the following link. They have to split whole numbers in hundreds, tens and units. <a href="http://www.bbc.co.uk/schools/starship/maths/games/place_the_penguin/big_sound/full.shtml">http://www.bbc.co.uk/schools/starship/maths/games/place_the_penguin/big_sound/full.shtml</a> Students are placed in groups of four and take turns calling out the answer for the PowerPoint presentation found on the Interactive CD for Form 1 Levels 5-7.</td>
<td>7.1 Students will be able to put large numbers in order. 6.3 Students will know the place value of any digit in a large number. 6.2 Students will read and write 3-digit numbers in words. 6.1 Students will read and write 3-digit numbers in figures. 5.3 Students will be able to read and write 2-digit numbers.</td>
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<tr>
<td><strong>2. Add natural numbers up to 1000 and subtract numbers less than 1000.</strong></td>
<td>Students are divided into groups of four and they play the addition pyramid which can be accessed at <a href="http://www.amblesideprimary.com/ambleweb/mentalmaths/pyramid.html">http://www.amblesideprimary.com/ambleweb/mentalmaths/pyramid.html</a>. Students are divided into pairs. Each student is given a set of cards. One student has the question written on the number card (e.g. 24 + 16). The other student has the answer (40). The students have to match the cards. The one with the largest number of pairs is the winner. Students are put in groups of three. Each student is given two or three dice. Students take it in turn to roll all the dice. The students must then add the biggest number to the smallest number. The same game as above can be played but instead of adding the largest and smallest, the students will need to subtract the smallest from the largest number. Students are divided into groups of two. Each student is given a set of cards with three digit figures. The students compare the two numbers and they subtract the smallest number from the largest number. Students use the computer to work on one of the games found on the Interactive CD for Form 1 Levels 5-7.</td>
<td><strong>7.1</strong> Students will work out subtraction of three-digit numbers. E.g.: 437 – 154 <strong>6.3</strong> Students will work out addition of three-digit numbers. E.g.: 365 + 437 <strong>6.2</strong> Students will work out subtraction of two-digit numbers. <strong>6.1</strong> Students will work out addition of two-digit numbers. <strong>5.3</strong> Students will be able to add/subtract one-digit number to/from 2-digit numbers.</td>
</tr>
</tbody>
</table>
| **3. Know the multiplication facts up to 10 × 10 and multiply natural numbers by a single-digit number.** | Students are divided into groups of three and given two blue dice and one yellow dice. The students roll the dice and they each multiply the result obtained on the blue dice by the result shown on the yellow die. Students are put into groups of two. One student is given a set of cards with multiplication questions and the other student is given a set of answers. The students match the question to the answer. The students are placed in groups of four and they are given a number crossword puzzle to solve. The clues of the crossword puzzle are all the results of multiplication facts. Students explore the unit pattern in the different tables. Students are divided in four/ five groups and take a different table each group and write out the unit pattern. Then they share and discuss their work and the patterns emerged. At the end they can write a general rule for each table discussed. Students are divided into groups of four and they play the game that can be played. | **7.1** Students will know the 10 × 10 multiplication facts and are able to multiply two-digit numbers by another two-digit number. Students use these calculations to solve simple problems. **6.3** Students will be able to choose the correct calculations to solve word problems. **6.2** Students will be able to multiply any integer by a single-digit number. **6.1** Students will know the 10 × 10 multiplication facts and can multiply a 3-digit number by a single-digit number. **5.3** Students will know the tables of 2, 5 and 10 and can multiply a two-digit number by 2, 5
4. Multiply and divide natural numbers by 10, 100 or 1000.

| Students are divided into groups of four. One student has the card with the number 10 on it, another with 100 and a third with 1000. The fourth student has ten number cards with any number from 0 to 999. This student reads out the number on each of his cards and the whole group multiplies that number by 10, 100 and 1000.
| Bingo game: The students are divided into groups of five. Four of the students have cards with numbers which are the answers to the questions that the fifth student will call out. (e.g. $678 \times 10$ will be written on the card that is pulled out of the bag and the answer 6780 will be marked on the card) Students take turns to draw the numbers.
| Students are divided in four groups. Each group is given three numbers (example 26000, 26, 260) and they discuss the relationship between them. Students can show this relationship using a place-value grid. Repeat the process using other cards.
| Students work a number of worksheets of varying difficulty at: [http://www.bbc.co.uk/skillswise/numbers/wholenumbers/multiplication/multiply10and100/worksheet.shtml](http://www.bbc.co.uk/skillswise/numbers/wholenumbers/multiplication/multiply10and100/worksheet.shtml)

7.1 Students will multiply and divide by 10, 100 and 1000. Eg: Convert 2l into ml.
6.3 Students will divide by 100 and 1000.
6.2 Students will be able to divide natural numbers by 10.
6.1 Students will be able to multiply natural numbers by 100 and 1000.
5.3 Students will be able to multiply natural numbers by 10.

The students work in pairs and answer the questions in the quiz that they can access at: [http://www.multiplication.com/flashgames/GrandPrix.htm](http://www.multiplication.com/flashgames/GrandPrix.htm)

Students use the computer to work on one of the games found on the Interactive CD for Form 1 Levels 5-7.

Students use the computer to work on one of the games found on the Interactive CD for Form 1 Levels 5-7.
| 5. Order a set of numbers and find a number which lies between two given whole numbers. | Students work individually. Each student is given a set of numbers and the student has to put them in ascending order. The students work in pairs. They are given a set of ten number gaps. Some numbers are filled but others empty. They have to put the numbers in order and invent the missing numbers.

The teacher writes ten numbers on the board, 2-digit, 3-digit and 4-digit numbers, depending on the level of ability. Students are divided in six teams. The 1st team writes the smallest number of each sequence, the 2nd team writes the second smallest number, the third write and so on, up to the tenth team who write the largest number.

Students work in pairs and play the game at: [http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/writingbignumbers/game.shtml](http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/writingbignumbers/game.shtml)

Students work in pairs. They are given two numbers and a space between the numbers. Students take turns to give a number that lies between the other two numbers.

Students form a circle on the floor and are given 2/3 cards from a shuffled pack of 0-100 cards. Then name a starting number and an end number and ask students to come out and place their cards in order. Repeat for different sections of the number line.

*Example:* start number 35, end number 50. The students with those numbers stick the cards, in order, on the board. 2, 3 or 4-digit numbers can be used, according to different levels of abilities of the students.

Students use the computer to work on one of the games found on the Interactive CD for Form 1 Levels 5 - 7. | 7.1 Students will be able to order a set of numbers between 0 and 9999 and fill in the missing numbers on a number line.

6.3 Students will be able to order a set of numbers between 0 and 999, and fill in the missing numbers on a number line.

6.2 Students will be able to order a set of 3-digit numbers.

6.1 Students will be able to order a set of 2-digit numbers on a number line, and fill in the missing numbers on a number line.

5.3 Students will be able to order a set of numbers between 0 and 100, putting them in ascending or descending order. |
**Subject:** MATHEMATICS  
**Strand:** Number  
**Unit Code and Title:** MTH 7.1 Properties of Whole Numbers (Levels 1 – 4)  
**Unit Duration:** 9 sessions

<table>
<thead>
<tr>
<th>OBJECTIVES at attainment levels 5,6,7</th>
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<tbody>
<tr>
<td>1. Understand place value and read and write whole numbers in figures and words.</td>
</tr>
<tr>
<td>2. Add natural numbers up to 1000 and subtract numbers less than 1000.</td>
</tr>
<tr>
<td>3. Know the multiplication facts up to $10 \times 10$ and multiply natural numbers by a single-digit number.</td>
</tr>
<tr>
<td>4. Multiply and divide natural numbers by 10, 100 or 1000.</td>
</tr>
<tr>
<td>5. Order a set of numbers and find a number which lies between two given whole numbers.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OBJECTIVES at attainment levels 1,2,3,4</th>
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<tbody>
<tr>
<td>1.1 Students will begin to know what each digit in a two digit number represents.</td>
</tr>
<tr>
<td>2.1 Students will be able to give the value of a requested number and add a combination of two numbers.</td>
</tr>
<tr>
<td>3.1 Students will be familiar with group counting.</td>
</tr>
<tr>
<td>4.1 Students will identify and write the missing numbers in a sequence.</td>
</tr>
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</table>

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<tr>
<th>Key Words</th>
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<th>Resources</th>
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</table>
| Figures, whole numbers, position, under.  
On, behind, stand, sit, tens.  
Count on, how many, next, after. | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook.  
Oxford Framework Maths 7Software: Ilearn Maths, Calculator, Excel Worksheets  
Internet Links:  
[www.ictgames.com](http://www.ictgames.com)  
[www.arcademicskillsbuilders.com](http://www.arcademicskillsbuilders.com)  
[www.funbrain.com/numword](http://www.funbrain.com/numword)  
[http://www.bbc.co.uk/schools/ks1bitesize/numeracy/units/index.shtml](http://www.bbc.co.uk/schools/ks1bitesize/numeracy/units/index.shtml)  
[http://more2.starfall.com/m/math/addition](http://more2.starfall.com/m/math/addition) |
<table>
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<tr>
<th>Teaching Objectives</th>
<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Students will begin to know what each digit in a two digit number represents.</td>
<td><strong>Starter:</strong> Students are shown objects, pictures and numbers, according to their current level of functioning. They will either talk about or indicate by pointing or gazing about the position of an object, person or number. Students are given a card with a number less than 10. They count on or add 10 and they discuss the new position of the number given on the card. Students are given red and blue coins in a circular shape. For every 10 coins, there is an exchange for a card with the number 10 written on it. Students end up with two cards e.g. a red card with a value of 10 on it and a blue card with a value of one on it. Then they are asked to count by rote the total amount. Students are introduced to a score table with tens and units and they have to fix the cards into the right place. Teacher gives the students an item and gives them verbal instructions to place this item in class. E.g. put the book on the table, under the table, behind the table, so the children get used to the idea that an object can be placed in different positions. Teacher gets a chair and a student. Teacher puts the student in a seating position on the chair, then standing up behind the chair, so the student experiences the idea of different positions in relation to the chair.</td>
<td>Students will: Understand the place value of a digit by giving its value. (Level 4) Recognise and read numbers at least up to ten when printed. They will be able to talk about the one as a packet of ten. (Level 3) Demonstrate an understanding of the instructions. (Level 2) Be engaged in the active exploration of his position in relation to an object. (Level 1)</td>
</tr>
<tr>
<td>2.1 Students will be able to give the value of the requested number and add a combination of two numbers.</td>
<td><strong>Starter:</strong> Students will listen to a number of beats. They are asked to show on their fingers how many beats they have heard. Students are presented with a number track. They take turns to throw two dice, add the two numbers and place cube on the matching total on the track. Some numbers will end up with more than one cube. Students should continue playing the game until every number except 1 is covered. Then they discuss why one is not covered. Students choose a card. They count that number of cubes and build a tower. They choose another card with a smaller number from another pile and repeat. They put the towers together to make one tall tower, and then work out by counting how many cubes are in the new tower. Ask the children to fold down their fingers. Count very deliberately, holding up one finger with each number spoken. Start with the thumb on the left</td>
<td>Students will: Understand addition as a counting on activity, knowing that the last number in the count indicates the total. (Level 4) Begin to count a set of objects up to ten, giving one number name to each outcome. (Level 3) Be able join in reciting the numbers from one to ten. (Level 2) Cooperate with an adult and vocalise in the recitation of numbers from 1 to 5. At the end of the counting they respond by giving a shake.</td>
</tr>
</tbody>
</table>
| 3.1 Students will be familiar with group counting. | **Starter:** Students are told a story about identical twins that had the same number of objects. They were asked to indicate, each one according to his way of communication, the number of objects they had.  
Two groups of students are presented with four blocks each. Each group has to count their total and then carry on finding the total of the two groups. Students will be asked to write the total of each group and the total combination too. Afterwards they will be asked to make different sets of equal amounts with the number of blocks they have.  
Students are presented with a set of ten cups and two containers. They have to place the cups in the container but they have to end up with an equal amount. Then they count the number of cups in each container and colour that number on the grid.  
Students are presented with blue and red cups. They have to sort them by colour and then join in rote counting. | Students will: Be able to translate pictorial representations into sums. Moreover they will be able to count in twos, fives and tens.  
**(Level 4)**  
Be able to circle sets of equal amounts and check this by counting them.  
**((Level 3)**  
Be able to make two groups of objects by specific criteria (e.g. cups) and then join in counting.  
**((Level 2)**  
Respond differently to the objects through verbal and nonverbal means of communication.  
**((Level 1)** |
| 4.1 Students will identify and write the missing numbers in a sequence. | **Starter:** Students are given a set of plastic numbers. They are asked to put them in order.  
Students work individually. Each student is given a set of numbers up to 10 and the student has to put them in ascending order. The students work in pairs. They are given a set of 2 number gaps. Some numbers are filled but others empty. They have to put the numbers in order and find the missing numbers. They can be supported by a number grid.  
Two students take a card and find the same number on the number line. They decide on the smallest number and the one who has the smallest number is awarded a point. Activity is repeated till 5 points are gained to claim the winner. Students are given a big number card each. They shuffle amongst themselves and the rest recite the numbers with the teacher. Whilst reciting the numbers the teacher puts the children in order according to their number card. Another activity can be about skipping some numbers by saying them silently whilst the teacher points to the cards so they get used to the idea of the middle number. | Students will: Be able to order numbers and position them on a number line. They will write the missing number between two.  
**((Level 4)**  
Begin to use numbers when describing position of objects or people.  
**((Level 3)**  
Be able to point or say the missing number between two indicated numbers.  
**((Level 2)**  
Follow an object on the screen and learn to activate it and anticipate the outcome on the screen.  
**((Level 1)** |
Subject: MATHEMATICS
Strand: Shape, Space & Measures
Unit code and title: MTH 7.2 Angles (Levels 7.1 – 8.1)

Objectives
The teacher will teach the students to:

1. Distinguish between acute, right, obtuse and reflex angles, estimate the size of an angle and use a protractor to measure and draw angles up to 180°.
2. Solve problems involving angles at a point, angles on a straight line and vertically opposite angles.
3. Identify parallel lines, alternate and corresponding angles formed by parallel lines and understand that when two lines are parallel, alternate and corresponding angles are equal.

Key Words
- Degrees, whole revolution, acute, obtuse, right and reflex angles, protractor, estimate, measure.
- Angles at a point, angles on straight line, vertically opposite angles, exterior angle, interior angles.
- Parallel lines, intersecting lines, corresponding angles, alternate angles, interior angles, supplementary angles. Triangle and quadrilateral.

Points to note
- Three main teaching approaches are being recommended.
  
  **Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

  **Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

  **Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
- FOM A2, Students’ Book, Practice Book, Resource Pack - Chapter 4
- Internet Links:
  - www.ex.ac.uk/cimt/puzzles/pentoes/pentoint.htm
  - www.mathsisfun.com/geometry/index.html
- Protractors and rulers or angle measure. Worksheets from Resource Pack Pages 41–46
- Cabri Geometre Software
- GeoGebra Software
<table>
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<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
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<tbody>
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<td>The teacher will teach the students to:</td>
<td>The teacher reinforces the fact that a revolution is made up of 360°, revises vocabulary related to angles and builds upon the students’ knowledge of the use the protractor, using different activities.</td>
<td>8.1 Students will express any angle as a fraction of one revolution.</td>
</tr>
</tbody>
</table>
| 1. Distinguish between acute, right, obtuse and reflex angles, estimate the size of an angle and use a protractor to measure and draw angles up to 180°. | Mental Starter: The teacher asks questions to find out what students already know about angles:  
- What is an angle?  
- When do you use angles?  
- How do you measure an angle? | 7.3 Students will be able to estimate, draw and measure reflex angles. |
| | Discovering the protractor: An activity designed to make students inspect the scales on a protractor closely. | 7.2 Students will be able to estimate, draw and measure angles up to 180°. |
| | In groups students are given a set of 8 card sectors (each card marked with its measured angle) and they have to choose five of them which add up to form a revolution. This is followed by a discussion that a revolution is made up of 360°. | 7.1 Students will distinguish between right, acute, obtuse and reflex angles. Students know the fact that a revolution is made up of 360° and draw angles up to 180°. |
| | These cards can also be used for a matching activity where students have to classify the angles according to their names. This will reinforce the required vocabulary. | |
| | ICT Activity: The teacher presents students with a handout with different angles and students are asked to identify type of angle and give an estimate of its size. A digital version of this handout is also prepared on Cabri Geometre software where students can check the exact size of the angle. | |
| | www.mathsteacher.com | |
2. Solve problems involving angles at a point, angles on a straight line and vertically opposite angles.

The teacher leads the children to investigate different examples of angles at a point, angles on a straight line and vertically opposite angles.

Investigative Worksheet with different examples, where the students have to measure the required angles: on a straight line, vertically opposite and angles at a point.

ICT Activity: Dynamic Geometry software can be used to draw and measure these kinds of angles to consolidate the rules.

www.mathsisfun.com/angle360.html
www.mathsisfun.com/geometry/vertically-opposite-angles.html

8.1 Students solve complex problems involving angles at a point, angles on a straight line and vertical opposite angles.

7.3 Students will solve simple problems aided by a diagram, involving angles at a point; angles on a straight line and vertical opposite angles.

7.2 Students will solve problems aided by a diagram, which may involve one of the following facts separately: angles at a point; angles on a straight line; vertical opposite angles.

7.1 Students will know that:
- Vertically opposite angles are equal.
- Angles on a straight line add up to 180°.
- Angles at a point add up to 360°.

3. Identify parallel lines, alternate and corresponding angles formed by parallel lines and understand that when two lines are parallel, alternate and corresponding angles are equal.

The teacher discusses how parallel lines can be recognized, how a transversal creates angles and the relationship between these angles.

Worksheet – Recognising and identifying parallel lines from different designs and patterns.

Draw parallel lines using the sliding set square method.

www.mathsisfun.com/geometry/parallel-lines.html

8.1 Students will solve problems involving the angles of parallelograms and rhombi.

7.3 Students will solve problems involving parallel lines.

7.2 Students will understand that the alternate angles and the corresponding angles formed between parallel lines are equal (restrict problems involving alternate and corresponding angles to simple cases).

7.1 Students will identify alternate and corresponding angles formed between parallel lines.
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.2 Angles

The speed of computers and calculators encourages students to explore a greater number of examples which can support their observations. Tables, formulae and graphs can be linked and students can see how change to one affects another and understand the connections. The suggested software is either free or licensed by the CMeLD. The category is indicated at the end of every URL.

1. [http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml)\(^3\) In this game students can practise all the five objectives set out in this unit. In the first game students will show they understand that an angle is a measure of rotation about a fixed point.

2. [http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml)\(^3\) In the second game the student can distinguish among the various types of angles. In [http://www.mathplayground.com/alienangles.html](http://www.mathplayground.com/alienangles.html) and [http://www.mathopolis.com/games/estimate-angle.php](http://www.mathopolis.com/games/estimate-angle.php)\(^3\) students are asked to estimate a given angle to rescue an alien.

3. [http://www.amblesideprimary.com/ambleweb/mentalmaths/angleshapes.html](http://www.amblesideprimary.com/ambleweb/mentalmaths/angleshapes.html)\(^3\) is a site which lets students experiment with angles, and parallel and intersecting lines. There are 20 challenging questions that students can investigate using the online protractor.


5. [http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play_popup.shtml)\(^3\) in the final game students join three dots to form a triangle and enter the missing angle to complete the game. Students can also discover the properties of quadrilaterals from [http://www.mathsisfun.com/geometry/quadrilaterals-interactive.html](http://www.mathsisfun.com/geometry/quadrilaterals-interactive.html)\(^3\).

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1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Shape, Space & Measures
Unit code and title: MTH 7.2 Angles (Level 6.3 – 7.3) Duration: 9 sessions

Objectives
The teacher will teach the students to:
1. Distinguish between acute, right, obtuse and reflex angles, estimate the size of an angle and use a protractor to measure and draw angles up to 180°.
2. Solve problems involving angles at a point, angles on a straight line and vertically opposite angles.
3. Identify parallel lines, alternate and corresponding angles formed by parallel lines and understand that when two lines are parallel, the alternate and corresponding angles are equal.

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<th>Key Words</th>
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<td>Degrees, whole revolution, acute, right, obtuse and reflex angles, protractor. Angles at a point, angles on straight line, vertically opposite angles, exterior angle, interior angle. Parallel lines, intersecting lines, corresponding angles, alternate angles, interior angles, supplementary angles. Triangle and quadrilateral.</td>
<td>Three main teaching approaches are being recommended. <strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. <strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations. <strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>FOM A1, Students’ Book, Practice Book, Resource Pack - Chapter 4 Internet Links: <a href="http://www.ex.ac.uk/cimt/puzzles/pentoes/pentoint.htm">www.ex.ac.uk/cimt/puzzles/pentoes/pentoint.htm</a> <a href="http://www.mathsisfun.com/geometry/index.html">www.mathsisfun.com/geometry/index.html</a> Protractors and rulers or angle measure. Worksheets from Resource Pack Pages 41–47 Cabri Geometre Software GeoGebra Software</td>
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<td>The teacher will teach the students to:</td>
<td>The teacher reinforces the fact that a revolution is made up of 360°, revises vocabulary related to angles and builds upon the students’ knowledge of the use the protractor, using different activities.</td>
<td>7.3 Students will be able to estimate, draw and measure reflex angles.</td>
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<td>1. Distinguish between acute, right, obtuse and reflex angles, estimate the size of an angle and use a protractor to measure and draw angles up to 180°.</td>
<td>Mental Starter: The teacher asks questions to find out what students already know about angles: - What is an angle? - When do you use angles? - How do you measure an angle? Discovering the protractor: An activity designed to make students inspect the scales on a protractor closely. In groups students are given a set of 8 card sectors (each card marked with its measured angle) and they have to choose five of them which add up to form a revolution. This is followed by a discussion that a revolution is made up of 360°. These cards can also be used for a matching activity where students have to classify the angles according to their names. This will reinforce the required vocabulary. ICT Activity: The teacher presents students with a handout with different angles and students are asked to identify the type of angle and give an estimate of its size. A digital version of this handout is also prepared on Cabri Geometre software where students can check the exact size of the angle.</td>
<td>7.2 Students will be able to estimate, draw and measure angles up to 180°.</td>
</tr>
<tr>
<td>7.1 Students will distinguish between right, acute, obtuse and reflex angles. Students know the fact that a straight line is made up of 180°.</td>
<td></td>
<td>7.1 Students will distinguish between right, acute, obtuse and reflex angles. Students know the fact that a revolution is made up of 360° and draw angles up to 180°.</td>
</tr>
<tr>
<td>6.3 Students will recognise right, acute, and obtuse angles only. Students will know the fact that a straight line is made up of 180°.</td>
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<td>6.3 Students will recognise right, acute, and obtuse angles only. Students will know the fact that a straight line is made up of 180°.</td>
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[www.mathsteacher.com](http://www.mathsteacher.com)
| 2. Solve problems involving angles at a point, angles on a straight line and vertically opposite angles. | The teacher leads the children to investigate different examples of angles at a point, angles on a straight line and vertically opposite angles. Investigative Worksheet with different examples, where the students have to measure the required angles: on a straight line, vertically opposite and at a point. ICT Activity: Dynamic Geometry software can be used to draw and measure these kinds of angles to consolidate the rules. [www.mathsisfun.com/angle360.html](http://www.mathsisfun.com/angle360.html) [www.mathsisfun.com/geometry/vertically-opposite-angles.html](http://www.mathsisfun.com/geometry/vertically-opposite-angles.html) | 7.3 Students will solve simple problems aided by a diagram, involving angles at a point; angles on a straight line and vertical opposite angles. 7.2 Students will solve problems aided by a diagram, which may involve one of the following facts separately: angles at a point; angles on a straight line; vertical opposite angles. 7.1 Students will know that: ▪ Vertically opposite angles are equal. ▪ Angles on a straight line add up to 180°. ▪ Angles at a point add up to 360°. 6.3 Students will know that: ▪ Vertically opposite angles are equal. ▪ Angles on a straight line add up to 180°. |
| 3. Identify parallel lines, alternate and corresponding angles formed by parallel lines and understand that when two lines are parallel, alternate and corresponding angles are equal. | The teacher discusses how parallel lines can be recognized, how a transversal creates angles and the relationship between these angles. Worksheet – Recognising and identifying parallel lines from different designs and patterns. Drawing parallel lines using the sliding set square method. [www.mathsisfun.com/geometry/parallel-lines.html](http://www.mathsisfun.com/geometry/parallel-lines.html) | 7.3 Students will solve problems involving parallel lines. 7.2 Students understand that alternate angles and corresponding angles formed between parallel lines are equal (restrict problems involving alternate, corresponding angles to simple cases). 7.1 Students identify alternate and corresponding angles formed between parallel lines. 6.3 Students identify parallel lines in geometric figures. |
Subject: MATHEMATICS
Strand: Shapes, Space and Measures
Unit code and title: MTH 7.2 Angles (Levels 5.3 – 7.1)

Objectives:
The teacher will teach the students to:
1. Distinguish between acute, right, obtuse and reflex angles.
2. Understand that an angle is a measure of turn of a line about a fixed point and that a revolution is divided into 360 parts called degrees.
3. Estimate the size of an angle and use a protractor to measure and draw angles up to 180˚.

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<td>Degrees, acute, right, obtuse and reflex angles, revolution, protractor, estimate, measure.</td>
<td>Three main teaching approaches are being recommended. Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations. Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>FOM Gold A Students’ Book, Practice Book, Resource Pack – Chapter 4 Protractor and Angle Estimator Internet Links: <a href="http://www.primaryresources.co.uk/">http://www.primaryresources.co.uk/</a> <a href="http://www.mathsisfun.com/angles.html">http://www.mathsisfun.com/angles.html</a> <a href="http://www.echalk.co.uk/Maths/angleEstimator/EstimatingAngles.htm">http://www.echalk.co.uk/Maths/angleEstimator/EstimatingAngles.htm</a> <a href="http://www.bbc.co.uk/">http://www.bbc.co.uk/</a> <a href="http://www.subtangent.com/maths/flash/measures1.swf">http://www.subtangent.com/maths/flash/measures1.swf</a> <a href="http://www.crickweb.co.uk/ks2numeracy-tools.html#angle">http://www.crickweb.co.uk/ks2numeracy-tools.html#angle</a> Cabri Geometre Software GeoGebra Software</td>
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| The teacher will teach the students to: 1. Distinguish between right, acute, obtuse and reflex angles. | After asking students whether they know what a right angle is, explaining and showing them examples of right angles, the teacher projects this site: [http://www.primaryresources.co.uk/online/powerpoint/rightangles.swf](http://www.primaryresources.co.uk/online/powerpoint/rightangles.swf)  
The teacher can ask each student, in turns, on whether the shape shown in the presentation has a right-angle or not.  
Students are placed in pairs. Each pair should write down all the right-angles present in the classroom. Ask each pair to point out the right-angles they’ve found around them.  
Teacher should explain the activity found at: [http://www.hittingthetarget.com/hittingthetarget.php](http://www.hittingthetarget.com/hittingthetarget.php) (choose the Football activity from the bottom right corner). Students are then to complete the activity in pairs on the computers.  
Angle between fingers and arms activity: Students are asked questions such as: what is the type of angle between the fingers? What is the angle between your thumb and index finger? Can you make an obtuse angle with your index finger and thumb? How many right-angles are there when you open your arms in a straight line? Can you open your arms to make a reflex angle?  
The students work in pairs on the computers to answer the questions in the quiz accessed from: [http://www.primaryresources.co.uk/maths/powerpoint/quiz_simple_angles.swf](http://www.primaryresources.co.uk/maths/powerpoint/quiz_simple_angles.swf)  
Show students several pictures and objects and ask them whether they can spot an acute, obtuse or reflex angle in each of them. | 7.1 Students will distinguish between right, acute, obtuse and reflex angles. Students know the fact that a revolution is made up of 360°.  
6.3 Students will recognise right, acute, and obtuse angles only. Students will know the fact that a straight line is made up of 180°.  
6.2 Identify right angles in 2-D shapes and the environment. Recognise that a straight line is equivalent to two right angles and half a right angle is 45°.  
6.1 Students will be able to distinguish between acute and obtuse angles.  
5.3 Students will know that a right angle is a measure of a quarter turn, and recognise right angles in squares and rectangles. |
2. Understand that an angle is a measure of turn of a line about a fixed point and that a revolution is divided into 360 parts called degrees

| The teacher can use the following link to help students understand that an angle is a measure of turn of a line about a fixed point. It also helps students understand that a revolution is divided into 360 parts called degrees. |
| http://www.skola.gov.mt/maths/Spreadsheets_for_Primary/Measuring_Angles.xls |
| Which is the larger angle? Students are placed in pairs. The teacher shows several pairs of angles. For each pair, students have to write down which is the larger angle. The teacher should then tell students the right answers. |
| The teacher projects this site to help students get an idea of the number of degrees in an angle, and that a right angle is 90˚ and a straight line is 180˚. http://www.amblesideprimary.com/ambleweb/mentalmaths/protractor.html |
| 7.1 Students will know how to estimate the size of an angle and use a protractor to measure and draw angles up to 180°. |
| 6.3 Students will know that angles are measured in degrees with a protractor or angle measurer. |
| 6.2 Students will be able to know that angles are measured in degrees and that one whole turn is 360° or 4 right angles; a quarter turn is 90° or one right angle. |
| 6.1 Students will be able to know that angles are measured in degrees and that one whole turn is 360°. |
| 5.3 Students will understand that an angle is a measure of turn of a line about a fixed point. |

3. Estimate the size of an angle and use a protractor to measure and draw angles up to 180°.

| The teacher projects this site: http://www.echalk.co.uk/Maths/angleEstimator/EstimatingAngles.htm and asks different students to give an estimate of the angle shown. Make sure the angle size is hidden. Then show the angle size so that the students will know whether they got a close estimate. |
| Students are set into pairs, and work on a different computer. http://www.bbc.co.uk/schools/ks2bitesize/maths/shape_space/angles/play.shtml |
| In the following activity students are given the size of an angle, and they should produce an angle which is a good estimate of the given size: http://www.echalk.co.uk/Maths/PrimaryNationalStrategy_Yr6/DfES-MathsActivitiesforyear6/sailing.html |
| In the following activity students are given the angle, and the students should estimate the size of the angle to the nearest 10°: |
| 7.1 Students will use a protractor to estimate, measure and draw angles up to 180° |
| 6.3 Students will use the protractor to draw and measure acute and obtuse angles. |
| 6.2 Students will use the protractor to draw and measure acute and obtuse angles in multiples of 5. |
| 6.1 Students will use the protractor to draw and measure acute and obtuse angles in multiples of 10. |
| 5.3 Students will be able to draw an angle of 90° and determine the larger between two |
Using a Protractor to Measure Angles

The teacher can project the ‘Introduction’ presentation available on this site to point out the importance of measuring accurately.

http://www.subtangent.com/maths/flash/measures1.swf

The teacher projects the ‘Measuring Angles’ interactive presentation available on:

http://www.subtangent.com/maths/flash/measures1.swf

The teacher should project the following site and ask students one by one to read the size of the angle.

http://www.crickweb.co.uk/ks2numeracy-tools.html#angle

Students should work in pairs on the computers to measure the different angles available on this site:

http://www.amblesideprimary.com/ambleweb/mentalmaths/protractor.html

The measuring exercises in this site vary in difficulty. Students can either measure angles up to 90˚ or up to 180˚. Moreover, they can either measure angles to the nearest 10˚, 5˚ or 1˚, depending on their level.

For further practice on reading the size of an angle from the protractor, in an interactive way and at different difficulty levels, students can work on the ‘Measuring’ activity available at:


Using a Protractor to Draw Angles

The teacher should project the following video which demonstrates how to draw angles up to 180˚ using a protractor.

http://www.youtube.com/watch?v=X3IO6Uhtlp8

It is also important for students to carry out hands on work on measuring and drawing angles using a protractor, besides working on the computer.
For the following activities students can work in pairs. The following quiz at the end, gives students their score:

http://www.bbc.co.uk/apps/ifl/schools/ks2bitesize/maths/quizengine?quiz=angles&templateStyle=maths

A matching game which revises estimating angles:


Revision of measuring angles. It provides a report on which answers the students got right or wrong.

http://www.edu.dudley.gov.uk/numeracy/Primary/Easter%20CD/programs/angle_challenge.swf
**OBJECTIVES at attainment level 5,6,7**

1. Distinguish between right, acute, obtuse and reflex angles.
2. Understand that an angle is a measure of turn of a line about a fixed point.
3. Estimate the size of an angle and use a protractor to measure and draw angles up to 180°.

**OBJECTIVES at attainment level 1,2,3,4**

1.1 Students start tracking objects within their field of awareness and distinguish between whole turn and half turn movement.
2.1 Students observe and experience left and right movements of an object from a fixed point.
3.1 Students are given opportunities to indicate whether an angle is a right angle, less than half a turn or more.

### Key Words

Angle, right angle, estimate, measure, less than, greater than, half turn, whole turn.

### Points to note

In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.

### Resources

- Visual cards, plasticine, salt, sand tray, touch screen, interactive whiteboard, big mac or any other adapted mouse.
- New Maths Frame Working-Step Up Workbook.
- Oxford Framework Maths 7
- Software: Ilearn Maths, Calculator, Excel Worksheets, Protractor and compass on the IWB.
- [http://www.primaryresources.co.uk/online/powerpoint/rightangles.swf](http://www.primaryresources.co.uk/online/powerpoint/rightangles.swf)
- [http://www.bbc.co.uk/schools/ks2bitesize/shapespace/angles/play.shtml](http://www.bbc.co.uk/schools/ks2bitesize/shapespace/angles/play.shtml)
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| **1.1 Students start tracking objects within their field of awareness and distinguish between whole and half turn movement.** | **Starter:** Teacher starts the lesson by marking a point on the IWB and then using the online compass the teacher draws a line from that point. During this time, she will observe whether some students can track a moving object whilst listening to others who will talk about the different diagrams. This will be the starter activity to help the teacher identify where the students are in their learning.  
Students are presented with a timer which is timed to make a whole turn. At the starting point a piece of blu tac is fixed to the timer. Meanwhile they are asked to jump on the spot or continue an activity to their liking but when the timer rings they have to stop. This activity can be extended to other situations like a child walking in a path – they have to show and talk about the whole path back to the starting point.  
Students are presented with a series of V strokes representing acute, obtuse and reflex without mentioning the terminology. They are to focus on the similarities and differences and talk about them like some VVV are wider than the others, some Students are then asked to draw similar shapes in imitation and to sort them according to the angle.  
Students are given various pictures with dotted lines around them. They use finger painting to join the dots thus showing the whole turn that one makes from end to the other.  
The adult rests her elbow with palms together, as if she is praying, and then starts to move one palm and then both palms are open to different degrees in opposite directions. Students follow this open and close movement.  
Students will:  
- Talk about and write whether the angle given has made a whole or half turn.  
  (Level 4)  
- Be able to mark and sort shapes according to their angle.  
  (Level 3)  
- Be able to fill angle points with colour.  
  (Level 2).  
Follow an object, visually, moving past their midline.  
(Level 1) | |
| **2.1 Students experience left and right movement of an object from a fixed point.** | **Starter:** Students will be shown a clip or a picture of an acrobat who is turning about a fixed point. They are asked to look at, point to and maybe talk about the performance especially the way he is turning.  
Students are provided with plasticine and a string tied to a pencil or marker. They will draw/paint points or lines from a fixed point thus experiencing movement from a fixed point.  
Students are taken to the playing field and they grab to horizontal poles with both hands and they are helped to turn from a fixed point.  
Students are presented with a ball and a bucket is placed within reasonable | Students will:  
- Be able to say and explain whether the movement was made to the left or to the right.  
  (Level 4).  
- Be able to colour or tick whether there was a left or right movement.  
  (Level 3).  
- Keep their position whilst moving other body parts to do an action.  
  (Level 2). |
distance. They have to throw the ball in the bucket by stretching or bending but they cannot move from the point set.

Students are placed on a swing located in the playing field or else in the school multipurpose room and they have the swinging experience whilst it is being noted that the swing is fixed at a particular point. They can also experience movement on a net tied from both ends to a pole or something sturdy.

Try to do some movements to push their body in an effort to swing when this slows down. (Level 1)

| 3.1 Students are given opportunities to indicate whether an angle is a right angle, less than half a turn or more. | **Starter**: The teacher uses the i-learn maths software to show the whole and half turn of the angle. Students will talk about it.

Students are shown different angle movements on the IWB and they talk about whether the angles shown are smaller/greater, less/more than half a turn.

Students will be shown an angle and given three pictures at a time they have to compare and match which angle is the same as the picture shown.

Students will sort objects or pictures containing right angles, acute and obtuse angles (terminology not mentioned).

Students will explore the objects to get the experience of the opening variations. They can also follow the movement of a line from a fixed point. |

|  | Students will:

Mark or tick the right angles and those that are bigger/smaller than a right angle. (Level 4)

Be able to match two pictures with the same angle. (Level 3)

Be able to sort pictures according to angle category. (Level 2)

Encounter and be engaged in activities involving position, direction and movement. (Level 1). |
**Subject:** MATHEMATICS  
**Strand:** Algebra  
**Unit code and title:** MTH 7.3 Number Patterns & Coordinates (Levels 7.1 – 8.1)  
**Duration:** 9 sessions

### Objectives
The teacher will teach the student to:

1. **Know** the meaning of factors and multiples, even and odd numbers and find the common multiples of two numbers.
2. **Understand** and use squares and square roots and cube and cube roots and use a calculator to find the square and square roots.
3. **Recognise** prime numbers and write numbers as a product of their prime factors.
4. **Read and plot** points using ordered pairs, draw lines and shapes given the co-ordinates of their endpoints/vertices and use positive/negative ordered pairs to plot points and draw lines and shapes.

### Key Words
- Even, odd, factors, multiples, common multiples, LCM, squares, square roots, prime numbers, prime factors and their products, cubes and cube roots.
- x-axis, y-axis, co-ordinates, ordered pairs, origin, vertices, plot, positive and negative numbers.

### Points to note
Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

### Resources
- **FOM A2, Students’ Book, Practice Book, Resource Pack** – Chapters 8 and 10
- **C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons**
  - 100SQUAR.xls
  - Quadrilaterals.xls

**Internet Links:**
- [www.bbc.co.uk/skillswise/numbers](http://www.bbc.co.uk/skillswise/numbers)
- [www.aaamath.com/g25a2-evenodd.html](http://www.aaamath.com/g25a2-evenodd.html)
- [www.helpingwithmath.com](http://www.helpingwithmath.com)
- [www.mathplayground.com/factortrees.html](http://www.mathplayground.com/factortrees.html)
- [www.ixl.com/math/practice](http://www.ixl.com/math/practice)
- [www.mathsisfun.com/prime-factorization.html](http://www.mathsisfun.com/prime-factorization.html)
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<td>1. Know the meaning of factors and multiples, even and odd numbers and find the common multiples of two numbers.</td>
<td>Snakes and Ladder Game: Students are in pairs or in groups. If the counter lands on a multiple of 6, student has to start again from the starting point. This can be used for different multiples. Students can check their understanding of multiples and factors by taking part in the Quiz found at <a href="http://www.bbc.co.uk/skillswise/numbers">www.bbc.co.uk/skillswise/numbers</a> Factor Feeder is a good game to practice understanding of factors and tests speed recognition of factors. <a href="http://hoodamath.com/games/factorfeeder.php">http://hoodamath.com/games/factorfeeder.php</a> In this interactive activity students can work in pairs or in groups of four as the game allows up to four players. <a href="http://www.math-play.com/Factors-and-Multiples-Jeopardy/Factors-and-Multiples-Jeopardy.html">www.math-play.com/Factors-and-Multiples-Jeopardy/Factors-and-Multiples-Jeopardy.html</a> Factor Trees to find common multiples is a good interactive activity where students use factors in order to fill in the tree branches and hence work out the LCM. <a href="http://www.mathplayground.com/factortrees.html">www.mathplayground.com/factortrees.html</a></td>
<td>8.1 Students will be able to work out problems involving (least) common multiple/s.</td>
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<td>7.3 Students will be able to identify the common multiples of two numbers from the list of multiples.</td>
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<td>7.2 Students will be able to list all the multiples of numbers up to 12 and lists all the factors of given numbers up to 100.</td>
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<td>7.1 Students will be able to list all the multiples of numbers up to 10 and lists all the factors of given numbers up to 50.</td>
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| 2. Understand and use squares and square roots and cube and cube roots and use a calculator to find the square and square roots. | The teacher sets the students in groups and gives each group a bag filled with bottle caps. The students will be asked to form squares of different sizes using these caps. This is followed by a worksheet to be filled in. Students can access tables of square numbers and their square roots at [www.helpingwithmath.com](http://www.helpingwithmath.com). Power point of Squares/Square Roots/Estimates: mr-van-raalte-math-9.wikispaces.com. Printable Worksheets [www.homeschoolmath.net/worksheets/](http://www.homeschoolmath.net/worksheets/). Interactive activity can be used as a revision for squares, square roots and cubes: [www.funbrain.com/tictactoe/index.html](http://www.funbrain.com/tictactoe/index.html) [www.ixl.com/math/practice](http://www.ixl.com/math/practice) | 8.1 Students will be able to evaluate mental calculations, such as: $\sqrt{1600}$, $90^2$, $20^3$, $\sqrt[3]{8000}$.  
7.3 Students will be able to work out mentally the square root of perfect squares up to 100 and the cube root of perfect cubes up to 125. Use the calculator for any other integer.  
7.2 Students will be able to work out squares of integers up to the square of 10 and cubes up to the cube of 5, also with the use of a calculator.  
7.1 Students will be able to work out squares of integers up to the square of 100, also with the use of a calculator. |
| 3. Recognize prime numbers and write numbers as a product of their prime factors. | The definition of prime numbers is explained to the students and then the students are given a $10 \times 10$ grid where they have to recognize and colour the prime numbers. Information on Prime Numbers and secret codes [www.mathsisfun.com/prime-factorization.html](http://www.mathsisfun.com/prime-factorization.html). Students can use the Prime Factors Calculator to work out the prime factorization of any number including their date of birth. [www.mathsisfun.com/prime-factorization-tool.php](http://www.mathsisfun.com/prime-factorization-tool.php). An interactive activity Factor Trees helps students to find multiples [www.mathplayground.com/factortrees.html](http://www.mathplayground.com/factortrees.html) | 8.1 Students will understand that prime numbers are the building blocks of all natural numbers.  
7.3 Students will be able to use primes to write numbers as a product of prime factors.  
7.2 Students will understand the definition of a prime number and be able to identify and distinguish between the factors and the prime factors of a number.  
7.1 Students will be able to identify the prime numbers up to 100. |
| 4. Read and plot points using ordered pairs, draw lines and shapes given the co-ordinates of their endpoints/vertices and use positive/negative ordered pairs to plot points and draw lines and shapes. | Students are given an attractive handout with different animals or places of interest drawn in the first quadrant and they have to read and write the position of each picture.

Students need to read and write Coordinates of lettered points using the four quadrants.


Students are give an investigative handout where they have to plot a set of given ordered pairs on the graph and discover what is formed by joining the points.

Students can enjoy simple different Interactive Games using Coordinates at [www.woodlandsjunior.kent.sch.uk/maths/shapes/coordinates.html](http://www.woodlandsjunior.kent.sch.uk/maths/shapes/coordinates.html)

Students are divided into groups and each group is given a simple map (graph with labeled and numbered axis, pictures) and each group has to make clues using ordered pairs to find the treasure. | 8.1 Students will be able to find the coordinates of a missing vertex of a shape.

7.3 Students will be able to plot points, read ordered pairs and join lines and draw shapes in all 4 quadrants.

7.2 Students will be able to plot vertices, join lines and shapes in the first quadrant.

7.1 Students will be able to read the positive number line (horizontally & vertically) and read and plot a point in the first quadrant. |
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.3 Number Patterns & Coordinates

Technology can be used to give access to large quantities of data and provides tools to represent it in a variety of ways. When using these tools students can put forward hypotheses, represent, interpret and discuss data. Students can collect primary and secondary data and plan carefully how to use various sources. Equipment for data collection such as data loggers and sensors should not be confined to science labs but made available during Math to gather first hand data. Secondary sources such as databases and the Internet will provide students with evidence to support their enquiries.

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be asked to create quizzes for others and publish them or design games using Kodu which is free from Microsoft and can be downloaded from [http://fuse.microsoft.com/kodu](http://fuse.microsoft.com/kodu).

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Algebra
Unit code and title: MTH 7.3 Number Patterns & Coordinates (Levels 6.3 – 7.3)
Duration: 9 sessions

Objectives
The teacher will teach the student to:
1. Know the meaning of factors and multiples, even and odd numbers and find the common multiples of two numbers.
2. Understand and use squares and square roots and cube and cube roots and use a calculator to find the square and square roots.
3. Recognise prime numbers.
4. Read and plot points using ordered pairs, draw lines and shapes given the co-ordinates of their endpoints/vertices and use positive/negative ordered pairs to plot points and draw lines and shapes.

Key Words
- Even, odd, factors, multiples, common multiples, LCM, squares, square roots, prime numbers, prime factors, cubes and cube roots.
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Points to note
- Three main teaching approaches are being recommended.
- **Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.
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<td>6.3 Students will be able to list all the multiples of 2, 5 and 10 and lists all the factors of given numbers up to 30.</td>
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<td>Factor Trees to find common multiples is a good interactive activity where students use factors in order to fill in the tree branches and hence work out the LCM. <a href="http://www.mathplayground.com/factortrees.html">www.mathplayground.com/factortrees.html</a></td>
<td></td>
</tr>
</tbody>
</table>
2. Understand and use squares and square roots and cube and cube roots and use a calculator to find the square and square roots.

The teacher sets the students in groups and gives each group a bag filled with bottle caps. The students will be asked to form squares of different sizes using these caps. This is followed by a worksheet to be filled in.

Students can access tables of square numbers and their square roots at [www.helpingwithmath.com](http://www.helpingwithmath.com)


Printable Worksheets
[www.homeschoolmath.net/worksheets/](http://www.homeschoolmath.net/worksheets/)

Interactive activity can be used as a revision for squares, square roots and cubes:

7.3 Students will be able to work out mentally the square root of perfect squares up to 100 and the cube root of perfect cubes up to 125. Use the calculator for any other integer.

7.2 Students will be able to work out squares of integers up to the square of 100 and cubes up to the cube of 125, also with the use of a calculator.

7.1 Students will be able to work out squares of integers up to the square of 100, also with the use of a calculator.

6.3 Students will recall the squares of integers up to the square of 10.

3. Recognise prime numbers.

The definition of prime numbers is explained to the students and then the students are given a 10 × 10 grid where they have to recognize and colour the prime numbers.

Information on Prime Numbers and secret codes [www.mathsisfun.com/prime-factorization.html](http://www.mathsisfun.com/prime-factorization.html)

Students can use the Prime Factors Calculator to work out the prime factorization of any number including their date of birth. [www.mathsisfun.com/prime-factorization-tool.php](http://www.mathsisfun.com/prime-factorization-tool.php)

An interactive activity Factor Trees helps students to find multiples. [www.mathplayground.com/factortrees.html](http://www.mathplayground.com/factortrees.html)

7.3 Students will be to find those factors of numbers which are prime.

7.2 Students will understand the definition of a prime number.

7.1 Students will be able to identify the prime numbers up to 100.

6.3 Students will be able to identify prime numbers up to 50.
4. Read and plot points using ordered pairs, draw lines and shapes given the co-ordinates of their endpoints/vertices and use positive/negative ordered pairs to plot points and draw lines and shapes.

Students are given an attractive handout with different animals or places of interest drawn in the first quadrant and they have to read and write the position of each picture.

Students need to read and write Coordinates of lettered points using the four quadrants.

www.worsleyschool.net/science/files/plot/plot.html

Students are given an investigative handout where they have to plot a set of given ordered pairs on the graph and discover what is formed by joining the points.

Students can enjoy simple different Interactive Games using Coordinates at www.woodlands-junior.kent.sch.uk/maths/shapes/coordinates.html

Students are divided into groups and each group is given a simple map (graph with labeled and numbered axis, pictures) and each group has to make clues using ordered pairs to find the treasure.

7.3 Students will be able to plot points, read ordered pairs and join lines and draw shapes in all 4 quadrants.

7.2 Students will be able to plot vertices, join lines and shapes in the first quadrant.

7.1 Students will be able to read the positive number line (horizontally & vertically) and read and plot a point in the first quadrant.

6.3 Students will be able to read the positive number line (horizontally & vertically) and read a point in the first quadrant.
Subject: MATHEMATICS

Strand 1: Algebra

Unit code and title: MTH 7.3 Number Patterns & Coordinates (Levels 5.3 – 7.1)

Form 1

Duration: 9 sessions

Objectives

The teacher will teach the student to:

1. Know the meaning of factors and multiples, even and odd numbers.
2. Understand and use square numbers.
3. Recognise prime numbers.
4. Read and plot points in the first quadrant using ordered pairs; Draw lines and shapes given the co-ordinates of their endpoints/vertices.

Key Words

Factors, multiples, product, odd, even, square, squared, power of 2, index, prime, plot, co-ordinates, points, x-axis, y-axis, axes, grid, origin, quadrant, vertex, vertices, endpoint, straight line.

Points to Note

Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources

FOM Gold A, Students’ Book, Resource Pack – Chapters 8 and 10

Internet Links:

www.bbc.co.uk/skillwise/numbers/wholenumbers
http://www.factmonster.com/spka/A0876700.html
http://www.mathsisfun.com/games/games-4.html
http://www.superteacherworksheets.com/
http://www.oldswinford.dudley.gov.uk/Coordinates_Resources.htm
http://math.pppst.com/
http://nrich.maths.org/public/leg.php
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<tr>
<td>The teacher will teach the students to:</td>
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<tr>
<td>1. Know the meaning of factors and multiples, even and odd numbers.</td>
<td>The following website can be used as an introduction: <a href="http://www.primarygames.com/storybooks/even_odd/3.htm">http://www.primarygames.com/storybooks/even_odd/3.htm</a> Students use the 100 grid to shade the odd and even numbers in two different colours in order to identify the pattern. Students work in groups using the multilink cubes to form numbers in rows of two, thus differentiating between odd and even numbers. Students work individually using these websites: <a href="http://www.ictgames.com/dragonmap.html">http://www.ictgames.com/dragonmap.html</a> <a href="http://www.bbc.co.uk/schools/starship/maths/games/number_jumbler/small_sound/standard.shtml">http://www.bbc.co.uk/schools/starship/maths/games/number_jumbler/small_sound/standard.shtml</a> Students work in pairs using this website: <a href="http://www.oswego.org/ocsd-web/games/Ghostblasterseven/ghosteven.html">http://www.oswego.org/ocsd-web/games/Ghostblasterseven/ghosteven.html</a> Students use the 100 grid to shade the multiples of some given numbers, using different colours, thus identifying patterns. Students work in pairs on the following excel sheet: from teacher’s laptop: Maths Excel Lessons: 100square.xls The teacher uses worksheet 10.1 from the teacher’s pack A Gold as an ICT lesson Factors and Multiples Game. The game can be played one player against another or one team against the other. The game and instructions can be downloaded and printed from the following website: <a href="http://nrich.maths.org/5468">http://nrich.maths.org/5468</a> Students use counters and the squared face of the Show-me Board to form rectangles and identify the factors of a number. Alternatively they can use multilink cubes. According to the number of students in class the teacher asks the students to divide themselves in 2, 3, 4, and so on, to find the factors of a number. For example in a class of 20 the teacher asks the students to group themselves in 4, thus having 5 groups of 4, indicating that 4 and 5 are factors of 20. Teacher uses worksheet 10.3 from the teacher’s pack A Gold as a puzzle. The teacher projects this site and prepares the grid beforehand: <a href="http://media.emgames.com/emgames/demosite/playdemo.html?activity=M2">http://media.emgames.com/emgames/demosite/playdemo.html?activity=M2</a></td>
<td>7.1 Students will be able to list all the multiples of numbers up to 10 and lists all the factors of given numbers up to 50. 6.3 Students will be able to list all the multiples of 2, 5 and 10 and lists all the factors of given numbers up to 30. 6.2 Students will be able to find some factors of given numbers up to 30. 6.1 Students will be able to list all the multiples of 2, 5 and 10. 5.3 Students will distinguish between odd and even numbers for numbers less than 100.</td>
</tr>
</tbody>
</table>
| 2. Understand and use square numbers. | Students use counters and the squared face of the Show-me Board to form squares for square numbers. Alternatively use multilink cubes. The teacher can use the bingo game used in the first teaching objective of this unit, including questions on square numbers. Teacher uses worksheet 10.2 (teacher’s pack A Gold) as a puzzle. Students work individually using this site: [http://www.oswego.org/ocsd-web/games/spookysq/spookysqno.html](http://www.oswego.org/ocsd-web/games/spookysq/spookysqno.html) A calculator can be used to make this activity easier. Problem solving ideas using square numbers can be obtained from the following website [http://nrich.maths.org/public/leg.php?group_id=1&code=307#results](http://nrich.maths.org/public/leg.php?group_id=1&code=307#results) | 7.1 Students will be able to work out squares of integers up to the square of 100, also with the use of a calculator.  
6.3 Students will recall the squares of integers up to the square of 10.  
6.2 Students will be able to identify square numbers $\leq 100$.  
6.1 Students will be able to calculate the squares of numbers up to 10. They are also able to identify some square numbers $\leq 100$.  
5.3 Students will be able to multiply by itself: 1, 2, 3, 4, 5 and 10. |
| 7.1 Students will be able to identify the prime numbers up to 100. |
| 6.3 Students will be able to identify some prime numbers less than 50. |
| 6.2 Students will be able to identify the prime numbers up to 30. |
| 6.1 Students will be able to list all the factors of the numbers less than 30. |
| 5.3 Students will be able to list some of the factors of the numbers less than 30. |
| 4. Read and plot points in the first quadrant using ordered pairs; draw lines and shapes given the co-ordinates of their endpoints/vertices. | Teacher uses this presentation as an introduction for co-ordinates in the first quadrant. [http://math.pppst.com/coordinates.html](http://math.pppst.com/coordinates.html) Battle ship. The teacher divides the students in groups of two. Each group plays a battleship game on a grid for positive values of x and y. Students use co-ordinates to plot ships and eventually sink them. Students work individually or in pairs using this website: [http://www.oswego.org/ocsd-web/games/BillyBug/bugcoord.html](http://www.oswego.org/ocsd-web/games/BillyBug/bugcoord.html) Alternatively, another game using co-ordinates is found on this site: [http://hotmath.com/hotmath_help/games/ctf/ctf_hotmath.swf](http://hotmath.com/hotmath_help/games/ctf/ctf_hotmath.swf) However, all four quadrants are used in this game. Treasure hunt in groups. The teacher uses the classroom or school hall as a grid, putting large printed numbers on tiles to form the x and y axes. The teacher also puts letters as needed on the grid (floor). Each group is given a number of co-ordinates. The group looks for these points on the grid, and gather the corresponding letter placed on that point. Finally the group has to form a word using the letters gathered from the grid. Ideally the words chosen are related to this unit. The game can be played one group at a time with a |
| 7.1 Students will be able to read the positive number line (horizontally & vertically) and read and plot a point in the first quadrant. |
| 6.3 Students can identify: x-axis, y-axis, origin and state the position of a point in terms of horizontal and vertical moves i.e. coordinates. |
| 6.2 Students distinguish between the horizontal and the vertical axis. |
| 6.1 Students are aware that the position of a point on a grid can be described by means of horizontal and vertical moves. |
| 5.3 Students can join points to draw a line or a set of lines. |
time limit to complete the task.

The teacher uses the following website to download an activity on plotting co-
ordinates in the first quadrant  http://nrich.maths.org/2653

The students work in groups of 4. Each group has a set of points that join to
form a letter or a number, but are not given in order. Students have to plot
them and then join them in such a way as to form a letter or a number.

The teacher uses the activity found on the following website:
www.mathsisfun.com/coordinate_alien.html

The teacher uses the class/school yard/school gym or school hall as a grid,
giving each student a co-ordinate. The students then find their positions on
the grid sitting down. The teacher asks certain students to stand up, calling
out their co-ordinates, and the class has to state what shape they form.
Alternatively the teacher leaves out one of the “co-ordinates” but states the
name of the shape. The missing “vertex” stands up to complete the shape.

Eight Hidden Squares problem. The teacher uses the following website to print
out the corresponding activity sheet or uses the same activity on an interactive
whiteboard:

A Cartesian Puzzle. This puzzle requires students to identify missing co-
ordinates of quadrilaterals, and can be downloaded from the following site:
http://nrich.maths.org/1110

The teacher divides the class in a number of teams. The teacher then starts
calling out the co-ordinates of the vertices of a shape one by one. Each team
plots the points and calls out the name of the shape as soon as they recognise
the shape, even if not all the co-ordinates of the vertices have been called out.
The team who recognises the shape has to say its name and calls out the co-
ordinates of any remaining vertices to complete that shape. A point is given
for the correct name and also for every remaining vertex of which the co-
ordinates are called out correctly.
Subject: MATHEMATICS

Strand 1: Number

Unit Code and Title: MTH 7.3 Number Patterns & Coordinates (Levels 1 – 4)

Objectives at attainment levels of 5, 6 and 7

1. Know the meaning of factors and multiples, even and odd numbers.
2. Understand and use of square numbers.
3. Recognise prime numbers.
4. Plot points in the first quadrant using ordered pairs. Draw lines and shapes given the co-ordinates of their endpoints/vertices

OBJECTIVES at attainment levels 1, 2, 3 and 4

1.1 Students will develop the idea of factors through the use of sets of objects. They will develop the idea of even and odd numbers too.
2.1 Students will create equal sets of two and express the result as a multiplication sum.
3.1 Students will be involved in multiplication sums using prime numbers only.
4.1 Students begin to use the language of direction and movement (up, down, left and right, forward and backwards) and use the language of position (before, after, in front of, between).

Key Words

Points to Note

Resources

Count in, twos, threes, fives, even, odd, position, up, down, backwards, forward, groups, equal amount, before, after, in front of, between, left and right.

In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.

New Maths Frame Working-Step Up Workbook.
Oxford Framework Maths 7
Software: Ilearn Maths, Calculator, Excel Worksheets
Internet Links:
http://www.ictgames.com/dragonmap.html
http://www.bbc.co.uk/schools/starship/maths/games/number_jumbler/small_sound/standard.shtml
http://www.oswego.org/ocsd-web/games/BillyBug/bugcoord.html
http://hotmath.com/hotmath_help/games/ctf/ctf_hotmath.swf
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</tr>
</thead>
</table>
| 1.1 Students will develop the idea of factors through the use of sets of objects. They will develop the idea of odd numbers too. | **Starter:** Students are presented with a number line up to 20. Teachers give out some instructions like colour the number 2 red, the number 3 green to check whether students have number recognition. Others can experience this multi-sensorially.  
The teacher presents a set of cards from 0 to 10. They are asked to start counting in 2's and make sets of 2, 3 and 5. Teacher will point out the difference between the odd and even sets of numbers. Students will talk about the number of sets they have, e.g. 2 sets of 2.  
Teacher points to a set of flashcards from 1 to 10. She starts counting by saying out one number in a loud voice and another number in a quiet voice. Then the students colour the numbers said in a loud voice in red whilst the others in blue. Students will build towers to represent the respective sets.  
Teacher presents a coloured square grid. She asks one student to walk on the blue numbers and another one to walk only on the red numbers. The square grid activity can be lowered down to clapping the blue numbers the child walks on and to beating a drum when the child walks on the red numbers. | Students will:  
Be able to count and write the number of objects in a set and begin to recognise odd and even numbers.  
(Level 4)  
Be able to count the number of objects in an odd or even set.  
(Level 3)  
Match diagrams or objects that have the same amount of numbers (odd with odd and even with even).  
(Level 2)  
Observe, notice and if possible indicate more when clapping or beating an odd number.  
(Level 1) |
| 2.1 Students will create equal sets of two and express the result as a multiplication sum. | **Starter:** Students are presented with a number of objects or a worksheet and they are asked to group objects in 2, 3 and 5. Teacher will check whether they know how to create equal sets.  
Students will be asked to make sets of equal amounts, e.g. 3 sets of 3, 8 sets of 1 and count the total. They will discuss how they worked out the total and possibly find a quicker method of calculation than repeated addition.  
Students will be involved in a similar activity to the above but the number of objects in a set is limited to 5. At a lower level, the students will be involved in matching equal sets of objects and at a further lower level, the students will drop equal amount of objects into two containers. | Students will:  
Be able to group equal sets of objects and translate the pictorial representation into a multiplication sum.  
(Level 4)  
Be able to make equal sets of objects up to 5.  
(Level 3)  
Be able to match equal sets of objects.  
(Level 2).  
Be involved in grabbing and dropping equal amounts of objects into two containers.  
(Level 1) |
### 3.1 Students will be involved in multiplication sums using prime numbers only

**Starter:** Students are given sets of objects containing a prime number amount and teacher checks on whether they have the value concept.

Students will build on the activity of the previous objective but this time with sets of prime numbers. For instance, with a prime number, say 7, students have to make a set of seven and write it as 1 set of 7 and then make 7 sets of ones. The above activity can be lowered down and limited to the one set of the said prime number. At a lower level, students can be involved in the same activity but this time making the sets with finger painting whilst counting.

**Students will:**
- Be able to group sets of objects as per example and write this as a multiplication sum. (Level 4)
- Be able to make one set of the requested number up to 10. (Level 3)
- Begin to develop the idea of a set through multi-sensory activities and counting. (Level 2)
- Encounter and be engaged in activities of objects related to numbers and number system. (Level 1).

### 4.1 Students begin to use the language of direction and movement (up, down, left and right, forward and backwards)

**Starter:** Teacher shows a map representation and asks questions to test the knowledge of particular vocabulary related with this lesson.

The teacher presents a simple coloured grid (4X4) together with direction cards, arrow up, arrow down, backward, forward. The students are given instructions like move one box forward and one box up. Students have to talk about what they found in that position.

Using the above coloured grid, the teacher points to one of the top colours and asks what it is? Then asks which colour is below it whilst supporting her instructions with visuals. Teacher puts two blocks in front of the student. Teacher takes one and gives it to the student who has to reach for it and try to put it on top of another block. During this exercise the teacher says red on top of blue. Exercise is repeated with various colours.

**Students will be able:**
- To identify what is found in a position by reading the coordinates in terms of steps to the right and steps up. (Level 4)
- To count and colour the number of boxes indicated by an arrow, for e.g. for the first number and for the second number. (Level 3)
- To match single object cards with their picture on a square grid. (Level 2)
- Develop awareness and possibly participate in activities involving direction and movement. (Level 1)

### 4.1 b) and use the language of position (before, after, in front of, between).

**Starter:** Teacher tells out some instructions for the students to follow. She can assess whether they can carry them out or not.

The teacher gives out a grid containing pictures. The teacher points to the star on the grid and asks the students to talk about its position in relation to another object using the terms before, after, in front of, in between.

Using the same but enlarged grid activity, students talk about their starting and finishing point. The teacher or higher functioning students programme the bee bot to move on the required path. Using the same grid activity, the

**Students will:**
- Be able to identify, talk about and ask questions about the position of particular objects on a grid. (Level 4)
- Talk about the position of an object using only two terms e.g. before and after. (Level 3)
| Students paint the starting point box in one colour and the finishing box in another colour. At a lower level, they just follow the travelled path. | Point to the requested object on the grid. (Level 2) Be involved in activities involving direction by holding their finger to follow the path travelled. (Level 1) |
**Subject:** MATHEMATICS  
**Strand:** Number

**Unit code and title:** MTH 7.4 Decimal Numbers and Money *(Levels 7.1 – 8.1)*

**Duration:** 9 sessions

### Objectives
The teacher will teach the students to:

1. Read scales and decimal numbers from scales; use scales in practical situations and arrange decimal numbers in ascending and descending order.
2. Write equivalent fractions and change fractions to decimals (restrict fractions with denominators that are factors of 100); add and subtract decimal numbers.
3. Multiply and divide decimal numbers by an integer; solve related problems involving money.

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<th>Resources</th>
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| Add, subtract, multiply, divide, fractions, decimal numbers, scales, ascending, descending. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics. | FOM A2, Students’ Book, Practice Book, Resource Pack – Chapters 7 and 13.  
Use of the Calculator, Scales, Number Line, Euro Money set.  
Internet Links:  
[www.funbrain.com/cashreg/](http://www.funbrain.com/cashreg/)  
[www.primaryresources.co.uk/maths/](http://www.primaryresources.co.uk/maths/)  
[www.youtube.com/watch](http://www.youtube.com/watch)  
[www.ixl.com](http://www.ixl.com)  
[www.homeschoolmath.net/worksheets/decimal](http://www.homeschoolmath.net/worksheets/decimal)  
[www.bbc.co.uk/skillswise/numbers/](http://www.bbc.co.uk/skillswise/numbers/)  
[www.hoodamath.com/games](http://www.hoodamath.com/games) |
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<td>The teacher will teach the students to: 1. Read scales and decimal numbers from scales; use scales in practical situations and arrange decimal numbers in ascending and descending order.</td>
<td>The notion of decimal number is introduced through the pupils’ concrete experience with measurement, money and weight. A practical activity where students are shown different scales. The scales used in the kitchen to weigh things up to 5 kg and scales used to weigh persons. Students in groups experiment weighing and reading scales of different items. Students work in groups, each group is given a set of cards which have to be arranged in ascending / descending order. Interactive Whiteboard – Students drag numbers from a set to put them in order. Measurement Worksheets can be accessed at <a href="http://www.primaryresources.co.uk/maths/">www.primaryresources.co.uk/maths/</a> In groups students can play “Guess my decimal” using the number line and the calculator. A student enters a decimal to 1 d.p. on the calculator and the others have to guess this number and mark it on the number line.</td>
<td>8.1 Students will be able to read more complex scales. 7.3 Students will be able to arrange decimal numbers in ascending and descending order. 7.2 Students will be able to read and use decimal numbers from scales up to 2 decimal places. 7.1 Students will be able to read scales and arrange numbers in ascending and descending order up to 1 decimal place.</td>
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<tr>
<td>2. Write equivalent fractions and change fractions to decimals (restrict fractions with denominators that are factors of 100); add and subtract decimal numbers.</td>
<td>Students work in pairs to match equivalent cards of fractions and decimals. Video – Changing Fractions to Decimals <a href="http://www.youtube.com/watch">www.youtube.com/watch</a> Decimal Addition Interactive Game <a href="http://www.sheppardsoftware.com/mathgames/decimals">www.sheppardsoftware.com/mathgames/decimals</a> Decimal Jigsaw – a sheet with numbers from 0.01 to 1 is given to students in pairs. They have to cut along the thick black lines and remake the jigsaw. Students can investigate the differences between the numbers on the jigsaw pieces or in the rows and columns. Students can practice addition and subtraction of decimals at C:Documents and Settings/teacher/My Documents/Mathematics Excel Lessons which can be followed by Add and Subtract Decimal Worksheets <a href="http://www.ixl.com">www.ixl.com</a> <a href="http://www.homeschoolmath.net/worksheets/decimal">www.homeschoolmath.net/worksheets/decimal</a></td>
<td>8.1 Students will be able to solve worded problems involving addition and subtraction of mass (weight) and capacity. 7.3 Students will be able to solve worded problems involving addition and subtraction of money. 7.2 Students will be able to use equivalency to change fractions with denominator 1000 to decimals and add and subtract decimal numbers with 3 decimal places. 7.1 Students will be able to use equivalency to change fractions with denominator 100 to decimals and add and subtract decimal numbers with 2 decimal places.</td>
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<tr>
<td>3. Multiply and divide decimal numbers by an integer; solve related problems involving money.</td>
<td>In pairs, the students work a worksheet using a calculator, which enables them to notice how the value of the number changes. Other printable worksheets <a href="http://www.helpingwithmath.com/printables">www.helpingwithmath.com/printables</a> Students can take part in a Quiz to check their ability of “÷ and × by 10, 100” found at <a href="http://www.bbc.co.uk/skillswise/numbers/">www.bbc.co.uk/skillswise/numbers/</a> A classroom discussion can be done as an introduction to elicit from students where and how money is used. Eg: to buy things, salaries, tax, vat, investments etc... A practical activity using the Euro set of money to play a real life situation. Eg: at the supermarket, at the bank etc. In groups students take part in a Quiz involving simple money questions to encourage them work mentally. In the lab, students can use Excel to work out a given worksheet involving money. Other Money Word Problems can be found at <a href="http://www.dadsworksheets.com">www.dadsworksheets.com</a> Coffee Shop Game can be played in pairs to give the students the idea of how to manage a small business. <a href="http://www.hoodamath.com/games">www.hoodamath.com/games</a></td>
<td>8.1 Students will be able to solve more challenging word problems involving money. 7.3 Students will be able to solve simple word problems involving money. 7.2 Students will be able to round up and work mentally multiplication and division of quantities involving money. 7.1 Students will be able to multiply and divide decimal numbers by an integer.</td>
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**Digital Technology Enhanced Learning - Maths eLearning Entitlement**

**Unit MTH 7.4 Decimal Numbers and Money**

Learners should be able to use questions from a database as a basis for a survey of their own class. They could discuss possible groupings for their data before designing a data collection sheet. Their own results can then be inserted in a spreadsheet and students discuss how data can be turned into information. Students can compare and discuss their data with other classes from other schools via email, blogs and other online environments or through e-Twinning projects. This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

1. For objective 1 students can experiment with scales at: [http://nationalstrategies.standards.dcsf.gov.uk/downloader/cdd9be38ebe2bb93d9de6162290eeaa2.swf](http://nationalstrategies.standards.dcsf.gov.uk/downloader/cdd9be38ebe2bb93d9de6162290eeaa2.swf)  
   This interactive tool supports the exploration of number, measures and problem solving. The student can add different masses of 1, 2, 5, 10, 50, 100 and 500 units to a scale pan. The scale intervals can be changed to challenge students to interpret different scales. The suggested link is in Flash format so it can be used on IWB.

2. Change fractions to decimals and add and subtract decimal numbers. Students can have fun and play around with decimals at [http://www.sheppardsoftware.com/mathgames/fractions/FractionsToDecimals.htm](http://www.sheppardsoftware.com/mathgames/fractions/FractionsToDecimals.htm)

3. Students can work on objective 3 at [http://www.math-play.com/multiplying-decimals-game.html](http://www.math-play.com/multiplying-decimals-game.html). Can be played online although names are required for score keeping. This multiplying decimals game is a fast-paced basketball game for 10 to 11 year old students. Students can play it alone, with another friend, or even in teams.

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1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Number
Unit code and title: MTH 7.4 Decimal Numbers and Money (Levels 6.3 – 7.3)
Duration: 9 sessions

Key Words
Add, subtract, multiply, divide, fractions, decimal numbers, scales, ascending, descending.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
FOM A1, Students’ Book, Practice Book, Resource Pack – Chapters 7 and 13
Use of the Calculator, Scales, Number Line, Euro Money set.

Internet Links
www.funbrain.com/cashreg/
www.funbrain.com/match2/index.html
www.primaryresources.co.uk/maths/
www.youtube.com/watch
www.ixl.com
www.homeschoolmath.net/worksheets/decimal
www.bbc.co.uk/skillswise/numbers/
www.hoodamath.com/games

Objectives
The teacher will teach the students to:
1. Read scales and decimal numbers from scales; use scales in practical situations and arrange decimal numbers in ascending and descending order.
2. Change fractions with denominators 10, 100 or 1000 to decimals; add and subtract decimal numbers.
3. Multiply and divide decimal numbers by an integer; solve related problems involving money.
<table>
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<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
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<tbody>
<tr>
<td>The teacher will teach the students to: 1. Read scales and decimal numbers from scales; use scales in practical situations and arrange decimal numbers in ascending and descending order.</td>
<td>The notion of decimal number is introduced through the pupils’ concrete experience with measurement, money and weight. A practical activity where students are shown different scales. The scales used in the kitchen to weigh things up to 5kg and scales used to weigh persons. Students in groups experiment weighing and reading scales of different items. Measurement Worksheets can be accessed at <a href="http://www.primaryresources.co.uk/maths/">www.primaryresources.co.uk/maths/</a> In groups students can play “Guess my decimal” using the number line and the calculator. A student enters a decimal to 1 d.p. on the calculator and the others have to guess this number and mark it on the number line. Students work in groups, each group is given a set of cards which have to be arranged in ascending / descending order. Interactive Whiteboard – Students drag numbers from a set to put them in order. In pairs, and according to their level, students can arrange the randomly generated numbers in the online game at the website <a href="http://www.ezschool.com/Games/Order.html">http://www.ezschool.com/Games/Order.html</a></td>
<td>7.3 Students will be able to arrange decimal numbers in ascending and descending order. 7.2 Students will be able to read and use decimal numbers from scales up to 2 decimal places. 7.1 Students will be able to read scales and arrange numbers in ascending and descending order up to 1 decimal place. 6.3 Students will be able to read scales and arrange numbers in ascending and descending order –the range of numbers involves half unit and quarter unit intervals.</td>
</tr>
</tbody>
</table>
| 2. Change fractions with denominators 10, 100 or 1000 to decimals and add and subtract decimal numbers. | Students work in pairs to match equivalent cards of fractions and decimals. Video – Changing Fractions to Decimals [www.youtube.com/watch](http://www.youtube.com/watch) Decimal Addition Interactive Game [www.sheppardsoftware.com/mathgames/decimals](http://www.sheppardsoftware.com/mathgames/decimals) Decimal Jigsaw – a sheet with numbers from 0.01 to 1 is given to students in pairs. They have to cut along the thick black lines and remake the jigsaw. Students can investigate the differences between the numbers on the jigsaw pieces or in the rows and columns. Students can practice addition and subtraction of decimals at C:Documents and Settings/teacher/My Documents/Mathematics Excel Lessons which can be followed by Add and Subtract Decimal Worksheets [www.ixl.com](http://www.ixl.com) [www.homeschoolmath.net/worksheets/decimal](http://www.homeschoolmath.net/worksheets/decimal) | 7.3 Students will be able to solve worded problems involving addition and subtraction of money.  
7.2 Students will be able to change fractions with denominator 1000 to decimals and add and subtract decimal numbers with 3 decimal places.  
7.1 Students will be able to change fractions with denominator 100 to decimals and add and subtract decimal numbers with 2 decimal places.  
6.3 Students will be able to change fractions with denominator 10 into decimals and add and subtract decimal numbers with 1 decimal place. |
|---|---|---|
| 3. Multiply and divide decimal numbers by an integer; solve related problems involving money. | A classroom discussion can be done as an introduction to elicit from students where and how money is used. Eg: to buy things, salaries, tax, vat, investments etc... A practical activity using the Euro set of money to play a real life situation. Eg: at the supermarket, at the bank etc. In groups students take part in a Quiz involving simple money questions to encourage them work mentally. In the lab, students can use Excel to work out a given worksheet involving money. Other Money Word Problems can be found at [www.dadsworksheets.com](http://www.dadsworksheets.com) Coffee Shop Game can be played in pairs to give the students the idea of how to manage a small business. [www.hoodamath.com/games](http://www.hoodamath.com/games) | 7.3 Students will be able to solve simple word problems involving money.  
7.2 Students will be able to round up and work mentally multiplication and division of quantities involving money.  
7.1 Students will be able to multiply and divide decimal numbers by an integer.  
6.3 Students will be able to multiply decimal numbers up to 2 decimal places by an integer. |
Subject: MATHEMATICS
Strand: Number
Unit code and title: MTH 7.4 Decimal Number and Money (Levels 5.3 – 7.1)
Form 1
Duration: 9 Sessions

Objectives:
The teacher will teach the students to:
1. Read scales and decimal numbers from scales; use scales in practical situations.
2. Understand place value of decimal numbers.
3. Arrange decimal numbers in ascending and descending order.
4. Add and subtract decimal numbers; multiply and divide decimal numbers by an integer.

Key Words
<table>
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<th>Points to Note:</th>
<th>Resources</th>
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</thead>
<tbody>
<tr>
<td>Whole, decimal point, digits, decimal number, scales, dials, place value, tens, hundreds, thousands, ten thousands, tenths, hundredths, thousandths, ascending order, descending order, add, subtract.</td>
<td>Three main teaching approaches are being recommended.</td>
</tr>
<tr>
<td><strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.</td>
<td>FOM Gold A: Student’s book and Resource Pack: Chapters 7 and 13.</td>
</tr>
<tr>
<td><strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.</td>
<td>Use of the Calculator, Scales, Number Line.</td>
</tr>
<tr>
<td><strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>Internet Links:</td>
</tr>
</tbody>
</table>

http://www.bbc.co.uk/apps/ifl/schools
http://www.numeracyworld.com
http://www.bbc.co.uk/skillswise
http://www.mathworksheets4kids.com
<table>
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</thead>
</table>
| The teacher will teach the students to:                                            | The teacher presents this you tube presentations on how to read a decimal number [http://www.youtube.com/watch?v=vPdBey0qCPg], [http://www.youtube.com/watch?v=iaSFUPRReow] and [http://www.youtube.com/watch?v=YTd_fpTsAcG](http://www.youtube.com/watch?v=YTd_fpTsAcG). Divide the students in groups and each group will do the following activities in turns:  
- Measure the height of each student, using a measuring tape, read it and record it.  
- Measure the height of water in a set of measuring cylinders.  
- Measure the students’ weight from a bathroom scale, read it and record it.  
- Weigh ingredients like flour, eggs, butter, sugar and raisins to do a cake using kitchen scales recording the weights.  
Another activity for this topic is to tell the students to go for a ride in a fun park, one must be taller than 110cm. The students have to measure and write down their heights to see if they are allowed to go for the ride or not. The teacher presents these worksheets [http://www.numeracyworld.com/decimal-worksheets.php](http://www.numeracyworld.com/decimal-worksheets.php) and the students are asked to work in pairs. They copy their solutions in their copybooks. |
| 1. Read scales and decimal numbers from scales; use scales in practical situations. | 7.1 Students will be able to read scales up to 1 decimal place.  
6.3 Students will be able to read scales involving half unit and quarter unit intervals.  
6.2 Students will be able to read scales involving half unit intervals.  
6.1 Students will be able to read whole numbers from different scales.  
5.3 Students will be able read whole numbers from a ruler. |                                                                                                                                             |
| 2. Understand place value of decimal numbers.                                       | The teacher shows this you tube presentation explaining the place value of decimal numbers [http://www.youtube.com/watch?v=mu2miv9At-M](http://www.youtube.com/watch?v=mu2miv9At-M).  
The teacher presents a chart with columns of thousands, hundreds, tens, units, decimal point, tenths, hundredths, thousandths and ten thousandths. He/she writes a decimal number on the whiteboard and students take in turns by writing each digit under the right column.  
The teacher divides the class in pairs and projects this site to the students [http://www.mathworksheets4kids.com/place-value/decimals/missing-chart.pdf](http://www.mathworksheets4kids.com/place-value/decimals/missing-chart.pdf). They have to write the solutions in their copybooks.  
The teacher asks the students to work in pairs. The teacher presents this game [http://www.aaastudy.com/dec51bx2.htm](http://www.aaastudy.com/dec51bx2.htm) (and press play and scroll upwards to play) to practice and consolidate the place value of decimals. | 7.1 Students will be able to read and place a number given to 1 decimal place (e.g.: 3.1, 3.2, 3.3 etc.) on a number line marked in fifths.  
6.3 Students will be able to read a number given in fifths (e.g.: 3.2, 3.4, 3.6 etc.) on a number line marked in fifths.  
6.2 Students will be able to read and place a number given to 1 decimal place on a number line marked in tenths.  
6.1 Students will be able to understand that the first decimal place represents tenths.  
5.3 Students will be able to understand that 0.5 represents a half. |
### 3. Arrange decimal numbers in ascending and descending order.

The teacher projects this site to the students. [http://www.mathsisfun.com/numbers/ordering-game.php?m=Dec-Tricky](http://www.mathsisfun.com/numbers/ordering-game.php?m=Dec-Tricky) to work on the computer. They have to arrange the decimal numbers in ascending or descending order.

Another activity is found at [http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/decimals/introductiontodecimals/activity.shtml](http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/decimals/introductiontodecimals/activity.shtml). The students work in pairs and copy their solutions on their copybooks.

The teacher divides the class into groups and project this site [http://www.bbc.co.uk/schools/ks2bitesize/maths/number/decimals/play.shtml](http://www.bbc.co.uk/schools/ks2bitesize/maths/number/decimals/play.shtml), where the students have to arrange the decimal numbers in order of size.

| 7.1 Students will be able to arrange numbers in ascending and descending order up to 1 decimal place and quarters. |
| 6.3 Students will be able to arrange decimal numbers represented as wholes, halves and quarters, in ascending and descending order. |
| 6.2 Students will be able to arrange decimal numbers represented as wholes and halves, in ascending and descending order. |
| 6.1 Students will be able to arrange integers, in ascending and descending order. |
| 5.3 Students will be able to understand the meaning of ascending and descending. |

### 4. Add and subtract decimal numbers; multiply and divide decimal numbers by an integer.

The teacher asks the students to work individually. As remote preparation, the teacher asks each student to prepare a five grid paper

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[ ] [ ] [ ] [ ] [ ]
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The teacher writes decimal numbers on the board and asks the students to choose five decimal numbers and write them on their grid. The teacher gives addition and subtraction questions on the board to be worked out, one at a time. The students match their answers with decimal numbers from the grid and cross it out (if they have). The game ends until one student crosses all the answers from their grid. This game is in the form of a bingo.

The teacher divides the class in four groups and prepares the following quiz. The teacher projects the site [http://www.bbc.co.uk/skillswise/inthenews/numbers/0626.shtml](http://www.bbc.co.uk/skillswise/inthenews/numbers/0626.shtml) to the students. Each group answers and the class as a whole checks these answers. Another activity is asking each student to bring different objects or their wrappers with marked prices. The items are placed as a small shop and the teacher appoints four students to select some items for a bill to be worked out. Other students will be in charge to work out the change.

| 7.1 Students will be able to add and subtract decimal numbers with 2 decimal places; multiply and divide decimal numbers by an integer. |
| 6.3 Students will be able to multiply decimal numbers up to 2 decimal places by an integer. |
| 6.2 Students will be able to multiply decimal numbers up to 1 decimal place by an integer. |
| 6.1 Students will be able to add decimal numbers with 1 decimal place and multiply decimal numbers by 10 and 100. |
| 5.3 Students will be able to add decimals not involving carrying over and subtract decimals not involving change over place value (borrowing). |
**Subject:** MATHEMATICS  

**Strand 1:** Number  

**Unit Code and Title:** MTH 7.4 Decimal Number (Levels 1 – 4)  

**Duration:** 9 Sessions  

**Objectives: 5,6,7**  
1. Read decimal numbers from scales and dials; use scales in practical solutions  
2. Understand place value of decimal numbers  
3. Arrange numbers in ascending and descending order  
4. Add and subtract decimal numbers, multiply and divide decimal numbers by a whole number.  

**Objectives: 1,2,3,4**  
1. Students develop an awareness of the different representations of numbers; use practical situations like weight comparisons of heavy/light objects.  
2. Students will compare two familiar numbers, say which is more or less, and give a number which lies in between.  
3. Students will order numbers starting from the smallest and then from the largest.  
4. Students will encounter addition and subtraction.  

<table>
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<th>Key Words</th>
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</table>
| Whole, decimal point, digits, decimal number, scales, dials, place value, heavy and light, tens, hundreds, most to least, largest to smallest, add, subtract. | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7  
Software: Ilearn Maths, Calculator, Excel  
Worksheets  
Internet Links:  
Place value [http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/decimals/introductiontodecimals/factsheet.shtml](http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/decimals/introductiontodecimals/factsheet.shtml)  
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of teaching experiences and activities</th>
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</tr>
</thead>
</table>
| **1.1**  
  a. Students develop an awareness of the different representations of numbers.  
  b. Use weight comparisons of heavy/light objects. | **Starter:** Students’ are presented with different number representations, even those beyond the scope of the lesson, so the teacher can check whether they can discriminate them in a sorting activity. 
Students are involved in a shopping activity with a variety of marked prices ranging from whole numbers to numbers with a point. They point out the differences by talking it through. 
Students are presented with a set of mixed cards containing whole and decimal numbers. They will be asked to sort them out. Then they will be given a sheet with mixed numbers and they have to visually discriminate between the two. 
Students are presented with real life objects to experience the decimal system in digital clocks, calculators, money etc. Using paint or sand students are involved in drawing various dots.  
**Starter:** Students are asked to indicate their preference about a fast food meal. Would they prefer to eat 2 big macs or a bag of chips? They can talk about their choice or else indicate by pointing or gazing.  
Students are given one set of objects of a similar heavy weight and confirm that they are the same. Then they are given another set of objects of similar light weight and confirm that they are the same. Then they pick up different objects and indicate if they are light or heavy  
Students are presented with three objects e.g. a shoe, a book and a pencil. They compare them, indicate the heaviest object and order them according to the weight. Students confirm their choice by weighing the objects. They play with the scales and observe as it goes down and up according to the weight. Then they group the heavy objects on one side and the light objects on the other side. Student is presented with a packet of sugar. The teacher says, ‘This is a packet of sugar. It is quite heavy. Students hold the packet so that they feel the weight. Same thing is repeated with a lighter object e.g. a cotton wool. Teacher observes their reaction to heavy and light objects. | Students will: Begin to recognise the use of the point symbol in numbers.  
(Level 4)  
Sort out different representations according to whether they are whole or decimal numbers.  
(Level 3)  
Match number representations.  
(Level 2)  
Mark intentionally on a surface with fingers or tools.  
(Level 1)  
Students will: measure and use the words light and heavy when comparing the weights of two or more objects.  
(Level 4)  
Be able to lift an object and comment whether it is heavy or light.  
(Level 3)  
Sort heavy and light objects.  
(Level 2)  
Experience weight by holding objects, feeling the weight and react to the weight.  
(Level 1) |
<table>
<thead>
<tr>
<th>Topic</th>
<th>Starter</th>
<th>Description</th>
<th>Ability Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Students will compare two familiar numbers, say which is more or less, and give a number which lies in between.</td>
<td>Students are shown four numbers which they have to recognise and read thus enabling the teacher to identify whether they can name the numbers and whether they have an idea of largest or smallest. Students are given two numbers up to 20 and they have to identify the larger and the smaller number. Furthermore, they will give a number which lies in between. Same activity can be lowered down for numbers up to 10 and students will point to the number which would give them the largest and then the smallest number of objects. At even a lower level, students can be presented with two sets of contrasting amounts and they match to the sets. For a sensori-motor level experience, students can participate in putting in different amounts of objects in a container.</td>
<td>Students will: Be able to recognise and name the largest and smallest number and give a number that lies in between. Be able to indicate and say which set has the most and least amount. Be able to match the quantities in sets. Follow adult’s hand as they put in objects.</td>
<td>(Level 4) (Level 3) (Level 2) (Level 1)</td>
</tr>
<tr>
<td>3.1 Students will order numbers starting from the smallest and then from the largest.</td>
<td>Teacher writes a set of four numbers which have to be placed in order. Students are presented with a set of mixed numbers up to at least 20, and they have to position them on a number track from smallest to largest and vice-versa. Same activity can be done with cards up to 5 and students have to join the numbers from the smallest to the largest. At a lower level, the students will match a sequence of numbers with another sequence. At the sensorial level, students will experience rote counting whilst grabbing one and then two and three objects.</td>
<td>Students will be able to: Order a set of given numbers starting from the smallest and then from the largest. Join numbers in a sequence. Match or sort an ordered sequence of numbers. Engage in activities involving number and number systems.</td>
<td>(Level 4) (Level 3) (Level 2) (Level 1)</td>
</tr>
<tr>
<td>4.1 Students will encounter addition and subtraction.</td>
<td>Students are presented with two party scenarios, people arriving with food items whilst other leaving with empty dishes. The students talk about the two different scenarios or simulate it to experience it. In a birthday party situation the students count the number of plates and cups needed for the whole group. The teacher shows the class different coloured cups, e.g. 2 red and 3 blue, how many cups altogether? Students choose the food they want to eat. They count the items on their plate whilst the student next to them counts theirs and they have to work out how many items they have altogether. When they start eating the food they can check again how.</td>
<td>Students will: Be able to work out simple totals by applying adding one and taking away one and write simple sum representations e.g. 4 + 3 =. Be able to indicate one more and count total. Also, they will observe taking away one and count the total.</td>
<td>(Level 4) (Level 3)</td>
</tr>
</tbody>
</table>
many items are left and how many they have altogether.

Students count how many plates, cups and napkins are needed. Teacher reads a story about a party situation which is about two girls/boys who took 2 cheesecakes and a nugget. Students represent this situation visually and they count the pictures to find the total amount. Alternatively the story can be elaborated to show the situation when they have ate the items. Relating to the above situation students hand is held and they point and touch the object whilst hearing the number one being named. They observe the disappearance of an object and the adult counts again to expose them to a new amount.

| Match same number of objects.  
| (Level 2) |
| Observe the movement of an object and its disappearance.  
| (Level 1) |
Subject: MATHEMATICS
Strand: Number
Unit code and title: MTH 7.5 Fractions (Levels 7.1 – 8.1)
Duration: 9 sessions

Objectives
The teacher will teach the students to:
1. Understand the notion of a fraction, reduce fractions to their lowest terms and find the fraction of a quantity.
2. Add/Subtract two fractions with same/different denominators and multiply a fraction by another fraction.
3. Change fractions and percentages to decimals and vice-versa and find the percentage of a quantity.
4. Use the ratio notation to compare two or more quantities and write ratios in their simplest form.

Key Words
Fraction, numerator, denominator, equivalent, cancel, lowest term, common denominator, percentage, ratios, proportion.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
FOM A2, Students’ Book, Practice Book, Resource Pack – Chapters 9 and 13
Fraction Puzzle Cards (Pizza & Cakes), Rainbow fraction Tiles.
C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons
  - Percentages.xls
  - Ratios.xls

Internet Links:
www.mathgoodies.com/lessons/toc_vol4.shtm
www.mathsisfun.com
www.mathopolis.com
www.ixl.com
www.ictgames.com

Worksheets from FOM A2 resource Pack Pages 98-107
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<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| The teacher will teach the students to: 1. Understand the notion of a fraction, reduce fractions to their lowest terms and find the fraction of a quantity. | Students are set in groups; each group is given a Fraction Puzzle, where they have to match fractions with the equivalent pizza pieces. Besides they can access [www.mathsisfun.com](http://www.mathsisfun.com) to see more examples of equivalent fractions.  
Students should be given the opportunity to work out the 10 fraction examples of the pie portions at the website [http://www.vectorkids.com/vkfractions.htm](http://www.vectorkids.com/vkfractions.htm)  
In pairs students play the game found online at [http://pbskids.org/cyberchase/games/equivalentfractions/index.html](http://pbskids.org/cyberchase/games/equivalentfractions/index.html)  
An interactive activity involving notion of fractions can be found at [www.mathopolis.com](http://www.mathopolis.com)  
Students can take part in a Quiz to test their understanding of simplifying fractions at [www.mathopolis.com](http://www.mathopolis.com)  
Students can find fractions of quantities using these sites: [http://www.ixl.com/math/grade-6/fractions-of-whole-numbers-i](http://www.ixl.com/math/grade-6/fractions-of-whole-numbers-i)  
Students can be asked to come out to the interactive whiteboard and shade the correct fraction on the interactive site: [http://nlvm.usu.edu/en/nav/frames_asid_10_2_g_1_t_1.html](http://nlvm.usu.edu/en/nav/frames_asid_10_2_g_1_t_1.html) | 8.1 Students will be able to solve worded problems.  
7.3 Students will be able to arrange fractions in ascending/descending order using equivalent fractions.  
7.2 Students will be able to reduce a fraction to its simplest form.  
7.1 Students will be able to find the fraction of a quantity without the use of a calculator. |
### 2. Add/Subtract two fractions with same/different denominators and multiply a fraction by another fraction.

Students can use the pizza cards used for equivalent fractions to add two different fractions at a time.

Students can work on addition and subtraction of fractions using an interactive activity found at [www.ixl.com/math/practice/grade-7-add-and-subtract-fractions](http://www.ixl.com/math/practice/grade-7-add-and-subtract-fractions)

Students can practice multiplication of a fraction by another fraction also illustrated by the shading of a grid at [www.ixl.com/maths/grade-7-multiply-fractions](http://www.ixl.com/maths/grade-7-multiply-fractions)

Students can revise and practice using these sites:
- [http://www.mathsisfun.com/fractions-menu.html](http://www.mathsisfun.com/fractions-menu.html)

Students can work in pairs to finish off the timed mode version of the level 3 shooting game in fraction addition and subtraction with different denominators at the site:
- [http://www.sheppardsoftware.com/math.htm](http://www.sheppardsoftware.com/math.htm)

### 3. Change fractions and percentages to decimals and vice-versa and find the percentage of a quantity.

Students can compare different number lines for fractions, decimals and percentages by dragging various tags on the correct number line.
- [www.ictgames.com/equivalence.html](http://www.ictgames.com/equivalence.html)

Students can work in pairs to match cards of equivalent fractions, decimals and percentages.

Students can practice conversions using the quiz questions on this site.

Students may play games to find percentages of given quantities.

Students may play games to find percentages of given quantities.

Students can test their knowledge of conversion of fractions in the speed mode.

### 8.1 Students will be able to solve problems involving the addition, subtraction and multiplication of fractions.

### 7.3 Students will be able to multiply fractions by other fractions and solve simple problems involving fractions.

### 7.2 Students will be able to add and subtract two fractions with different denominators using equivalent fractions.

### 7.1 Students will be able to add and subtract two fractions with same denominators.

### 7.1 Students will be able to express fractions as percentages and decimals and vice-versa.

Fractions should be restricted to denominators that are factors of 100.

### 7.2 Students will be able to express fractions as percentages and decimals and vice-versa.

Denominators include numbers that are not factors of 100.

### 7.3 Students will be able to find simple percentages of whole-numbered quantities.

### 8.1 Students will be able to find the percentage of a quantity. Solve simple problems involving percentages.
version of the shooting online game at: 
http://www.sheppardsoftware.com/mathgames/fractions/FractionToDecimals.htm

As a whole class and paired in teams, students can do the puppy chase race, while converting fractions to decimals. Race can be found at 

| 4. Use the ratio notation to compare two or more quantities and write ratios in their simplest form. | Students can be involved in a painting activity, after mixing paints in different ratios to see the visual effect of such ratios as per Craig’s DIY activity at: 
http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/activity.shtml

As an introduction students can practice comparing two or more quantities in different ratio notations at 
www.ixl.com/math/practice/grade-7-understanding-ratios

Students can work interactively to simplify ratios: 
www.ixl.com/math/practice/grade-7-equivalent-ratios

Students can go through ratio work using this site: 
http://www.mathsisfun.com/numbers/ratio.html

As revision students can try the quiz found at 
http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/quiz.shtml
They can try the quiz level according to their different abilities. | 8.1 Students will be able to solve simple problems involving finding one quantity given the other.

7.3 Students will be able to write ratios given in different units in their simplest form.

7.2 Students will be able to write ratios given in the same unit in their simplest form.

7.1 Students will be able to use the ratio notation to compare two or more quantities given in the same unit. |
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.5 Fractions

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge. Students can have fun at http://themathgames.com/our-games/fraction-games/fraction-balls1\(^2\) enjoying 4 difficulty levels. Other examples can be found at http://www.mathwarehouse.com/fractions/manipulatives/visual-fractions.php\(^3\).

Students may be asked to create quizzes for others and publish them or design games using Kodu which is free from Microsoft and can be downloaded from http://fuse.microsoft.com/kodu\(^4\).

1 License available from CMELD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Number
Unit code and title: MTH 7.5 Fractions (Levels 6.3 – 7.3)

Objectives
The teacher will teach the students to:
1. Understand the notion of a fraction, reduce fractions to their lowest terms and find the fraction of a quantity.
2. Add/Subtract two fractions with same denominators and multiply a fraction by another fraction.
3. Change fractions and percentages to decimals and vice-versa and find the percentage of a quantity.
4. Use the ratio notation to compare two or more quantities and write ratios in their simplest form.

Key Words
Fraction, numerator, denominator, equivalent, cancel, lowest term, common denominator, percentage, ratios, proportion.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
Fraction Puzzle Cards (Pizza & Cakes), Rainbow fraction Tiles.
C:\Documents and Settings\teacher\My Documents\Maths Excel Lessons
- Percentages.xls
- Ratios.xls
Internet Links:
www.mathsisfun.com
www.mathopolis.com
www.ixl.com
www.ictgames.com
Worksheets from FOM A1 resource Pack Pages 98-107

Duration: 9 sessions
### Teaching Objective

The teacher will teach the students to:

1. Understand the notion of a fraction, reduce fractions to their lowest terms and find the fraction of a quantity.

### Examples of Teaching Experiences and Activities

<table>
<thead>
<tr>
<th>Examples of Teaching Experiences and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students are set in groups and each group is given a Fraction Puzzle, where they have to match fractions with the equivalent pizza pieces. Besides they can access <a href="http://www.mathsisfun.com">www.mathsisfun.com</a> to see more examples of equivalent fractions.</td>
</tr>
<tr>
<td>Students should be given the opportunity to work out the 10 fraction examples of the pie portions at the website <a href="http://www.vectorkids.com/vkfractions.htm">http://www.vectorkids.com/vkfractions.htm</a></td>
</tr>
<tr>
<td>In pairs students play the game found online at <a href="http://pbskids.org/cyberchase/games/equivalentfractions/index.html">http://pbskids.org/cyberchase/games/equivalentfractions/index.html</a></td>
</tr>
<tr>
<td>An interactive activity involving notion of fractions can be found at <a href="http://www.mathopolis.com">www.mathopolis.com</a></td>
</tr>
<tr>
<td>Students can take part in a Quiz to test their understanding of simplifying fractions at <a href="http://www.mathopolis.com">www.mathopolis.com</a></td>
</tr>
<tr>
<td>Students can be asked to come out to the interactive whiteboard and shade the correct fraction on the interactive site: <a href="http://nlvm.usu.edu/en/nav/frames_asid_10_2_g_1_t_1.html">http://nlvm.usu.edu/en/nav/frames_asid_10_2_g_1_t_1.html</a></td>
</tr>
</tbody>
</table>

### Indicators of Learning Outcomes

<table>
<thead>
<tr>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3 Students will be able to arrange fractions in ascending/descending order using equivalent fractions.</td>
</tr>
<tr>
<td>7.2 Students will be able to reduce a fraction to its simplest form.</td>
</tr>
<tr>
<td>7.1 Students will be able to find the fraction of a quantity without the use of a calculator.</td>
</tr>
<tr>
<td>6.3 Students will be able to find half, a quarter, a tenth and a fifth of an integer.</td>
</tr>
<tr>
<td>2. Add/Subtract two fractions with same denominators and multiply a fraction by another fraction.</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>3. Change fractions and percentages to decimals and vice-versa and find the percentage of a quantity.</td>
</tr>
</tbody>
</table>
### 4. Use the ratio notation to compare two or more quantities and write ratios in their simplest form.

Students can be involved in a painting activity, after mixing paints in different ratios to see the visual effect of such ratios as per Craig’s DIY activity at: [http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/activity.shtml](http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/activity.shtml)

As an introduction students can practice comparing two or more quantities in different ratio notations at [www.ixl.com/math/practice/grade-7-understanding-ratios](http://www.ixl.com/math/practice/grade-7-understanding-ratios)

Students can work interactively to simplify ratios: [www.ixl.com/math/practice/grade-7-equivalent-ratios](http://www.ixl.com/math/practice/grade-7-equivalent-ratios)

Students can go through ratio work using this site: [http://www.mathsisfun.com/numbers/ratio.html](http://www.mathsisfun.com/numbers/ratio.html)

As revision students can try the quiz found at [http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/quiz.shtml](http://www.bbc.co.uk/skillswise/numbers/wholenumbers/ratioandproportion/ratio/quiz.shtml)

They can try the quiz level according to their different abilities.

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| 7.3 Students will be able to write ratios given in different units in their simplest form. |
| 7.2 Students will be able to write ratios given in the same unit in their simplest form. |
| 7.1 Students will be able to use the ratio notation to compare two or more quantities given in the same unit. |
| 6.3 Students will be able to understand the concept of ratio through pictorial representations and the use of different counters. |
**Subject:** MATHEMATICS

**Strand 1:** Number

**Unit code and title:** MTH 7.5 Fractions (Levels 5.3 – 7.1)

**Form:** 1  
**Duration:** 9 sessions

**Objectives**
The teacher will teach the students to:
1. Understand the notion of a fraction, understand the meaning of: half, third, quarter, fifth, tenth.
2. Find a fraction of a quantity.
3. Use equivalent fractions.
4. Use simple percentages.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Parts, fraction, numerator, denominator, whole, half, third, quarter, fifth, tenth, equivalent, percentages. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics. | FOM Gold A Student’s book and Teacher’s resource Pack - Chapter 9.  
Fraction Puzzle Cards (Pizza & Cakes), Rainbow fraction Tiles.  
Internet Links:  
www.math-drills.com/fractions.shtml  
www.numeracyworld.com/fractions-worksheets.php  
http://math.about.com/od/worksheets/a/fractions.htm  
www.superteacherworksheets.com/fractions.html  
http://edhelper.com/fractions.htm  
www.mathsisfun.com/worksheets/fractions.php  
www.freemathworksheets.net/  
www.primaryresources.co.uk/maths/mathsB6.htm  
http://www.ixl.com/ |
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach the students to: 1. Understand the notion of a fraction; understand the meaning of: half, third, quarter, fifth, tenth.</td>
<td>Fractions in everyday life on the video <a href="http://www.youtube.com/watch?v=P0o_HLMZk8k&amp;feature=related">http://www.youtube.com/watch?v=P0o_HLMZk8k&amp;feature=related</a> and <a href="http://www.youtube.com/watch?v=Z0uL6_it6TY&amp;feature=related">http://www.youtube.com/watch?v=Z0uL6_it6TY&amp;feature=related</a> Notion of numerators and denominators by showing the video <a href="http://www.youtube.com/watch?v=P0o_HLMZk8k&amp;feature=related">http://www.youtube.com/watch?v=P0o_HLMZk8k&amp;feature=related</a> Video on notion of fractions is found on <a href="http://www.youtube.com/watch?v=vjv1CVjwso">http://www.youtube.com/watch?v=vjv1CVjwso</a> The teacher divides the students in groups of 5 and let them work the questions from the website <a href="http://www.ixl.com/math/grade-2/compare-fractions">http://www.ixl.com/math/grade-2/compare-fractions</a> by jotting down the answers on a piece of paper Students can also be divided in groups of three and give them a packet of coloured sweets, coloured cards, etc... Students work out the fractions of each colour and write them on a piece of paper. Students can also find a fraction from a number line from 0 to 1 and check their answers from the website <a href="http://www.ixl.com/math/grade-3/fractions-on-number-lines">http://www.ixl.com/math/grade-3/fractions-on-number-lines</a> Fractions are displayed pictorially to the students by following an activity on the computer; click and shade the fraction <a href="http://www.beaconlearningcenter.com/WebLessons/FloweringFractions/default.htm">http://www.beaconlearningcenter.com/WebLessons/FloweringFractions/default.htm</a> By using the following websites <a href="http://www.ixl.com/math/grade-2/identify-the-fraction">http://www.ixl.com/math/grade-2/identify-the-fraction</a> and <a href="http://www.ixl.com/math/grade-2/fractions-parts-of-a-group">http://www.ixl.com/math/grade-2/fractions-parts-of-a-group</a> students are divided in groups of 5 to identify the fractions shown to them. Students could be given shaded shapes. They have to choose the right fraction for the respective shapes from the websites <a href="http://www.ixl.com/math/grade-2/which-shape-illustrates-the-fraction">http://www.ixl.com/math/grade-2/which-shape-illustrates-the-fraction</a> and <a href="http://www.ixl.com/math/grade-3/fraction-review">http://www.ixl.com/math/grade-3/fraction-review</a>. On the other hand, the teacher can prepare a set of different shaded shapes and give them to the groups of five students. She writes a fraction on the whiteboard and they have to choose the right shaded shape from the set given. A worksheet which is found on <a href="http://www.math-drills.com/fractions/parts_of_a_group_001.pdf">http://www.math-drills.com/fractions/parts_of_a_group_001.pdf</a> could be given to the students.</td>
<td>7.1 Students will be able to identify equivalent fractions (e.g.: 1/2 =2/4; 4/5=8/10) 6.3 Students will be able to identify the larger/smaller fraction. 6.2 Students will be able to identify and read quarters, fifths and tenths through a pictorial representation. 6.1 Students will be able to identify and read a half, a quarter, a fifth and a tenth through a pictorial representation. 5.3 Students will be able to understand that a fraction is part of a whole.</td>
</tr>
</tbody>
</table>
students for practice.

Students could be given the following worksheets for the notion of halves, thirds, quarters and fifths. They have to write down the fraction or shade the required fraction accordingly:


A class activity could be done such that the teacher divides the class in two and does a quiz by projecting the following sites:
http://www.ixl.com/math/grade-2/halves-thirds-and-fourths and
http://www.ixl.com/math/grade-1/halves-thirds-fourths on the interactive whiteboard and asks the students to identify the fractions.

Another activity could be given by giving the following shapes from the website: http://www.beaconlearningcenter.com/documents/6_01.pdf and ask the students who are divided in groups of 3 to fold the shape with the respective denominator.

| 2. Find a fraction of a quantity. | The teacher divides the class in two so the students take part in the following quiz http://www.ixl.com/math/grade-1/simple-fractions-parts-of-a-group. Students can do it also individually and record their time taken to answer the questions.

For this activity in order to find a fraction of a quantity which is on http://www.ixl.com/math/grade-3/fractions-of-a-number, students have to be divided in groups of 5 so they share their ideas in order to solve the fractions.

Students can also work in groups to solve the fraction problems found on the following http://www.ixl.com/math/grade-3/fractions-of-a-number-word-problems

Students are asked to prepare a paper 60cm long and 1cm wide at home. A group is asked to paint or colour one-half of this paper. At first the teacher can work this together with all the students. Another group is asked to paint one third of 60 cm. Other groups will be asked to paint one-fifth, one fourth and one tenth. Later, the students can compare fractions. This activity can also help to revise the above objective as well as introduce equivalent fractions- one half, two fourths, two tenths, one fifth.... | 7.1 Students will be able to find the fraction of a quantity without the use of a calculator.

6.3 Students will be able to find half, a quarter, a tenth and a fifth of an integer.

6.2 Students will be able to find the quarter of an integer.

6.1 Students will be able to work out half of an integer.

5.3 Students understand that a fraction of a quantity means that it is a smaller part of that quantity. |
3. Use equivalent fractions.

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>The teacher can tell the students to work the following activities from the websites given below; individually, groups or as quizzes:</td>
</tr>
<tr>
<td>The following worksheets <a href="http://www.math-drills.com/fractions/frac_equiv_missing_number_001.pdf">http://www.math-drills.com/fractions/frac_equiv_missing_number_001.pdf</a> and <a href="http://www.math-drills.com/fractions/frac_equiv_missing_number_002.pdf">http://www.math-drills.com/fractions/frac_equiv_missing_number_002.pdf</a> have to be given to the students so they get a better idea how they can work equivalent fractions.</td>
</tr>
<tr>
<td>The students can be asked to play the game in the Teacher’s Resource pack page 202 MATCHING PAIRS in groups. One of the students in each group can be asked to shuffle the cards and be in charge of writing down the pairs of equivalent fractions.</td>
</tr>
</tbody>
</table>

7.1 Students will be able to find the missing numerator/denominator of two equivalent fractions.

6.3 Students will be able to find the missing numerator/denominator of two equivalent fractions from a pictorial illustration.

6.2 Students will be able to give equivalent fractions of simple fractions.

6.1 Students will be able to recognize equivalent fractions through a pictorial representation.

5.3 Students know the meaning of simple equivalent fractions.
4. Use simple percentages.

In explaining percentage the following examples can be used: - a centipede which has 100 legs, a centurion commands 100 soldiers, 100cm make 1 metre, 100 cent make 1 euro, etc... Then examples must be given so students know the use of a percentage such as the mark of an exam on 100, sale of an object, etc...

Students can be shaded shapes which are represented by a 10 by 10 square grid with the same shaded part. They have to write the fraction of the shape and write it as a fraction with 100 as denominator. They can represent the fraction over 100 as a %. An example of this could be seen from this website [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages,%20fractions%20&%20decimals.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages,%20fractions%20&%20decimals.pdf)

Students could be given the following worksheet to work out the percentage of a whole line that a spider has travelled at the points indicated [http://www.numeracyworld.com/Worksheets%20Percentages/Spider%20Percentages.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Spider%20Percentages.pdf)

For the following exercises students should be given a hint that is to change the percentages as fractions: Exercise 1:

Students could be given the following worksheet where there are Three sets of shapes which need to be shaded. The task is to shade 50% of each shape in the first set, 25% of each shape in the second set, and 75% in the third. [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Shape%20Shading.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Shape%20Shading.pdf) Exercise 2:

On the other hand students could be given another worksheet where they circle instead of shading [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Circle%20the%20Dots.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Circle%20the%20Dots.pdf)

The “Equivalence Display Wooden Board “(A Maths Resource) can be used. This includes flash cards of decimals, fractions and percentages, together with 100 square grids with different shaded parts.

| 4. Use simple percentages. | In explaining percentage the following examples can be used: - a centipede which has 100 legs, a centurion commands 100 soldiers, 100cm make 1 metre, 100 cent make 1 euro, etc... Then examples must be given so students know the use of a percentage such as the mark of an exam on 100, sale of an object, etc... Students can be shaded shapes which are represented by a 10 by 10 square grid with the same shaded part. They have to write the fraction of the shape and write it as a fraction with 100 as denominator. They can represent the fraction over 100 as a %. An example of this could be seen from this website [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages,%20fractions%20&%20decimals.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages,%20fractions%20&%20decimals.pdf) Students could be given the following worksheet to work out the percentage of a whole line that a spider has travelled at the points indicated [http://www.numeracyworld.com/Worksheets%20Percentages/Spider%20Percentages.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Spider%20Percentages.pdf) For the following exercises students should be given a hint that is to change the percentages as fractions: Exercise 1: Students could be given the following worksheet where there are Three sets of shapes which need to be shaded. The task is to shade 50% of each shape in the first set, 25% of each shape in the second set, and 75% in the third. [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Shape%20Shading.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Shape%20Shading.pdf) Exercise 2: On the other hand students could be given another worksheet where they circle instead of shading [http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Circle%20the%20Dots.pdf](http://www.numeracyworld.com/Worksheets%20Percentages/Percentages-%20Circle%20the%20Dots.pdf) The “Equivalence Display Wooden Board “(A Maths Resource) can be used. This includes flash cards of decimals, fractions and percentages, together with 100 square grids with different shaded parts. | 7.1 Students will be able to find the percentage of a quantity. 6.3 Students will be able to find a percentage (e.g. a picture showing 3 out of 10 insects are ants. What percentage are ants?) 6.2 Students will be able to recognise and understand simple percentages (e.g.: 75% means three quarters and 25% means a quarter). 6.1 Students will be able to recognise and understand simple percentages (e.g.: 50% means a half and). 5.3 Students know that percentage with symbol % is a fraction with 100 as denominator. |
### Subject: MATHEMATICS

### Strand 1: Number

#### Unit Code and Title: MTH 7.5 Fractions (Levels 1 – 4)

<table>
<thead>
<tr>
<th>Objectives at attainment levels 5, 6 and 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Understand the notion of a fraction and the meaning of: half, third, quarter, fifth, tenth.</td>
</tr>
<tr>
<td>2. Find a fraction of a quantity.</td>
</tr>
<tr>
<td>3. Use equivalent fractions.</td>
</tr>
<tr>
<td>4. Use simple percentages.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objectives at attainment levels 1, 2, 3 and 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Students develop an awareness of the parts of an object by identifying and counting the number of parts.</td>
</tr>
<tr>
<td>1.1 Students will identify half of an object.</td>
</tr>
<tr>
<td>2. Students will find the number of parts of a given object.</td>
</tr>
<tr>
<td>3. Students will compare different quantities together representing the same number of parts.</td>
</tr>
</tbody>
</table>

#### Key Words

Parts, together, whole, same quantity, half, share, equal

#### Points to Note

In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.

#### Resources

- New Maths Frame Working-Step Up Workbook.
- Oxford Framework Maths 7
- Software: Ilearn Maths, Calculator, Excel
- Worksheets
- Internet Links:
  - [http://math.about.com/od/worksheets/a/fractions.htm](http://math.about.com/od/worksheets/a/fractions.htm)
  - [www.superteacherworksheets.com/fractions.html](http://www.superteacherworksheets.com/fractions.html)
  - [http://edhelper.com/fractions.htm](http://edhelper.com/fractions.htm)
  - [www.mathsisfun.com/worksheets/fractions.php](http://www.mathsisfun.com/worksheets/fractions.php)
  - [www.freemathworksheets.net/fraction-equations.php](http://www.freemathworksheets.net/fraction-equations.php)
### Teaching Objective

1.1 Students develop an awareness of the parts of an object by identifying and counting the number of parts.

### Examples of teaching experiences and activities

**Starter:** Students are presented with either a disassembled object or a simple jigsaw puzzle. They are left to their own devices to put the pieces together to make a whole.

- Students are given a simple picture divided into an equal number of parts. They have to count the number of parts and talk about how the total numbers of parts make the whole.
- Students are shown a picture of an object followed by the same object with missing parts. They have to identify, point or name the missing part.
- Students are presented with a 4 part nesting object and they have to put it together. Then the students can point to requested body parts.
- Students look at their reflection in a mirror and they listen and watch the adult as s/he indicates the facial body parts.

### Indicators of Learning Outcomes

**Students will:**

- Find the total number of parts making the whole. (Level 4)
- To point, name and colour different parts of a particular object. (Level 3)
- Point to a number of requested body parts. (Level 2)
- Try to interact with their reflection and maybe reproduce a gesture. (Level 1)

1.1b Students will identify half of an object.

**Starter:** Students are given a picture of a blank face together with the related body parts. They are left on their own to put the parts into their appropriate place to complete the picture.

- Students are involved in life skill activity – preparing sandwiches for lunch. In pairs, they are to prepare one sandwich to share between two. Then they share it and observe that there was one whole sandwich divided into two parts. A similar activity can be presented in pictures containing a middle dotted line and the students have to colour half of the shape. Students are presented with an assembled and a disassembled 2 piece jigsaw puzzle. They have to try to put it together to come up with the whole picture.
- Using a touch screen students observe how two parts of an object can be brought together to make a whole part.

### Indicators of Learning Outcomes

**Students will:**

- Be able to share something equally by dividing it into two equal parts. (Level 4)
- Be able to colour or cut through the dotted line an exact half of a picture. (Level 3)
- Be able to match half of a picture with the other half. (Level 2)
- Perform a simple gesture on request to bring the parts together. (Level 1)

3.1 Students will find the number of parts of a given object.

**Starter:** Using football cards or any other popular character cards, students are engaged in a kind of trading game. They pick a number card and have to trade in the number on the card.

- Students are given shapes divided into an equal number of parts and they try to count the number of parts and object is divided into and talk about the parts they coloured. (Level 4)
<table>
<thead>
<tr>
<th>Number</th>
<th>Activity Description</th>
<th>Level 1</th>
<th>Level 2</th>
<th>Level 3</th>
<th>Level 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>Students will compare different quantities together representing the same number of parts.</td>
<td>Students will:</td>
<td>Be able to match shapes by their number of parts.</td>
<td>Apply the concept of counting to colour the same part of a shape.</td>
<td>Encounter and experience the cutting of different parts.</td>
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<td></td>
<td>Starter: Students are shown two pictures of two restaurants serving a particular dish. The dishes vary in the portion. Students are to indicate and, if possible, talk about their choice.</td>
<td>Be able to compare and talk about the idea that one part of two is the same as two parts of four.</td>
<td>Be able to compare and talk about the idea that one part of two is the same as two parts of four.</td>
<td>Be able to compare and talk about the idea that one part of two is the same as two parts of four.</td>
<td>Be able to compare and talk about the idea that one part of two is the same as two parts of four.</td>
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<td></td>
<td>Students are shown a rectangle divided into two equal parts and then another rectangle divided into four equal parts. For both situations, they are asked to colour half of the rectangle and count the number of parts. Eventually, they will compare and talk about the situation. This activity can be lowered to asking students to just colour one part and then two parts. At an even lower level, the students can match the shapes that go together according to their coloured parts. At a further basic level, the students observe and experience how a pizza is divided into two or four parts but yet having the same portion.</td>
<td>Students will:</td>
<td>Students will:</td>
<td>Students will:</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>(Level 1)</td>
<td>Count the number of parts and colour one part.</td>
<td>Complete a geoboard.</td>
<td>Encounter and experience activities involving number systems.</td>
<td>Be able to compare and talk about the idea that one part of two is the same as two parts of four.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Level 3)</td>
<td>(Level 2)</td>
<td>(Level 1)</td>
<td>(Level 4)</td>
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</table>
### Subject:
MATHEMATICS

### Strand:
Shape, Space and Measures

### Unit code and title:
MTH 7.6 Metric Measures and Time (Levels 7.1 – 8.1)

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length, line segment, metre, centimetre, millimetre</td>
<td>Three main teaching approaches are being recommended. <strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. <strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations. <strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.</td>
<td>FOM A2 Student’s Book, Practice Book, Resource Pack – Chapter 11 and 1 (page 6) From Teacher’s Laptop C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons • Time Interval Internet links: <a href="http://www.digitaldutch.com/unitconverter/">http://www.digitaldutch.com/unitconverter/</a> <a href="http://www.unc.edu/~rowlett/units/index.html">http://www.unc.edu/~rowlett/units/index.html</a> <a href="http://www.metric.org.uk/">http://www.metric.org.uk/</a> <a href="http://www.funbrain.com/match2/index.html">http://www.funbrain.com/match2/index.html</a></td>
</tr>
</tbody>
</table>

### Objectives
The teacher will teach the students to:

1. Convert metric units of length, mass (weight) & volume (capacity) to smaller units and vice-versa.
2. Add, subtract, multiply and divide quantities of length, mass (weight) and volume (capacity) and solve problems involving metric measures.
3. Use different units of time; determine time intervals in hours and minutes; Write time using 12-hour and 24-hour clock, convert 12-hour to 24-hour clock and vice-versa and read and use a timetable and a calendar.

### Duration:
9 sessions
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach the students to:</td>
<td>Teacher provides students with practical situations to apply conversion of units. The teacher can ask students to get empty food containers and cans to investigate their weight and volume. In groups, students are asked to change units indicated on containers: • By weight (e.g.: cornflakes packets, rice, tuna etc.) • By volume (e.g.: milk, drinks, water etc.)</td>
<td>8.1 Students will be able to use more than one conversion in a simple problem. 7.3 Students will be able to convert and use units of length, mass (weight) and volume (capacity) to smaller units and vice-versa in simple problems. 7.2 Students will be able to convert and use units of length, mass (weight) and volume (capacity) to smaller units and vice-versa. 7.1 Students will be able to convert units of length, mass and volume (capacity) to smaller units and vice-versa.</td>
</tr>
<tr>
<td>1. Convert metric units of length, mass (weight) &amp; volume (capacity) to smaller units and vice-versa.</td>
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<tr>
<td>2. Add, subtract, multiply and divide quantities of length, mass (weight), and volume (capacity) and solve problems involving metric measures.</td>
<td>Teacher provides students with real-life problems. The teacher can present students with problem solving situations related to the data gathered from the empty food containers. In groups, students are presented with contextualized problems to use: • addition (e.g. total weight of portions of cereal taken by a number of people; total capacity of drinks) • subtraction (e.g. amount left in container) • division (e.g. number of portions possible from a particular pack) • multiplication (e.g. working out recipe quantities needed)</td>
<td>8.1 Students will be able to solve problems relating two quantities e.g. relating length to mass. 7.3 Students will be able to solve real-life problems related to metric measures. 7.2 Students will be able to add, subtract, multiply and divide quantities; be able to solve real-life problems related to metric measures. 7.1 Students will be able to add, subtract, multiply and divide quantities; be able to solve simple problems related to metric measures.</td>
</tr>
<tr>
<td>3. Use different units of time; determine time intervals in hours and minutes. Write time using 12-hour and 24-hour clock, convert 12-hour to 24-hour clock and vice-versa and read and use a timetable and a calendar.</td>
<td>Teacher provides students with real-life situations in which students will use the clock, a timetable and a calendar. Teacher presents students with an activity where they are asked to plan a holiday. In groups, students will need to plan the time and duration of the holiday. They can be asked to provide a daily plan of their holiday including cultural visits, time for lunch etc. (2 lessons). The teacher discusses students work related to:   - Using the 24-hour clock for afternoon activities;   - The timetable for planning activities within particular days;   - The calendar for planning the period of the holiday.</td>
<td>8.1 Students will be able to solve problems involving timetables and a calendar. 7.3 Students will be able to convert different units of time and use the 12-hour/24-hour clock; read and use a timetable and a calendar. 7.2 Students will be able to convert hours to minutes and vice-versa; convert the 12-hour clock to 24-hour clock and vice-versa; read and use a timetable and a calendar. 7.1 Students will be able to convert the 12-hour clock to 24-hour clock (five minute intervals) and vice-versa; read a calendar.</td>
</tr>
</tbody>
</table>
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.6 Metric Measures and Time

Students can investigate and explore Metric Measures at [http://www.teachingmeasures.co.uk/menu.html](http://www.teachingmeasures.co.uk/menu.html) and [http://www.aaamath.com/B/mea.htm#topic50](http://www.aaamath.com/B/mea.htm#topic50). Both sites offer interactive exercises in the full range of measuring mass, time, volume and length that can be displayed on the interactive whiteboards.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

The use of floor robots like Roamer Too or the TTS Probot (available for evaluation purposes from the Curriculum Management and e-Learning Centre) can enhance the students’ experience metric measure and time.

Students can use Google Earth [http://www.google.com/earth/download/ge/agree.html](http://www.google.com/earth/download/ge/agree.html) (already installed on leased laptops) as a whole class activity to investigate length while allowing students the possibility to appreciate the concept of time through the time slider that sets the time of day.

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
**Subject:** MATHEMATICS  
**Strand:** Shape, Space and Measures  
**Unit code and title:** MTH 7.6 Metric Measures and Time (Levels 6.3 – 7.3)  
**Duration:** 9 sessions

**Objectives**  
The teacher will teach the students to:  
1. Convert metric units of length, mass (weight) and volume (capacity) to smaller units and vice-versa.  
2. Add, subtract, multiply and divide quantities of length, mass (weight) and volume (capacity) and solve problems involving metric measures.  
3. Use different units of time; determine time intervals in hours and minutes; Write time using 12-hour and 24-hour clock; convert 12-hour to 24-hour clock and vice-versa; read and use a timetable and a calendar.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Length, line segment, metre, centimetre, millimetre  
Weight, kilogram, gram  
Volume, capacity, cubic metre, cubic centimetre, cubic millimetre, $m^3$, $cm^3$, $mm^3$  
Time, hours, minutes, seconds, 12-hour clock, 24-hour clock, timetable and calendar | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics. | FOM A1 Student’s Book, Practice Book, Resource Pack – Chapter 11 and 1 (page 6)  
From Teacher’s Laptop  
C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons Time Interval  
Internet links:  
http://www.digitaldutch.com/unitconverter/  
http://www.unc.edu/~rowlett/units/index.html  
http://www.metric.org.uk/  
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach the students to:</td>
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</tbody>
</table>
| 1. Convert metric units of length, mass (weight) and volume (capacity) to smaller units and vice-versa. | Teacher provides students with practical situations to apply conversion of units. The teacher can ask students to get empty food containers and cans to investigate their length, mass (weight) and volume (capacity).  
In groups, students are asked to change units indicated on containers:  
- By weight (e.g.: cereal packets, rice, tuna etc.)  
- By volume (e.g.: milk, drinks, water etc.) | 7.3 Students will be able to convert and use units of length, mass (weight) and volume (capacity) to smaller units and vice-versa in more complex problems.  
7.2 Students will be able to convert and use units of length, mass (weight) and volume (capacity) to smaller units and vice-versa.  
7.1 Students will be able to convert units of length, mass (weight) and volume (capacity) to smaller units and vice-versa.  
6.3 Students will be able to convert units of length, mass (weight) and volume (capacity) to smaller units.                                                                                                                                 |
| 2. Add, subtract, multiply and divide quantities of length, mass (weight) and volume (capacity) and solve problems involving metric measures. | Teacher provides students with real-life problems. The teacher can present students with problem solving situations related to the data gathered from the empty food containers.  
In groups, students are presented with contextualized problems to use:  
- addition (e.g. total weight of portions of cereal taken by a number of people; total capacity of drinks)  
- subtraction (e.g. amount left in container)  
- division (e.g. number of portions possible from a particular pack)  
- multiplication (e.g. working out recipe quantities needed) | 7.3 Students will be able to solve complex real-life problems related to metric measures.  
7.2 Students will be able to add, subtract, multiply and divide quantities; be able to solve real-life problems related to metric measures.  
7.1 Students will be able to add, subtract, multiply and divide quantities; be able to solve simple problems related to metric measures.  
6.3 Students will be able to add, subtract, multiply and divide quantities of length, mass (weight) and capacity.                                                                 |
3. Use different units of time; determine time intervals in hours and minutes.
   Write time using 12-hour and 24-hour clock, convert 12-hour to 24-hour clock and vice-versa, read and use a timetable and a calendar.

Teacher provides students with real-life situations in which students will use the clock.
Teacher presents students with an activity where they are asked to plan an outing.
In groups, students will need to plan the time and duration of the outing, indicating clearly the duration of each activity.
The teacher can then discuss students work related to using the 24-hour clock for afternoon activities.

7.3 Students will be able to convert different units of time and use the 12-hour/24-hour clock; read and use a timetable and a calendar.

7.2 Students will be able to convert hours to minutes and vice-versa; convert the 12-hour clock to 24-hour clock and vice-versa; read and use a timetable and a calendar.

7.1 Students will be able to convert the 12-hour clock to 24-hour clock (five minute intervals) and vice-versa; read a calendar.

6.3 Students will be able to use the 12-hour clock; be able to read and write the time in hour, half hour and a quarter hour, an hour later or before.
Subject: MATHEMATICS
Strand: Shapes, Space and Measures
Unit code and title: MTH 7.6 Metric Measures and Time (Levels 5.3 – 7.1)

| Objectives: | 
|---|---|
| The teacher will teach the students to: | 
| 1. Measure the length of objects. | 
| 2. Convert metric units of length, mass (weight) and volume (capacity) to smaller units and vice-versa. | 
| 3. Solve simple problems involving addition, subtraction, multiplication and division of metric measures. | 
| 4. Write time using 12-hour and 24-hour clock; convert 12-hour to 24-hour clock and vice-versa; read and use a calendar. | 

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time, analogue, digital, 12-hour, 24-hour, hours, minutes, convert, calendar, day, month, year, date, units, length, ruler, millimeters, centimeters, metres, kilometers, weight, scales, grams, kilograms, capacity, volume, milliliters, litres.</td>
<td>Three main teaching approaches are being recommended.</td>
<td>FOM Gold A, Students’ Book, Resource Pack – Chapter 11 and 1 (pg6)</td>
</tr>
<tr>
<td></td>
<td><strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.</td>
<td>Clock faces stamps and charts</td>
</tr>
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<td><strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations.</td>
<td>Tape measure or long ruler.</td>
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<td></td>
<td><strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>Cards for the weight conversion activity.</td>
</tr>
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<td></td>
<td>Measuring jug and labelled bottles with water.</td>
<td>Internet Links:</td>
</tr>
<tr>
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<td><a href="http://doorwayonline.org.uk/">http://doorwayonline.org.uk/</a></td>
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<td><a href="http://www.wmnet.org.uk/">http://www.wmnet.org.uk/</a></td>
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<td><a href="http://www.bgfl.org/">http://www.bgfl.org/</a></td>
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<td><a href="http://www.bbc.co.uk">http://www.bbc.co.uk</a></td>
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<td><a href="http://www.mrnussbaum.com/">http://www.mrnussbaum.com/</a></td>
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<td><a href="http://www.primaryresources.co.uk/">http://www.primaryresources.co.uk/</a></td>
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<td><a href="http://www.funbrain.com/">http://www.funbrain.com/</a></td>
</tr>
<tr>
<td>Teaching objectives</td>
<td>Examples of Teaching Experiences and Activities</td>
<td>Indicators of Learning Outcomes</td>
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<td>------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>The teacher will teach the students to:</td>
<td>The ‘Activity’ found on page 87 of the ‘Formula One A Gold’ textbook can be carried out in groups. Students measure each others’ hands and feet, and then place the hand and feet measurements in order of size. Doing this could help them see whether the same people are in the same positions for the hand and foot measurement. This activity caters for students with different levels of understanding: <a href="http://www.funbrain.com/measure/index.html">http://www.funbrain.com/measure/index.html</a>. Students choose the correct length of the red bar from the given possibilities. An activity about measurement, ‘Reading Length’, is found at: <a href="http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm">http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm</a>. Students write the measurements together with the corresponding units of length (in full).</td>
<td>7.1 Students will be able to estimate and measure the length of a line correct to reasonable accuracy.</td>
</tr>
<tr>
<td>1. Measure the length of objects.</td>
<td></td>
<td>6.3 Students will be able to measure and draw lines.</td>
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<td>6.2 Students will be able to identify the appropriate unit of measure (cm and mm) of an object.</td>
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<td></td>
<td>6.1 Students will be able to suggest suitable measuring equipment to estimate or measure length.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.3 Students will be able to read and write the standard metric units related to length including their abbreviations: km, m, cm.</td>
</tr>
</tbody>
</table>
2. Convert metric units of length, mass (weight) and volume (capacity) to smaller units and vice-versa.

<p>| The following activity can be used as an introduction to the measurement of the weight of different objects: <a href="http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm">http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/measures/index.htm</a>. In ‘Reading Mass’, students write the measurements together with the corresponding units of weight (in full). Students are divided into groups of two and each student is given a set of cards. One student has different weight measurements in kilograms whilst the other student has different weight measurements in grams. The students match the cards. A game involving the conversions of different lengths is found at: <a href="http://www.bbc.co.uk/skillswise/numbers/measuring/lwc/game.shtml">http://www.bbc.co.uk/skillswise/numbers/measuring/lwc/game.shtml</a>. Students answer questions involving conversions of units of length. A class activity can be found at: <a href="http://www.primaryresources.co.uk/maths/powerpoint/millionaire_length_conversion.ppt">http://www.primaryresources.co.uk/maths/powerpoint/millionaire_length_conversion.ppt</a>. In this power point presentation, students answer questions about different conversions of length. An activity about measurements of both weight and length is: <a href="http://www.bbc.co.uk/schools/ks2bitesize/mathematics/shape_space/measures/play.shtml">http://www.bbc.co.uk/schools/ks2bitesize/mathematics/shape_space/measures/play.shtml</a>. Students are divided in groups of 2 or 3. Students use the length and weight of the given parcel to find the postage. This activity caters for students with different levels of understanding: <a href="http://www.bbc.co.uk/schools/ks1bitesize/numeracy/measurements/index.shtml">http://www.bbc.co.uk/schools/ks1bitesize/numeracy/measurements/index.shtml</a>. Students need to help load the boat by choosing the parcel with the same weight and length as the one being asked for. A class activity is found at: <a href="http://www.primaryresources.co.uk/maths/powerpoint/capacity_wwtbam.ppt">http://www.primaryresources.co.uk/maths/powerpoint/capacity_wwtbam.ppt</a>. In this power point presentation based on the ‘Who wants to be a Millionaire?’ game students are asked questions about different capacities. The following game can be used for converting units of volume: <a href="http://www.primaryresources.co.uk/maths/powerpoint/Measures_1_ml.ppt">http://www.primaryresources.co.uk/maths/powerpoint/Measures_1_ml.ppt</a>. Students are divided into groups of 2 and take turns to answer the questions posed in this interactive power point presentation. | 7.1 Students will be able to convert units of length, mass (weight) and volume (capacity) to smaller units and vice-versa. 6.3 Students will be able to convert units of length, mass (weight) and volume (capacity) to smaller units. 6.2 Students will be able to convert units of length and mass (weight) to smaller units and vice versa. 6.1 Students will be able to convert km to m, m to cm and cm to mm. 5.3 Students will be able to convert whole units to smaller units. |</p>
<table>
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<tbody>
<tr>
<td><strong>3. Solve simple problems involving</strong>&lt;br&gt;addition, subtraction, multiplication and division of metric measures.</td>
<td>Teacher provides students with real-life problems. The teacher can present students with problem solving situations related to the data gathered from the empty food containers. In groups, students are presented with contextualized problems to use:&lt;br&gt;• addition (e.g.: total weight of portions of cereal taken by a number of people; total capacity of drinks)&lt;br&gt;• subtraction (e.g.: amount left in container)&lt;br&gt;• division (e.g.: number of portions possible from a particular pack)&lt;br&gt;• multiplication (e.g.: working out recipe quantities needed)</td>
</tr>
<tr>
<td><strong>7.1 Students will be able to add, subtract, multiply and divide quantities; be able to solve simple problems related to metric measures.</strong></td>
<td><strong>6.3 Students will be able to add, subtract, multiply and divide quantities of length, mass (weight) and capacity.</strong></td>
</tr>
<tr>
<td><strong>6.3 Students will be able to add, subtract, multiply and divide quantities of length, mass (weight) and capacity.</strong></td>
<td><strong>6.2 Students will be able to add, subtract and multiply quantities of length, mass (weight) and capacity.</strong></td>
</tr>
<tr>
<td><strong>5.3 Students will be able to add, subtract, multiply and divide whole numbers.</strong></td>
<td><strong>6.1 Students will be able to add and subtract quantities of length, mass (weight) and capacity.</strong></td>
</tr>
</tbody>
</table>
4. Write time using 12-hour and 24-hour clock, convert 12-hour to 24-hour clock and vice-versa, read and use a calendar.

Students are divided in small groups, and each group is given the ‘Clock Faces Stamps’. Groups create charts showing what they do during the day together with the times, shown on the clock face as well as the time written in 12-hour and 24-hour clock notation.

The teacher projects the activity ‘Time Passing’ found at: http://doorwayonline.org.uk/abouttime.html. For a discussion on what happens during the different times of the day.

The following site can be used in the background throughout the whole lesson:
http://www.wmnet.org.uk/wmnet/custom/files_uploaded/uploaded_resources/503/clock.swf. The site presents time (that can be adjusted) shown: on a large analogue clock, on a 12-hour or 24-hour digital clock and displayed in words.

Group activities ‘Setting the Clock’ and ‘What time is it?’ are found at: http://doorwayonline.org.uk/abouttime.html. Students show the time given in words (or in audio) on a clock or match the time written in words with the time shown on the clock.


This game caters for students with different levels of understanding: http://www.bbc.co.uk/schools/ks1bitesize/numeracy/time/index.shtml.

Students answer questions related to the time presented on the analogue clock.

Students are divided into 12 groups, each group is assigned a different month. Students design a calendar page for the assigned month and add any information such as feasts, important days and other students’ birthdays in their calendar.

7.1 Students will be able to convert the 12-hour clock to 24-hour clock (five minute intervals) and vice-versa; read a calendar.

6.3 Students will be able to use the 12-hour clock; be able to read and write the time in hour, half hour and a quarter hour, an hour later or before.

6.2 Students will be able to use the 12-hour and be able to read and write the time in hour, half hour and quarter hour.

6.1 Students will be able to read the 12-hour clock in analogue and digital and write the time in hour, half hour and quarter hour.

5.3 Students will be able to read the 12-hour clock in analogue and digital and write the time in hour and half hour.
| | A group activity can be found at: [http://www.mrnussbaum.com/calendarclowns.htm](http://www.mrnussbaum.com/calendarclowns.htm). Students are placed in groups of two and take turns answering questions relating to different dates of a particular month displayed on a calendar.

A class activity can be found at: [http://www.primaryresources.co.uk/maths/powerpoint/Calendar_wwtbam.ppt](http://www.primaryresources.co.uk/maths/powerpoint/Calendar_wwtbam.ppt). In this power point presentation, students answer questions about the different months of the year, what specific important dates are called and how dates can be written. | |
**Subject:** MATHEMATICS  
**Strand 3:** Shapes, Space and Measures  
**Unit code and title:** MTH 7.6 Father Time and Other Measure Friends *(Levels 1 – 4)*  
**Unit Duration:** 9 sessions

### OBJECTIVES at attainment level 5,6,7,

1. Measure the length of objects.
2. Convert metric units of length, mass (weight) and volume (capacity) to smaller units and vice-versa.
3. Solve simple problems involving addition, subtraction, multiplication and division of metric measures.
4. Write time using 12-hour and 24-hour clock; convert 12-hour to 24-hour clock and vice-versa; read and use a calendar

### OBJECTIVES at attainment levels 1,2,3,4

1.1 Students will know and make use of units of length to do measurement.
2.1 Students will use language related to length and weight to compare quantities.
3.1 Students associate activities and events with different times of the day and are able to sequence events in order of occurrence.
4.1 Students will read and report the time on an analogue and digital clock by the hour and half hour.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Time, calendar, day, month, date, units, length, ruler, centimeters, meters, weight, scales, grams, kilograms, capacity, volume, milliliters, litres, full, empty, heavier, lighter, longer, shorter, taller, smaller. | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7  
Software: Ilearn Maths, Calculator, Excel  
Worksheets  
Internet Links:  
[www.sparklebox.co.uk](http://www.sparklebox.co.uk)  
[http://www.priorywoods.middlesbrough.sch.uk](http://www.priorywoods.middlesbrough.sch.uk)  
[http://www.mrnussbaum.com/calendarclowns.htm](http://www.mrnussbaum.com/calendarclowns.htm)  
[http://www.primaryresources.co.uk/maths/powerpoint/Calendar_wwtbam.ppt](http://www.primaryresources.co.uk/maths/powerpoint/Calendar_wwtbam.ppt) |
<table>
<thead>
<tr>
<th>Teaching objective</th>
<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| 1.1 Students will know and make use of units of length to do measurement.        | **Starter:** Students are given various objects of the different sizes. They either talk about or sort or just feel their differences. This will help the teacher in diagnosing the already existent knowledge that they have about sizes.   | Students will: Use a standard measurement tool to measure the length of an object. (Level 4)  
Students are asked to measure the length of the table by using the palm of their hands. Due to the different sizes, the teacher discusses or elicits from them the idea of having the same measurement tool—the use of the metre ruler.  
Students compare the length of objects with towers of cubes or to a number line with numbers not exceeding the recognition expected at their age.  
Students will be able to match or sort objects by their length, long with long and short with short. Students use their visual skills to follow the length of an object.  
                                                                                       | **Read the length value on the number line or else by counting.**  
Students will: Use a standard measurement tool to measure the length of an object. (Level 4)  
Students are asked to measure the length of the table by using the palm of their hands. Due to the different sizes, the teacher discusses or elicits from them the idea of having the same measurement tool—the use of the metre ruler.  
Students compare the length of objects with towers of cubes or to a number line with numbers not exceeding the recognition expected at their age.  
Students will be able to match or sort objects by their length, long with long and short with short. Students use their visual skills to follow the length of an object.  
                                                                                       | **Match and sort objects into categories by size.**  
Students will: Use a standard measurement tool to measure the length of an object. (Level 4)  
Students are asked to measure the length of the table by using the palm of their hands. Due to the different sizes, the teacher discusses or elicits from them the idea of having the same measurement tool—the use of the metre ruler.  
Students compare the length of objects with towers of cubes or to a number line with numbers not exceeding the recognition expected at their age.  
Students will be able to match or sort objects by their length, long with long and short with short. Students use their visual skills to follow the length of an object.  
                                                                                       | **Encounter objects and develop sensory-motor skills through activities related to measurement.**  
Students will: Use a standard measurement tool to measure the length of an object. (Level 4)  
Students are asked to measure the length of the table by using the palm of their hands. Due to the different sizes, the teacher discusses or elicits from them the idea of having the same measurement tool—the use of the metre ruler.  
Students compare the length of objects with towers of cubes or to a number line with numbers not exceeding the recognition expected at their age.  
Students will be able to match or sort objects by their length, long with long and short with short. Students use their visual skills to follow the length of an object.  
                                                                                       |                                                                                       |
| 2.1. Students will use language related to length, weight and volume to compare quantities. | **Starter:** Students are shown two clips of different workmen. One is carrying a stone whilst the other is carrying a book. They have to indicate by their means with which they would associate themselves.  
Students experience different weights. They are given bags with different weights and at least they have to indicate which is the heaviest and the lightest. Furthermore they are given a set of objects and they become aware of the concept that with two heavy objects one can be heavier than the other. Also in cooking making activities they will be able to match the weight of two bags of flour with a selection of equal number of bags of the same weight.  
Students are presented with two contrasting objects say an apple and a shopping bag. They will hold the apple in their hands and walk and run with it whilst with the shopping bag they try to lift but realize that it either does not move or else they have to drag it along as it is too heavy to lift.  
Students experience heavy and light, grasping and holding of light objects whilst heavier objects are experienced through grasp and release. Similar activities can be done to compare the volumes of two objects. | Students will be able to:  
Name three objects that are longer/shorter, heavier/lighter than a given object. (Level 4)  
Choose the longer/shorter, heavier/lighter object from a set. (Level 3)  
Match and sort objects by a criteria. (Level 2)  
Experience heavy and light material through grasp and release. Encounter and respond to objects taller than them by lifting their head and looking upwards. (Level 1)                                                                                       |
### 3.1 Students associate activities and events with different times of the day and are able to sequence events in order of occurrence

**Starter:** Students are given two visual cards representing sunset and sunrise. Then they are given different situations, which, they have to put under the correct heading.

They start classifying the events in terms of morning, mid-day and evening. Then they will be able to put them in order of occurrence.

Students are shown different pictures of particular events like waking up, breakfast, school start, lunch, watching TV and going to bed.

Students are shown visual cards with a sequence of events like the alarm clock, getting out of bed, wash their face, putting on clothes and breakfast. Using interactive story they discuss the events the right order.

Students are shown a picture of a daily event e.g. someone getting up in the morning. They are presented with a bowl to wash their face. This is repeated with different events of the day.

**Students will:**
- Put ten daily events in sequence and talk about whether they occur in the morning, afternoon or evening.
  - (Level 4)
- Identify morning and afternoon activities by being able to put in sequence three to five activities of a day in order.
  - (Level 3)
- Distinguish between things they could see during the day and the night.
  - (Level 2)
- Acknowledges peers and adults at the time they meet them.
  - (Level 1)

### 4.1 Students will read and report the time on an analogue and digital clock by the hour and half hour.

**Starter:** Students are given a clock without numbers and they have to put the numbers in the right order.

Students learn to read the time by the hour by associating the hour to particular activities, e.g. the news bulletin at 8pm. Eventually, they will be given the time and they show it on the clock. This is extended to the half past.

Teacher shows an analogue clock and together with the teacher they point to the numbers and say them. Then, the students are given a clock with missing numbers and they have to fill it in.

Students are shown the IWB stopwatch. Students are asked to start working on an activity when the stopwatch starts and they have to stop when the time allotted runs out.

Students will focus their attention on a sound making object from beginning to end.

**Students will:**
- Read the clock to the hour and half an hour. They will enter the hands given the time and start linking the analogue with its respective digital time.
  - (Level 4)
- Complete the clock by placing the correct numbers into the missing slots.
  - (Level 3)
- Become aware of beginning and end of an activity and they will start and stop accordingly.
  - (Level 2)
- Encounter and experience the idea of a timer.
  - (Level 1)
**Subject:** MATHEMATICS  
**Strand:** Shape, Space and Measures  
**Unit code and title:** MTH 7.7 Constructions and Scale Drawing (Levels 7.1 – 8.1)  
**Duration:** 9 sessions

<table>
<thead>
<tr>
<th>Key Words</th>
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</table>
| Construction, sketch, drawing, ruler and compasses, protractor | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics. | FOM A2 Student’s Book, Practice Book, Resource Pack – Chapters 12 and 15  
From Teacher’s Laptop  
C:\Documents and Settings\schools_home\My Documents\Maths PowerPoint Shows  
• Construct a triangle (SSS)  
• Construct a triangle (SAS)  
• Construct a triangle (ASA)  
• Construct an angle of 60°  
Cabri Geometre Software  
GeoGebra Software  
Internet Links: [http://www.mathsnet.net/curriculum.html](http://www.mathsnet.net/curriculum.html) |

The teacher will teach students to:  
1. Construct an angle of 60° using ruler and compasses only; a triangle given the length of the sides using ruler and compasses only; a triangle given the length of one side and two angles; a triangle given the length of two sides and the included angle.  
2. Understand and use a scale when it is written as a fraction or as a ratio; interpret the scale on plans and draw simple scale drawings.
<table>
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<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach students to:</td>
<td></td>
<td>8.1 Students will be able to construct triangles given the length of two sides and the included angle (60°), using ruler and compasses only.</td>
</tr>
<tr>
<td>1. Construct an angle of 60° using ruler and compasses only; a triangle given the length of the sides using ruler and compasses only; a triangle given the length of one side and two angles; a triangle given the length of two sides and the included angle.</td>
<td>Teacher introduces the topic using the power-point presentations available. Students can view the presentation and practice constructions working at their own pace. At the computer lab, students work individually/in pairs and go through each of the four power-point presentations to find out about constructing angles, lines and triangles. During whole-class instruction, the teacher can ask students to discuss the work they covered during their practice with constructions and assess their learning through this activity. The teacher can provide other exercises where students construct different triangles.</td>
<td>7.3 Students will be able to construct triangles given the length of one side and two angles; the length of two sides and the included angle using ruler and protractor. 7.2 Students will be able to construct triangles given the three sides, using ruler and compasses only. 7.1 Students will be able to construct an angle of 60°, using ruler and compasses only.</td>
</tr>
<tr>
<td>2. Understand and use a scale when it is written as a fraction or as a ratio, interpret the scale on plans and draw simple scale drawings.</td>
<td>Teacher can present students with an activity where they are asked to make a scale drawing of the school netball court or tennis court. The teacher can ask students to do a sketch of the court and provide measuring tape for students to take the necessary measurements. In groups of 4, students are asked to measure the necessary lengths of the court as accurately as possible and include these measurements in their sketch. Then they will be required to round each measurement to the nearest whole number. During whole-class discussion of the results, the students can be introduced to the use of ratios in finding a suitable scale. Students will then be asked to do a scale drawing on 1cm squared paper.</td>
<td>8.1 Students will be able to draw simple scale drawings. 7.3 Students will be able to find missing lengths from scale drawings. 7.2 Students will be able to use a scale to find the real length of an object. 7.1 Students will be able to use a scale written as a fraction and as a ratio.</td>
</tr>
</tbody>
</table>
**Digital Technology Enhanced Learning - Maths eLearning Entitlement**

**Unit MTH 7.7 Constructions and Scale Drawing**

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be encouraged to record and describe their own work using a basic digital video camera (the video capabilities on most mobile phone would suffice for this exercise). Students can then upload their work on either their own blog or their private e-portfolio space.

The use of floor robots like Roamer Too or the TTS Probot (available for evaluation purposes from the Curriculum Management and e-Learning Centre) can enhance the students’ experience of scale drawing and construction of triangles.

Students can use Geogebra [http://www.geogebra.org/cms/](http://www.geogebra.org/cms/) or Cabri to construct and investigate the properties of triangles.


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1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Shape, Space and Measures
Unit code and title: MTH 7.7 Constructions and Scale Drawing (Levels 6.3 – 7.3)
Duration: 9 sessions

Objectives
The teacher will teach students to:
1. Construct an angle of 60° using ruler and compasses only; a triangle given the length of the sides using ruler and compasses only; a triangle given the length of one side and two angles; a triangle given the length of two sides and the included angle.
2. Understand and use a scale when it is written as a fraction or as a ratio; interpret the scale from simple scale drawings.

Key Words
| Construction, sketch, drawing, ruler and compasses, protractor |
| Scale, plan, scale drawing, measuring tape, ratio |

Points to note
Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
- FOM A1 Student’s Book, Practice Book, Resource Pack – Chapter 12 and 15
- From Teacher’s Laptop C:\Documents and Settings\schools_home\My Documents\Maths PowerPoint Shows
  - Construct a triangle (SSS)
  - Construct a triangle (ASA)
  - Construct an angle of 60°
- Cabri Geometre Software
- GeoGebra Software
- Internet Links: http://www.mathsnet.net/curriculum.html
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<td>The teacher will teach students to:</td>
<td>Teacher introduces the topic using the power-point presentations available. Students can view the presentation and practice constructions working at their own pace. At the computer lab, students work individually/in pairs and go through each of the four power-point presentations to find out about constructing angles, lines and triangles. During whole-class instruction, the teacher can ask students to discuss the work they covered during their practice with constructions and assess their learning through this activity. The teacher can provide other exercises where students construct different triangles.</td>
<td>7.3 Students will be able to construct triangles given the length of one side and two angles; the length of two sides and the included angle using ruler and protractor. 7.2 Students will be able to construct triangles given the three sides, using ruler and compasses only. 7.1 Students will be able to construct an angle of 60°, using ruler and compasses only. 6.3 Students will be able to use a protractor to measure and draw angles up to 180°.</td>
</tr>
<tr>
<td>1. Construct an angle of 60° using ruler and compasses only; a triangle given the length of the sides using ruler and compasses only; a triangle given the length of one side and two angles; a triangle given the length of two sides and the included angle.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Understand and use a scale when it is written as a fraction or as a ratio; interpret the scale from simple scale drawings.</td>
<td>Teacher can ask students to draw a sketch of the schools’ tennis court and then take actual measurements. In class the teacher provides students with a scale drawing of the tennis court and asks the students to compare the readings and identify the scale used. This activity would ideally be done in groups. During whole-class discussion of the results, the students can present their findings and use ratios to assign a suitable scale. Students can be provided with other similar examples of maps, photographs etc. to understand using and finding the ratio, fraction or scale factor of each situation. The teacher can then assign students with textbook exercises related to writing scales as a ratio or fraction.</td>
<td>7.3 Students will be able to find missing lengths from scale drawings. 7.2 Students will be able to use a scale to find the real length of an object. 7.1 Students will be able to use a scale written as a fraction and as a ratio. 6.3 Students will be able to express the scale as a simplified ratio.</td>
</tr>
</tbody>
</table>
Subject: MATHEMATICS
Strand: Shapes, Space and Measures
Unit code and title: MTH 7.7 Constructions and Scale Drawing (Levels 5.3 – 7.1)
Form: 1 Duration: 9 sessions

Objectives
The teacher will teach students to:
2. Understand a scale when it is written as a ratio; find the scale from simple scale drawings.

Key Words
Construction, sketch, drawing, ruler, set squares
Scale, plan, scale drawing, measuring tape, ratio

Points to Note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students Discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
Show-me-board; Measuring tape; Ruler
Set Squares; Ribbon; Chalk
Graph paper of different measurements.
Similar objects of different sizes.

Internet Links:
http://nrich.maths.org/content/id/4785/cat%20grids.doc
<table>
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<tr>
<td>The teacher will teach the students to:</td>
<td>The teacher prepares a piece of ribbon 10.5 metres long. The ribbon is tied together so that the perimeter of the loop of ribbon is 10 metres. The ribbon is put on the floor. Four students are asked to hold the ribbon and make a square. Use coloured chalk to trace the square. The students measure the sides of the square to be sure that they are all equal. Another four students hold the ribbon to form a rectangle which is traced using a different coloured chalk. Other rectangles can be formed using the same procedure. A similar activity can be done but this time by using mathematical software (Cabri geometry and/or Microworlds Logo). These enable the students to draw rectangles and squares of different sizes. A discussion about the sides and angles of these rectangles follow these activities. This leads to the students realising that the rectangle is made up of two triangles and so it can be constructed by using set squares and protractors. The students are then given time to construct rectangles of different sizes by using set squares only. Their work can then be presented to the class and displayed in the classroom.</td>
<td>7.1 Students will be able to construct an angle of 60°, using ruler and compasses only. 6.3 Students will be able to use a protractor to measure and draw angles up to 180°. 6.2 Students will be able to draw squares and rectangles using ruler and set squares. 6.1 Students will be able to identify and draw right angles using set squares. 5.3 Students will be able to measure and draw lines using a ruler.</td>
</tr>
</tbody>
</table>

http://skola.gov.mt/maths/Logo_Workcards/Squares_1_and_2.doc
http://skola.gov.mt/maths/Logo_Workcards/Rectangles_1_and_2.doc
http://skola.gov.mt/maths/Logo_Workcards/Rectangles_3_and_4.doc
| 2. Understand a scale when it is written as a ratio; find the scale from simple scale drawings. | As an introduction, students are shown photos of buildings, models of popular landmarks, blueprints and maps. The students are then asked what these objects represent and about their use. At this point, it comes out that real objects/scenery etc. sometimes need to be planned in order to be built/captured. A discussion will be held to direct students to deduce that a smaller object/drawing etc. is needed before the real thing is built or scenery captured on a smaller scale. The following video can then be used to conclude the discussion. [http://www.youtube.com/watch?v=W9utg_2w0_Q&feature=related](http://www.youtube.com/watch?v=W9utg_2w0_Q&feature=related) Students are grouped in groups of four. Each group is given sets of drawings, or objects and is given the opportunity to discuss their ideas about these similar objects. Students using rulers/measuring tape etc. will realize that objects could be double the size, half the size etc. The following video can be used to conclude the discussion. [http://www.youtube.com/watch?v=Cv7_CVD6_Yk&feature=related](http://www.youtube.com/watch?v=Cv7_CVD6_Yk&feature=related) Alternatively, students are provided with patterns of different sizes. They draw an outline around these patterns on paper. Then, they use measuring tools to determine the scale of the objects drawn. The work produced will be presented to the whole class and eventually exhibited on charts in class. Each student is provided with three laminated grids, a 1cm grid, a 2 cm grid and a ½ cm grid. Simple drawings such as lines and shapes are drawn on the 1 cm grid. The students’ task is to draw these objects on the 2cm grid and the ½ cm grid. At this point, the students are asked to measure the dimensions to explore what is happening between the grids. [http://www.blackdoglas.com.au/taskcentre/041scale.htm](http://www.blackdoglas.com.au/taskcentre/041scale.htm) [http://nrich.maths.org/content/id/4785/cat%20grids.doc](http://nrich.maths.org/content/id/4785/cat%20grids.doc) Students are grouped in pairs to use the computer to work on the links below and where necessary recorded on their copybooks: [http://www.math4children.com/Grade5/quizzes/Ratios,%20proportions,%20percents/Scale%20conversions/Scale%20drawings/index.html](http://www.math4children.com/Grade5/quizzes/Ratios,%20proportions,%20percents/Scale%20conversions/Scale%20drawings/index.html) [http://www.studystack.com/flashcard-177531](http://www.studystack.com/flashcard-177531) (ignore imperial units) | | | 7.1 Students will be able to use a scale written as a fraction and as a ratio. 6.3 Students will be able to express the scale as a simplified ratio. 6.2 Students will be able to express the scale as a ratio. 6.1 Students will be able to measure lengths from drawings. 5.3 Students will understand that objects are drawn in different sizes according to a given scale. |
Subject: Mathematics
Strand 3: Shapes, Space and Measures
Unit code and title: MTH 7.7 Understand how to draw simple scale drawings (Levels 1 – 4)

OBJECTIVES at attainment level 5, 6, 7
2. Understand a scale when it is written as a ratio; find the scale from simple scale drawings.
   The mainstream objectives 1 and 2 are not relevant at this level of attainment, but the topic is very important and so extra objectives are included.

OBJECTIVES at attainment level 1, 2, 3, 4
1.1 Students will learn to measure and compare the lengths of objects and the distance between two objects.
2.1 Students will learn to make and describe patterns using construction kits.

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<td>Big and small, bigger and smaller, long and short, longer and shorter, more, less, what’s next?, continue the pattern, model.</td>
<td>In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.</td>
<td>New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7 Software: Ilearn Maths, Calculator, Excel Worksheets Plasticine, strips of paper, towers. Magnifying glasses, dominoes, scissors, sponges Internet Links: <a href="http://www.ngfl-cymru.org.uk/vtc/big_small/eng/introduction/">http://www.ngfl-cymru.org.uk/vtc/big_small/eng/introduction/</a> <a href="http://www.onlinemathlearning.com/heavy-and-light.html">http://www.onlinemathlearning.com/heavy-and-light.html</a> <a href="http://www.ictteachers.co.uk/resources/resources_numeracy.htm">http://www.ictteachers.co.uk/resources/resources_numeracy.htm</a></td>
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<tr>
<td>--------------------</td>
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<td>---------------------------------</td>
</tr>
<tr>
<td>1.1 Students will learn to measure and compare the lengths of objects and the distance between two objects.</td>
<td><strong>Starter:</strong> Students are presented with a group of big and small objects. Teacher asks them to point, sort or talk about them so she can take stock of what they know and proceed from there. Students are given a grid with a small and a big square drawn on it. Teacher asks them to count the number of cubes covered by the square and eventually they will compare them and talk about their sizes. Similarly, students are given two locations within their immediate environment and they have to compare the distances. Students are given a set of objects and they choose the smaller/shorter and put them in order of size according to their length. Students will be able to sort objects according to their size. Teachers use a magnifier or a visualiser to enlarge objects.</td>
<td>Students will be able to: Use objects to find the length and width and talk about the size differences. (Level 4) Recognise and choose the smaller/shorter and then the largest/tallest from a set. (Level 3) Make sets of objects by size. (Level 2) Become aware that things can be enlarged. (Level 1)</td>
</tr>
<tr>
<td>2.1 Students will learn to make and describe patterns using construction kits.</td>
<td><strong>Starter:</strong> Students are shown a sequence of shapes in a diagram and with guidance they talk about they see so the teacher can identify whether they have any idea of sequences. Students are presented with a model made up of shapes. Then they are given a copy of the same shape but with missing shapes. They have to complete the model. Students are presented with a simple model and an enlarged outline of that same model. By using construction shapes; they have to fill the outline to make the model thus giving them the idea that the model can be represented on a bigger scale. At a lower level, students will be able to match identical picture patterns together. Students will explore a small and a bigger version of the same object.</td>
<td>Students will be able to: Decide on the missing shape and put the correct shape into the pattern. (Level 4) Use the right construction tools to make an enlarged version of a model. (Level 3) Match up to 6 familiar objects. (Level 2) Become aware and engage in the exploration of objects of different sizes. (Level 1)</td>
</tr>
</tbody>
</table>
Subject: MATHEMATICS

Strand: Number / Algebra

Unit code and title: MTH 7.8 Accuracy, Number Machines and Patterns (Levels 7.1 – 8.1)

Objectives
The teacher will teach students to:

1. Round numbers to the nearest whole, 10, 100 or 1000; to one or two decimal places and to carry out rough estimates to check accuracy.
2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms.
3. Construct number machines, describe number machines verbally and symbolically, obtain the input/output using a number machine.
4. Find the rule for a number machine of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; use letters to represent the input/output of number machines and use number machines to form and solve simple linear equations.

Key Words

Estimation, rounding, approximation, nearest to, decimal places, whole numbers.
Number machine, rule, input, output, equation, solve.

Points to note

Three main teaching approaches are being recommended.

**Exposition**: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery**: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration**: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources

- FOM A2 Student’s Book, Practice Book, Resource Pack – Chapters 24, 23 and 14
- From Teacher’s Laptop
- C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons
  - Rounding
  - Function Machines

Internet links:

- [http://www.geocities.com/SiliconValley/2902/magic.htm](http://www.geocities.com/SiliconValley/2902/magic.htm)
- [http://www.aplusmath.com/Flashcards/rounding.html](http://www.aplusmath.com/Flashcards/rounding.html)
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| **The teacher will teach students to:**                                           | **Teacher introduces the topic by reviewing place value before starting this lesson. The teacher can then use practical examples for rounding figures. Provide students with figures involving:**  
  - Population: class, school, country etc. – correct to the nearest 10, 100 and 1000 (1 lesson).  
  - Weight: objects, people etc. – correct to one and two decimal places.  
  - Length and distances – in cm and m, correct to one and two decimal places  
  - Money – correct to one decimal place (1 lesson)  
  Students could be asked to round the figures presented to a sensible degree of accuracy.  
  - Use *Rounding* excel lesson as an assessment task of the above.  
  Students can be presented with the following:  
  - Lengths and weights of objects to give approximate values  
  - A bill of items to estimate the total cost  
  - Dimensions of a room to calculate area | **8.1 Students will be able to use rounded numbers and carry out rough estimates in context.**  
  **7.3 Students will be able to round numbers to one or two decimal places and carry out rough estimates.**  
  **7.2 Students will be able to round numbers to one decimal place and carry out rough estimates.**  
  **7.1 Students will be able to round any given number to the nearest whole number, 10, 100 or 1000 and carry out rough estimates.**                                                                                                                   |
| **2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms.** | **Teacher can set students a task where they create patterns using sticks, coins, counters, marbles, beads, cubes etc. In groups students construct and explore patterns using the above resources. Each group can present their work to the whole class and through a whole-class discussion they can continue the pattern.**  
  Students investigate and identify arithmetic and geometric sequences using the site: [http://www.ixl.com/math/year6/](http://www.ixl.com/math/year6/) | **8.1 Students will be able to recognise and continue complex number patterns.**  
  **7.3 Students will be able to recognise and continue complex pictorial patterns.**  
  **7.2 Students will be able to recognise complex pictorial patterns.**  
  **7.1 Students will be able to recognise and continue number patterns of the form \( n \pm k \) or \( kn \) here \( k \) is a positive integer.**                                                                                                                   |
| **3. Construct number machines, describe number machines verbally and symbolically, obtain the input/output using a number machine.** | **Teacher starts introducing the teaching objectives by using the excel lesson *Function Machines*. In pairs or individually, students can work on lesson 1 of *Function Machines*** | **8.1 Students will be able to work out the input/output of complex number machines.**  
  **7.3 Students will be able to work out the input of**                                                                                                           |
and investigate the three patterns provided. Students can then be asked to construct their own number machines and ask others to find the missing outputs.

In the next lesson, students can be introduced to describing rules and writing it down in words. Students can be introduced to simple number machines as below and asked to describe each rule.

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
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<td>4</td>
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<td>7</td>
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<table>
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<tr>
<th>x</th>
<th>y</th>
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<tbody>
<tr>
<td>1</td>
<td>5</td>
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<td>2</td>
<td>10</td>
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<tr>
<td>3</td>
<td>15</td>
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<tr>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td>25</td>
</tr>
</tbody>
</table>

Through a discussion lesson, point to the opportunity to discuss why it might be better to use letters rather than words. As a follow-up activity, students can carry out lesson 2 of Function Machines to understand how to use a rule to generate the output.

4. Find the rule for a number machine of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; use letters to represent the input/output of number machines and use number machines to form and solve simple linear equations.

The students engage in a cooperative learning activity. As an initial task, students working in groups of 3 or 4 can construct their own number machines and ask others to find the rule.

After a whole class discussion of the activity, the students return to their group and form an equation using \( x \) and \( y \) as the input and output of the number machines.

A final activity would involve students in finding their own way to solve the rule as in the example below.

8.1 Students will be able to use number machines to form and solve simple linear equations of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.

8.3 Students will be able to use letters to represent the input and output of a number machine of the form \( n \pm k \) where \( k \) is a positive integer.

8.2 Students will be able to write in words the rule for a number machine of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.

7.1 Students will be able to describe verbally and symbolically number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer and work out their output.

7.2 Students will be able to work out the input of number machines of the form \( n \pm k \) where \( k \) is a positive integer.

7.3 Students will be able use letters to represent the input and output of number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.8 Accuracy, Number Machines and Patterns

Students can practise their abilities to find the rules that govern the function machines in a game environment at:

http://teams.lacoe.edu/documentation/classrooms/amy/algebra/3-4/activities/functionmachine/functionmachine3_4.html

which is the first and easiest of the three suggestions for this objective. http://teams.lacoe.edu/documentation/classrooms/amy/algebra/5-6/activities/functionmachine/functionmachine5_6.html

is slightly more difficult than the 3 to 4 level while http://teams.lacoe.edu/documentation/classrooms/amy/algebra/6-8/activities/build/build.html

is the challenge that could be given to the more able students. All three games can be played online without any required registration.

Students can also be helped to reach objective 4 by playing online or using an interactive whiteboard for a whole class activity at:

http://www.teacherled.com/resources/functionmachine/functionmachineload.html

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS

Strand 1: Number / Algebra

Unit code and title: MTH 7.8 Accuracy, Number Machines and Patterns (Levels 6.3 – 7.3)

Duration: 9 sessions

Objectives

The teacher will teach students to:

1. Round numbers to the nearest whole unit, 10, 100 or 1000; to one or two decimal places and to carry out rough estimates to check accuracy.
2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms.
3. Construct number machines, describe number machines verbally and symbolically, obtain the input/output using a number machine.
4. Find the rule for a number machine of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; use letters to represent the input/output.

Key Words

- Estimation, rounding, approximation, nearest to, decimal places, whole numbers.
- Number machine, rule, input, output, equation, solve.

Points to note

Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources

- FOM A1 Student’s Book, Practice Book, Resource Pack – Chapters 24, 23 and 14
- From Teacher’s Laptop
  - C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons
    - Rounding
    - Function Machines
- Internet links:
  - [http://www.geocities.com/SiliconValley/2902/magic.htm](http://www.geocities.com/SiliconValley/2902/magic.htm)
  - [http://www.aplusmath.com/Flashcards/rounding.html](http://www.aplusmath.com/Flashcards/rounding.html)
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<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| The teacher will teach students to: | Teacher introduces the topic by reviewing place value before starting this lesson. The teacher can then use practical examples for rounding figures. Provide students with figures involving:  
- Population: class, school, country etc. – correct to the nearest 10, 100 and 1000.  
- Weight: objects, people etc. – correct to one and two decimal places.  
- Length and distances – in cm and m, correct to one and two decimal places  
- Money – correct to one decimal place.  
Students could be asked to round the figures presented to a sensible degree of accuracy.  
- Use *Rounding* excel lesson as an assessment task of the above.  
Students can be presented with the following:  
- Lengths and weights of objects to give approximate values  
- A bill of items to estimate the total cost  
- Dimensions of a room to calculate area | 7.3 Students will be able to round numbers to one or two decimal places and carry out rough estimates.  
7.2 Students will be able to round numbers to one decimal place and carry out rough estimates.  
7.1 Students will be able to round any given number to the nearest whole number, 10, 100 or 1000 and carry out rough estimates.  
6.3 Students will be able to round a given number to the nearest whole number. |
| 1. Round numbers to the nearest whole unit, 10, 100 or 1000; to one or two decimal places and to carry out rough estimates to check accuracy. | Teacher can set students a task where they create patterns using sticks, coins, counters, marbles, beads, cubes etc.  
In groups students construct and explore patterns using the above resources. Each group can present their work to the whole class and through a whole-class discussion they can continue the pattern.  
Students investigate and identify arithmetic and geometric sequences using the site: [http://www.ixl.com/math/year6/](http://www.ixl.com/math/year6/) | 7.3 Students will be able to recognise and continue complex pictorial patterns.  
7.2 Students will be able to recognise complex pictorial patterns.  
7.1 Students will be able to recognise and continue number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.  
6.3 Students will be able to continue number patterns of the form \( n \pm k \), where \( k \) is a positive integer. |
| 2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms. | | |
3. Construct number machines, describe number machines verbally and symbolically, obtain the input/output using a number machine.

Teacher starts introducing the teaching objectives by using the excel lesson *Function Machines.*

In pairs or individually, students can work on lesson 1 of *Function Machines* and investigate the three patterns provided. Students can then be asked to construct their own number machines and ask others to find the missing outputs.

In the next lesson, students can be introduced to describing rules and writing it down in words. Students can be introduced to simple number machines as below and asked to describe each rule.

| \( x \) | \( y \) | \( x \) | \( y \) |
| 1  | 3  | 1  | 5  |
| 2  | 4  | 2  | 10 |
| 3  | 5  | 3  | 15 |
| 4  | 6  | 4  | 20 |
| 5  | 7  | 5  | 25 |

Through a discussion lesson, point to the opportunity to discuss why it might be better to use letters rather than words. As a follow-up activity, students can carry out lesson 2 of *Function Machines* to understand how to use a rule to generate the output.

7.3 Students will be able to work out the input of number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.

7.2 Students will be able to work out the input of number machines of the form \( n \pm k \) where \( k \) is a positive integer.

7.1 Students will be able to describe verbally and symbolically number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer and work out their output.

6.3 Students will be able to describe number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer verbally and symbolically.
4. Find the rule for a number machine of the form $n \pm k$ or $kn$, where $k$ is a positive integer; use letters to represent the input/output.

Teacher can engage students in a cooperative learning activity.

As an initial task, students working in groups of 3 or 4 can construct their own number machines and ask others to find the rule.

After a whole class discussion of the activity, the students return to their group and form an equation using $x$ and $y$ as the input and output of the number machines.

A final activity would involve students in finding their own way to solve the rule as in the example below.

<table>
<thead>
<tr>
<th>INPUT</th>
<th>OUTPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>6</td>
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<tr>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

7.3 Students will be able use letters to represent the input and output of number machines of the form $n \pm k$ or $kn$ where $k$ is a positive integer.

7.2 Students will be able use letters to represent the input and output of a number machine of the form $n \pm k$ where $k$ is a positive integer.

7.1 Students will be able to write in words the rule for a number machine of the form $n \pm k$ or $kn$ where $k$ is a positive integer.

6.3 Students will be able to notice that numbers form a growing pattern.
**Subject:** MATHEMATICS  
**Strand:** Number / Algebra  
**Unit code and title:** MTH 7.8 Accuracy and Number Machines and Patterns *(Levels 5.3 – 7.1)*  
**Form 1**  
**Duration:** 9 sessions

### Objectives

The teacher will teach students to:

1. Round numbers to the nearest whole, 10, 100, or 1000 and carry out rough estimates to check accuracy.
2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms.
3. Construct simple number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; describe number machines verbally and symbolically; obtain the output using a number machine.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Estimation, rounding, approximation, nearest to, whole numbers. Number machine, input, output. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics. | FOM Gold A, Students’ Book and Resource Pack - Chapters 23, 22 and 14.  
Internet Links:  
[http://pbskids.org/cyberchase/games/functions/functions.html](http://pbskids.org/cyberchase/games/functions/functions.html) |
### Teaching Objective

The teacher will teach students to:

1. Round numbers to the nearest whole, 10, 100, or 1000 and carry out rough estimates to check accuracy.

### Examples of Teaching Experiences and Activities

Teacher gives a number and students have to identify which digit is with the value of tens, hundreds or thousands.

The teacher can show the following Power point presentation [http://math.pppst.com/rounding.html](http://math.pppst.com/rounding.html) to discuss with the students the rounding to the nearest 10 or 100.

Refer to the excel lesson- Rounding. With the following game, filling up on the relevant boxes students are given a work sheet with a list of numbers and after checking their work, they can take note of the answers. [http://www.funbrain.com/tens/index.html](http://www.funbrain.com/tens/index.html) - choose place value game

Alternatively the following game can be played in groups of twos [http://www.free-training-tutorial.com/rounding-games.html](http://www.free-training-tutorial.com/rounding-games.html)


Refer to excel lesson Rounding Numbers or [http://skola.gov.mt/maths/resources.htm](http://skola.gov.mt/maths/resources.htm)

This worksheet can be used [http://www.abcteach.com/free/m/mu_roundingtowholenumber.pdf](http://www.abcteach.com/free/m/mu_roundingtowholenumber.pdf)

### Indicators of Learning Outcomes

| 7.1 Students will be able to round any given number to the nearest whole number, 10, 100 or 1000 and carry out rough estimates. |
| 6.3 Students will be able to round a given number to the nearest whole number. |
| 6.2 Students will be able to round any whole number less than 1000 to the nearest 10 or 100. |
| 6.1 Students will be able to round any two-digit whole number to the nearest 10 and any three-digit whole number to the nearest 100. |
| 5.3 Students will be able to round whole numbers less than 100 to the nearest 10. |
| 2. Recognise arithmetic and geometric number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; continue patterns up to the next few terms. | Teacher can set students a task where they create patterns using sticks, coins, counters, marbles, beads, cubes etc.  
In groups students construct and explore patterns using the above resources. Each group presents their work to the whole class and through a whole-class discussion they can continue the pattern.  
Students investigate and identify arithmetic and geometric sequences using the site: [http://www.ixl.com/math/year6/](http://www.ixl.com/math/year6/) | 7.1 Students will be able to recognise and continue number patterns of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer.  
6.3 Students will be able to continue number patterns of the form \( n \pm k \) where \( k \) is a positive integer.  
6.2 Students will be able to recognise simple number patterns of the form \( n \pm k \) where \( k \) is a positive integer.  
6.1 Students will be able to continue simple pictorial patterns.  
5.3 Students will be able to recognise simple pictorial patterns. |

| 3. Construct simple number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer; describe number machines verbally and symbolically; obtain the output using a number machine. | The teacher can project this site [http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html](http://www.amblesideprimary.com/ambleweb/mentalmaths/functionmachines.html)  
The following [http://vimeo.com/4231208](http://vimeo.com/4231208) helps to see simple function machines with the addition rule.  
The following website gives the details of a game that can be played in pairs [http://letsplaymath.net/2008/05/13/game-function-machine/](http://letsplaymath.net/2008/05/13/game-function-machine/)  
Students can be grouped in twos or threes. Give them one or two tables with a few outputs for them to fill in. Ask them to describe in words what the function does.  
Students use the Excel lessons – Functions machines Lesson 1 | 7.1 Students will be able to describe verbally and symbolically number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer and work out their output.  
6.3 Students will be able to describe number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer verbally and symbolically.  
6.2 Students will be able to describe number machines of the form \( n \pm k \) or \( kn \) where \( k \) is a positive integer verbally and symbolically.  
6.1 Students will be able to construct simple number machines.  
5.3 Students will be able to describe and extend simple pictorial and number sequences. |
Subject: MATHEMATICS
Strand: NUMBER / ALGEBRA
Unit code and title: MTH 7.8 Accuracy and Number Machines and Patterns (Levels 1 – 4)  

**OBJECTIVES at attainment levels 5,6,7,8**

The teacher will teach students to:
1. Round numbers to the nearest whole, 10, 100, or 1000 and carry out rough estimates to check accuracy.
2. Recognise arithmetic and geometric number patterns of the form $n \pm k$ or $kn$ where $k$ is a positive integer; continue patterns up to the next few terms.
3. Construct simple number machines of the form $n \pm k$ or $kn$ where $k$ is a positive integer; describe number machines verbally and symbolically; obtain the output using a number machine

**OBJECTIVES at attainment levels 1,2,3,4**

1.1 Students will determine the nearest packet of ten and will be involved in estimation to identify the proximity of a number.
2.1 Students will give out and follow instructions.
3.1 Students will be able to identify the action that is leading to the end result.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Nearest to, next to, after, in between, close to, parts, whole, lots of, few. | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook. 
Oxford Framework Maths 7 Software: Ilearn Maths, Calculator, Excel Worksheets 
Internet Links: [http://www.mathplayground.com/functionmachine.html](http://www.mathplayground.com/functionmachine.html) (limited to level 1 only) 
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Students will determine the nearest packet of ten and will be involved in estimation to identify the proximity of a number.</td>
<td><strong>Starter:</strong> Students are shown a number line and they have to write on their dry erase boards the two numbers closest to ten and the two closest to 20. This helps the teacher to analyse whether the students have any idea of the word ‘nearest’. Students are presented with a number grid from 1 to 10. They draw up a card, find the matching number and count on to 10 and count back to 1, from the number on the card. The students compare the two distances and choose the smaller distance. Then they have a template to colour whether the chosen number is closer to 1 or to 10. Students are exposed to mathematical vocabulary like ‘close to’ or closer or nearer to or nearest. Students will make groups of contrasting quantities, e.g. 1 and 9. They compare them. Students will estimate the number of objects (up to 6) as shown on the ilearn Maths software and eventually check their estimation by counting. Activity can also be lowered down to just an identification of ‘lots of’ objects or ‘few’ objects. Students will match groups of same quantities. Students are presented with the interlocking cubes on the ilearn software and they have to build a similar one in length. Students are presented with a piano containing numbered musical points. They play a note close to one end and another note on the other side close to the other note. They listen and experience the difference in the sound outcome.</td>
<td>Students will: Count on from a given number and talk about the position of that number on a number line. (Level 4). Students will: Use number facts to add or subtract. (Level 4) Know the concept of add one and take away one. (Level 3) Students will follow short instructions like take one, add one, give one. Students will join in counting by rote up to 3. Students will: Make a close estimate by relying on their basic number value concept, e.g. be able to tell that there is more than 1, or else ‘lots of’ or ‘few’. Students will: Look at a given object and reproduce a similar one by copying in imitation and match groups of same quantities. (Level 3) Students will: Imitate an action to produce a sound and focus on an activity for a particular time. (Level 1) Familiarise themselves and try to vocalise when joining in rote counting.</td>
</tr>
<tr>
<td>2.1 Students will be able to give out and follow instructions.</td>
<td><strong>Starter:</strong> Teacher will put a statement for exploration, e.g. I think of a number, add 1, what is this number? Students will work with the function machine on the ilearn software. They decide the input number and the rule and work out the answer. Students will follow short instructions like take one, add one, give one. Students will join in counting by rote up to 3.</td>
<td>Students will: Use number facts to add or subtract. (Level 4) Know the concept of add one and take away one. (Level 3) Familiarise themselves and try to vocalise when joining in rote counting.</td>
</tr>
</tbody>
</table>
|   | Students will respond to adult instructions. | (Level 2)  
Be involved in activities of application of information.  
(Level 1) |
|---|---|---|
| 3.1 Students will identify the action that is leading to the end result. | Teacher writes two numbers on the board. Students have to guess how they can get the second number from the first. Eventually, they will generate their own numbers for others to guess the action.  
Students are presented with a picture of three objects and another one with two. Students are encouraged to talk about the two groups and that one has more and one has less.  
Using the above activity, students will give one object from a set thus observing the process of say having 3 objects and taking away one.  
Students are presented with an object which is then taken away. | Students will:  
Use addition and subtraction facts to find the hidden rule.  
(Level 4)  
Recognise the differences in quantities by using more or less.  
(Level 3).  
Understand the relation between cause and effect.  
(Level 2)  
Participate in activities involving objects in the line of vision and out of their sight.  
(Level 1) |
**Subject:** MATHEMATICS

**Strand 3:** Shape, space and Measures

**Unit code and title:** MTH 7.9 Polygons *(Levels 7.1 – 8.1)*

**Form 1**

**Duration:** 9 sessions

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**Objectives**

The teacher will teach students to:

1. Understand that the sum of the angles of a triangle is 180°, derive the sum of the angles of a quadrilateral from the angle sum property of a triangle and solve problems involving the angles of a triangle and of a quadrilateral.
2. Understand the term polygon and regular/irregular polygon.
3. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle, parallelogram, trapezium, rhombus, kite) using their geometric properties.
4. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

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<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
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<tbody>
<tr>
<td>Polygon: regular, non-regular, irregular, sides, angles, diagonals</td>
<td>Three main teaching approaches are being recommended.</td>
<td>FOM A2 Student’s Book, Practice Book, Resource Pack – Chapters 4 and 12</td>
</tr>
<tr>
<td>Triangle: scalene, isosceles, equilateral and right-angle</td>
<td><strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.</td>
<td>From Teacher’s Laptop</td>
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<tr>
<td>Quadrilateral: square, rectangle, trapezium, parallelogram, rhombus and kite</td>
<td><strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.</td>
<td>C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons</td>
</tr>
<tr>
<td>Circle: centre, radius, diameter and circumference, concentric circles, pattern, regular hexagon, compasses</td>
<td><strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.</td>
<td>C:\Documents and Settings\schools_home\My Documents\Maths PowerPoint Shows</td>
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**Resources**

- FOM A2 Student’s Book, Practice Book, Resource Pack – Chapters 4 and 12
- From Teacher’s Laptop
- C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons
  - Quadrilaterals
- C:\Documents and Settings\schools_home\My Documents\Maths PowerPoint Shows
  - Quadrilaterals
- Microworlds Software; Cabri Geometre Software; GeoGebra Software
- Internet Links: [http://www.mathsnet.net/curriculum.htm](http://www.mathsnet.net/curriculum.htm)
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<td>The teacher will teach students to:</td>
<td>The teacher extends the ideas of geometrical proof to angles in a triangle and a quadrilateral.</td>
<td>8.1 Students will appreciate the mathematical proof of the angle sum of a triangle and quadrilateral.</td>
</tr>
<tr>
<td>1. Understand that the sum of the angles of a triangle is 180°, derive the sum of the angles of a quadrilateral from the angle sum property of a triangle and solve problems involving the angles of a triangle and of a quadrilateral.</td>
<td>Investigative Activity: a) Angles in a Triangle Students draw a triangle on a piece of paper. They should cut out the triangle carefully, shade and cut out the angles. Fit them together. Put them together. What do you notice? b) Angles in a quadrilateral Draw a number of quadrilaterals. Draw a diagonal on each to result in two triangles from each quadrilateral. Use the sum of angles in a triangle to deduce the sum of the angles in a quadrilateral. ICT Activity: By drawing simple shapes such as squares, rectangles and triangles using simple LOGO commands such as FD, BK, RT, and REPEAT, to help students reflect upon the properties of these shapes.</td>
<td>7.3 Students will solve more complex problems involving the angles of triangles, including isosceles and quadrilaterals.</td>
</tr>
<tr>
<td></td>
<td>7.2 Students will know how to solve simple problems involving the angles of a triangle and of a quadrilateral.</td>
<td>7.1 Students will understand the angle sum properties of a triangle and of a quadrilateral.</td>
</tr>
<tr>
<td></td>
<td>7.1 Students will understand the term polygon.</td>
<td>8.1 Students will be able appreciate the properties of regular polygons related to sides, angles and diagonals.</td>
</tr>
<tr>
<td>2. Understand the term polygon and regular/irregular polygon.</td>
<td>Students are introduced to the topic by using flashcards with pictures with regular and irregular 2D shapes. Students select a flashcard of a 2D shape and talk about the selected shape and its properties. In groups, students classify the above shapes into groups of regular/irregular shapes.</td>
<td>7.3 Students will be able to understand the terms regular and irregular polygon.</td>
</tr>
<tr>
<td></td>
<td>7.2 Students will be able to distinguish between polygons that have equal/unequal sides.</td>
<td>7.1 Students will be able to understand the term polygon.</td>
</tr>
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</table>
3. **Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle, parallelogram, trapezium, rhombus, kite) using their geometric properties.**

   Students work in groups. Each group is given a set of flashcards with different types of triangles and quadrilaterals which they have to sort out.

   Students classify the above shapes and investigate their properties:
   - **Triangles** – scalene, isosceles and equilateral.
   - **Quadrilaterals** – square, rectangle, rhombus, parallelogram, kite, and trapezium.

   The teacher can ask groups of students to present their findings and then initiate a whole-class discussion related to the properties of the shapes.

   **Quiz in groups.** Each group takes turns to ask the teacher a question about the type of triangle the teacher has in mind to try and guess the answer.

   The students may access the following link:
   http://www.mathwarehouse.com/geometry/triangles/triangle-types.php

   Students use the LOGO handouts using this site:
   http://skola.gov.mt/maths/resources.htm
   *(The teacher chooses the Equilateral Triangles Handout)*

   Further ideas and activities can be found on these websites:

   Ideas for lesson plans can be obtained by using the following link:

   Alternatively origami can be used to show folding properties of squares and rectangles:

   The teacher projects this site on the interactive white board:

| 8.1 Students will be able to classify triangles and quadrilaterals using their geometric properties. |
| 7.3 Students will be able to classify square, rectangle, parallelogram, rhombus, trapezium and kite based on the length of their sides and size of their angles. |
| 7.2 Students will be able to classify square, rectangle, parallelogram and rhombus based on the length of their sides and size of their angles. |
| 7.1 Students will be able to classify scalene, isosceles, equilateral and right-angled triangles; squares and rectangles based on the length of their sides and size of their angles. |
### Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

Students draw different circles and identify the centre and measure the lengths of the radius, diameter and circumference.

Students are asked to draw circles of different radii. They are then asked to measure the diameter and deduce the relationship between the radius and diameter.

The teacher makes use of a dominoes game with questions and answers on the parts of a circle. Students are placed in groups to play the game. The teacher downloads this website: [http://www.primaryresources.co.uk/maths/mathsA2.htm](http://www.primaryresources.co.uk/maths/mathsA2.htm) and finds PDF document 'Make your own loop cards' to create this game.

The teacher uses this investigation as a group activity: [http://nrich.maths.org/7469](http://nrich.maths.org/7469)


The students sort out circles from a given set of shapes using this site: [http://nrich.maths.org/7192](http://nrich.maths.org/7192)

The teacher shows the video shown on this website and use it as induction: [http://www.gametrailers.com/user-movie/concentric-circles-coming/305561](http://www.gametrailers.com/user-movie/concentric-circles-coming/305561)

**Digital Technology Enhanced Learning - Maths eLearning Entitlement**

**Unit MTH 7.9 Polygons**

Technology allows students to use automated processes and to create simple software routines. Students may use automated functions in LOGO (available on schools’ PCs) or Scratch [http://scratch.mit.edu](http://scratch.mit.edu) to explore mathematical situations. Floor robots can also be used at this stage with either the available Mindstorms NXT robots, the simpler probots or just the online environment. Students can be introduced to logo and write procedures to draw a square or an equilateral triangle using repeat and call the procedures to build more complicated designs.

1. [http://www.saskschools.ca/curr_content/byersjmath/geometry/teachers/polygon/geopoly.swf](http://www.saskschools.ca/curr_content/byersjmath/geometry/teachers/polygon/geopoly.swf) helps students reinforce their understanding of polygons and triangles. Some of the pages in the Flash file require the student to interact (i.e. answer a question, click a button, drag and drop an item) with the content as the clip is played. Students can investigate the parts of a circle by turn on or off parts of the circle or they can move some points to see how a part can look differently at: [http://mathsclass.net/geogebra/fs/parts-of-a-circle](http://mathsclass.net/geogebra/fs/parts-of-a-circle). Then do a self review and test their knowledge at [http://www.ixl.com/math/grade-4/parts-of-a-circle](http://www.ixl.com/math/grade-4/parts-of-a-circle).

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand 3: Shape, Space and Measures
Unit code and title: MTH 7.9 Polygons (Levels 6.3 – 7.3)

### Objectives:
The teacher will teach students to:
1. Understand that the sum of the angles of a triangle is 180°, derive the sum of the angles of a quadrilateral from the angle sum property of a triangle and solve problems involving the angles of a triangle and of a quadrilateral.
2. Understand the term polygon and regular/irregular polygon.
3. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle, parallelogram, trapezium, rhombus, kite) using their geometric properties.
4. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

### Key Words
- Polygon: regular, non-regular, irregular, sides, angles, diagonals
- Triangle: scalene, isosceles, equilateral and right-angle
- Quadrilateral: square, rectangle, trapezium, parallelogram, rhombus and kite
- Circle: centre, radius, diameter and circumference, concentric circles, pattern, compasses

### Points to note
Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

### Resources
- FOM A1 Student’s Book, Practice Book, Resource Pack – Chapters 4 and 12
- From Teacher’s Laptop
  - C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons
    - Quadrilaterals
  - C:\Documents and Settings\schools_home\My Documents\Maths PowerPoint Shows
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- Internet Links:
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<td>The teacher extends the ideas of geometrical proof to angles in a triangle and a quadrilateral.</td>
<td>7.3 Students will solve more complex problems involving the angles of triangles, including isosceles and quadrilaterals.</td>
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</table>
| 1. Understand that the sum of the angles of a triangle is 180°, derive the sum of the angles of a quadrilateral from the angle sum property of a triangle and solve problems involving the angles of a triangle and of a quadrilateral. | Investigative Activity:  
a) Angles in a triangle  
Ask students to draw a triangle on a piece of paper. They should cut out the triangle carefully, shade and cut out the angles. Fit them together. Put them together. What do you notice?  
b) Angles in a quadrilateral  
Draw a number of quadrilaterals. Draw a diagonal on each to get two triangles from each quadrilateral. Use the sum of angles in a triangle to deduce the sum of the angles in a quadrilateral.  
ICT Activity: By drawing simple shapes such as squares, rectangles and triangles using simple LOGO commands such as FD, BK, RT, and REPEAT, to help students reflect upon the properties of these shapes.  
www.onlinemathlearning.com/triangle-angles.html  
www.mathsisfun.com/quadrilaterals.html | 7.2 Students will know how to solve simple problems involving the angles of a triangle and of a quadrilateral. |
| 2. Understand the term polygon and regular/irregular polygon. | Students are introduced to the topic by using flashcards with pictures with regular and irregular 2D shapes.  
Students select a flashcard of a 2D shape and talk about the selected shape and its properties.  
In groups, students classify the above shapes into groups of regular/irregular shapes. | 7.1 Students will understand the angle sum properties of a triangle and of a quadrilateral.  
6.3 Students will appreciate that shapes may have different number of sides. |
3. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle, parallelogram, trapezium, rhombus, kite) using their geometric properties.

Students work in groups. Each group is given a set of flashcards with different types of triangles and quadrilaterals which they have to sort out.

Students classify the above shapes and investigate their properties:
- Triangles – scalene, isosceles and equilateral.
- Quadrilaterals – square, rectangle, rhombus, parallelogram, kite, and trapezium.

The teacher can ask groups of students to present their findings and then initiate a whole-class discussion related to the properties of the shapes.

Quiz in groups. Each group takes turns to ask the teacher a question about the type of triangle the teacher has in mind to try and guess the answer.

Students access the following link:
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Students use the LOGO handouts using this site:
http://skola.gov.mt/maths/resources.htm
(The teacher chooses the Equilateral Triangles Handout).

Alternatively origami can be used to show folding properties of squares and rectangles:
http://www.wonderhowto.com/topic/make-a-origami-square/
http://www.wonderhowto.com/topic/rectangle-origami/

The teacher projects this site on the interactive white board:
http://www.onlinemathlearning.com/rectangles.html

This site can be used to introduce topic or as a revision Students can work on their own interactively:
http://www.mathwarehouse.com/geometry/quadrilaterals/parallelograms/rectangle.php

This site can be used to manipulate quadrilaterals to make squares and rectangles:
http://www.mathsisfun.com/quadrilaterals.html

7.3 Students will be able to classify square, rectangle, parallelogram, rhombus, trapezium and kite based on the length of their sides and size of their angles.

7.2 Students will be able to classify square, rectangle, parallelogram and rhombus based on the length of their sides and size of their angles.

7.1 Students will be able to classify scalene, isosceles, equilateral and right-angled triangles; squares and rectangles based on the length of their sides and size of their angles.

6.3 Students will be able to classify scalene, isosceles and equilateral triangles based on the length of their sides and the size of their angles.
4. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

| Students draw different circles and identify the centre and measure the lengths of the radius, diameter and circumference. Students are asked to draw circles of different radii. They are then asked to measure the diameter and deduce the relationship between the radius and diameter. The teacher makes use of a dominoes game with questions and answers on the parts of a circle. Students are placed in groups to play the game. The teacher downloads this website: [http://www.primaryresources.co.uk/maths/mathsA2.htm](http://www.primaryresources.co.uk/maths/mathsA2.htm) and finds PDF document ‘Make your own loop cards’ to create this game. The teacher uses this investigation as a group activity: [http://nrich.maths.org/7469](http://nrich.maths.org/7469) The students sort out circles from a given set of shapes using this site: [http://nrich.maths.org/7192](http://nrich.maths.org/7192) The teacher shows the video shown on this website and use it as induction: [http://www.gametrailers.com/user-movie/concentric-circles-coming/305561](http://www.gametrailers.com/user-movie/concentric-circles-coming/305561) These websites are helpful in forming patterns with circles: [http://nrich.maths.org/6468](http://nrich.maths.org/6468), [http://nrich.maths.org/4321](http://nrich.maths.org/4321), [http://nrich.maths.org/2912](http://nrich.maths.org/2912), [http://nrich.maths.org/2178](http://nrich.maths.org/2178) Teacher gives out LOGO handouts using this site: [http://skola.gov.mt/maths/resources.htm](http://skola.gov.mt/maths/resources.htm) and chooses Circles and Arcs |}

7.3 Students will be able to identify the relationship between radius and diameter.

7.2 Students will be able to form complex patterns using a number of circles with/without specified measurements.

7.1 Students will be able to identify the centre, radius, diameter and circumference of a circle.

6.3 Students will be able to form simple patterns using a number of circles.
**Subject:** MATHEMATICS  
**Strand 3:** Shapes, Space and Measures  
**Unit code and title:** MTH 7.9 Polygons *(Levels 5.3 – 7.1)*  
**Form 1**  
**Duration:** 9 sessions

**Objectives**
The teacher will teach the students to:
1. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle) using their geometric properties.
2. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

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**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics. | FOM Gold A Students Book, Resource Pack - Chapter 12  
Internet Links:  
http://www.superteacherworksheets.com/  
http://math.pppst.com/  
http://www.mathsisfun.com/games/games-4.html  
http://www.coolmath.com  
http://nationalstrategies.standards.dcsf.gov.uk/node/88452?uc=force_uj  
http://www.hufsoft.com/software/page4.html  
http://www.primaryresources.co.uk/  
http://nrich.maths.org/public/  
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| Quadrilateral: square and rectangle  
Circle: centre, radius, diameter and circumference, pattern, compasses | |
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<td>7.1 Students will be able to classify scalene, isosceles, equilateral and right-angled triangles; squares and rectangles based on the length of their sides and size of their angles. 6.3 Students will be able to classify scalene, isosceles and equilateral triangles based on the length of their sides and the size of their angles. 6.2 Students will be able to classify scalene and equilateral triangles, squares and rectangles based on the length of their sides. 6.1 Students will be able to use the term equilateral for a regular triangle and a square for a regular quadrilateral. 5.3 Students will be able to distinguish between a triangle and quadrilateral.</td>
</tr>
<tr>
<td>1. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle) using their geometric properties.</td>
<td>2. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles. Students draw different circles and identify the centre and measure the lengths of the radius, diameter and circumference. Students are asked to draw circles of different radii. They are then asked to measure the diameter and deduce the relationship between the radius and diameter.</td>
<td>7.1 Students will be able to identify the centre, radius, diameter and circumference of a circle. 6.3 Students will be able to form simple patterns using a number of circles.</td>
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The teacher makes use of a dominoes game with questions and answers on the parts of a circle. Students are placed in groups to play the game. The teacher downloads this website: [http://www.primaryresources.co.uk/maths/mathsA2.htm](http://www.primaryresources.co.uk/maths/mathsA2.htm) and finds PDF document ‘Make your own loop cards’ to create this game.

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<td>Students will be able to identify circles from a given set of shapes.</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Students will be able to identify the centre and radius of a circle.</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Students will be able to measure the radius of a circle and draw a circle of a given radius.</td>
<td></td>
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</table>
Subject: MATHEMATICS
Strand3: Shapes, Space and Measures
Unit Code and Title: MTH 7.9 Polygons (Levels 1 – 4)

OBJECTIVES at attainment levels 5,6 and 7
1. Classify triangles (scalene, isosceles, equilateral and right-angled); classify quadrilaterals (square, rectangle) using their geometric properties.
2. Identify parts of a circle (centre, radius, diameter and circumference) and form patterns using a number of circles.

Objectives at attainment levels 1, 2,3 and 4.
1.1 Students get familiar with the language used to describe the features of triangles, squares and rectangles.
2.1 Students will get familiar with the language used to describe the features of a circle and use this shape to make patterns.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circle, square, rectangle, pattern, sides, straight, curved.</td>
<td>In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.</td>
<td>New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7 Software: Ilearn Maths, Calculator, Excel Worksheets Internet Links: <a href="http://math.pppst.com/">http://math.pppst.com/</a> <a href="http://www.mathsisfun.com/games/games-4.html">http://www.mathsisfun.com/games/games-4.html</a> <a href="http://www.coolmath.com/">http://www.coolmath.com/</a> <a href="http://www.hufsoft.com/software/page4.html">http://www.hufsoft.com/software/page4.html</a> <a href="http://www.primaryresources.co.uk/maths/mathsE5.htm">http://www.primaryresources.co.uk/maths/mathsE5.htm</a></td>
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</tbody>
</table>
| 1.1 Students get familiar with the language used to describe the features of triangles, squares and rectangles. | **Starter:** On the IWB, the students are shown several 2D shapes. They have to show their recognition by some means of communication.  
Students are given a container with mixed shapes. They will pick the requested shape, e.g. triangle-count the number of sides and decide whether the sides are straight or curved. Same activity is repeated for the other shapes. Then, the students are given a table with four criteria, which they have to fill by drawing the shape or write the name of the shape.  
| Students will sort shapes into triangles, squares and rectangles. Students are presented with foam shapes with different tactile sensations and they explore them.  
| **Draw/write shapes with Straight lines only.** | **Less than four sides.** | **Four sides** |  
| Students will: Name the shape, talk about its sides and be able to draw it. (Level 4)  
| Name shapes and differentiate between four sided and 3 sided shapes. (Level 3)  
| Build notions of shapes and begin to match shapes. (Level 2)  
| Actively explore objects for more extended periods by feeling the different textures. (Level 1) | | |
| 2.1 Students will get familiar with the language used to describe the features of a circle and use this shape to make patterns | **Starter:** Students are shown a circle and they are encouraged to talk about it in relation to other shapes.  
Students are exposed to the features and to the language of curved side. Then they are given a set of shapes and they have to colour those with curved sides in one colour and those with straight lines only in another colour. Eventually, they experiment with these shapes to make a pattern.  
Students are given a set of shapes and asked to pick up the circles and count them.  
Students are shown a picture made up of shapes and they have to match the shapes.  
Students are given a picture and foam shapes. They make sponge shape printing. | Students will: Differentiate between shapes by talking about their sides and follow instructions according to these criteria. (Level 4)  
| Recognise and name a circle. (Level 3)  
| Match an object foam shape with the same shape on a picture. (Level 2)  
| Engage in sponge painting. (Level 1) | | |
Subject: MATHEMATICS

Strand: Data Handling

Unit code and title: MTH 7.10 Statistics and Probability (Levels 7.1 – 8.1)

Form 1 Duration: 9 sessions

Objectives

The teacher will teach students to:
1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; compile and interpret frequency tables for grouped discrete data; draw and interpret bar charts.
2. Compute manually and using a spreadsheet, the mean, median, mode and range for ungrouped data.
3. Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event; find the probability by experiment.

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<th>Key Words</th>
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<td>Data, observation, survey, experiment, grouped data</td>
<td>Three main teaching approaches are being recommended.</td>
<td>FOM A2 Student’s Book, Practice Book, Resource Pack – Chapters 5, 16 and 25</td>
</tr>
<tr>
<td>Tally, frequency, frequency table, bar chart</td>
<td><strong>Exposition</strong>: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.</td>
<td>From Teacher’s Laptop C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons</td>
</tr>
<tr>
<td>Mean, median, mode and range</td>
<td><strong>Discovery</strong>: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.</td>
<td>• Coins (probability)</td>
</tr>
<tr>
<td>Probability, event, certain, impossible, likely, unlikely</td>
<td><strong>Exploration</strong>: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.</td>
<td>• Mode, mean, median, range</td>
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<td>Resources: Dice; Spinners.</td>
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<td></td>
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<td>Internet Links:</td>
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<td><a href="http://www.gallup.com">http://www.gallup.com</a></td>
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<td><a href="http://www.science.ntu.ac.uk/rsscse/pose/index.html">http://www.science.ntu.ac.uk/rsscse/pose/index.html</a></td>
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| The teacher will teach students to:                                               | Working in groups, students may choose a topic of their interest (e.g.: sports, hobbies) and formulate a set of questions (minimum of 5) which would guide their survey.  
Students would then be asked to collect data by, for example, asking the questions to the other students in class and later tabulate their data.  
During these lessons students would compile frequency tables for each question and interpret their data.  
Finally, students could be asked to draw bar charts to represent their data. The teacher can also ask each group to present their work and findings to the whole class. | 8.1 Students will collect data using observations, surveys and experiments, compile and interpret frequency tables using grouped discrete data.  
7.3 Students will be able to interpret and draw a bar chart using grouped discrete data.  
7.2 Students will be able to compile a frequency table using grouped discrete data.  
7.1 Students will be able to compile a frequency table using ungrouped discrete data; interpret and draw a bar chart for ungrouped discrete data. |
| 1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; compile and interpret frequency tables for grouped discrete data; draw and interpret bar charts. |                                                                                                                                                                                                                                                                             | 8.1 Students will be able to understand and compute manually and using a spreadsheet the mean, mode, median and range for ungrouped data.  
7.3 Students will be able to compute manually and use a spreadsheet to find the mean, mode and median for ungrouped data.  
7.2 Students will be able to understand and compute manually the mean, mode and median for ungrouped data.  
7.1 Students will be able to understand and compute manually the mean and mode for ungrouped data. |
| 2. Compute, manually and using a spreadsheet, the mean, median, mode and range for ungrouped data. | The teacher can ask students to gather numerical data and using the Excel lesson available (Mean, Mode, Median, Range) they can investigate measures of central tendency of their data.  
Students can be asked to gather numerical data (e.g.: week temperatures, height or weights of a group of students, etc.) and using the excel lesson they would be allowed to investigate the mean, median, mode and range of their data.  
During a whole class discussion students can present and discuss their results. | 8.1 Students will be able to understand and compute manually and using a spreadsheet the mean, mode, median and range for ungrouped data.  
7.3 Students will be able to compute manually and use a spreadsheet to find the mean, mode and median for ungrouped data.  
7.2 Students will be able to understand and compute manually the mean, mode and median for ungrouped data.  
7.1 Students will be able to understand and compute manually the mean and mode for ungrouped data. |
| 3. Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event; find the probability by experiment. | Ask students to think of ‘certain’ and ‘impossible’ events and let them argue about the situations presented. Then, let them consider events that are ‘likely’ and ‘unlikely’ to happen. Students eventually come up with their own events and place them on a probability scale from 0 to 1 (1 lesson).

The teacher can now introduce fractions to work out the probability of events, using examples as throwing a die, tossing a coin etc. Again, they can use the probability scale as a checklist and to stimulate class discussion (1 lesson). | 8.1 Students will be able to say whether a game is fair or unfair.

7.3 Students will be able to find the probability by experiment and appreciate that probability cannot actually predict results.

7.2 Students will be able to describe the probability of an event and mark it on a probability scale; understand and work out the probability of an event.

7.1 Students will be able to describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event. |
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.10 Statistics and Probability

Students should be able to explore the effects of varying values in a spreadsheet to explore a situation. E.g. A birthday party can have different parameters that show relationships between price and number of guests. A number of free downloadable MS Excel resources from http://maths-it.org.uk/Flexcel/Flexcel.php offer many examples to be explored quickly by students. Hard to teach concepts can be explored at: http://nationalstrategies.standards.dcsf.gov.uk/search/results/%22hard%20to%20teach%20concepts%22

1. http://shodor.org/interactivate/activities/BarGraph/ and many of the activities that can be found at this site http://shodor.org/interactivate/activities/Measures can help the students reach objective 1 with ease.

2. http://shodor.org/interactivate/activities/PlopIt offers an ideal environment for students to experiment with a graph to understand mean, median, mode before moving to the spreadsheet. Students can just drop boxes onto the graph and with the stats button turned on they can observe how the mean, median and mode come to be.

3. Students can experiment with more than 20 different probability simulations at http://shodor.org/interactivate/activities/. At http://www.shodor.org/interactivate/activities/Coin/?version=1.6.0_06&browser=MSIE&vendor=Sun_Microsystems_Inc students can make thousands of tosses of a coin (in split seconds) to visualize how the Head or Tail probability values vary with each toss.

1 License available from CMELD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand 4: Data Handling
Unit code and title: MTH 7.10 Statistics and Probability (Levels 6.3 – 7.3)

### Objectives
The teacher will teach students to:

1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; compile and interpret frequency tables for grouped discrete data; draw and interpret bar charts.
2. Compute manually and using a spreadsheet, the mean, median and mode for ungrouped data.
3. Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event; find the probability by experiment.

### Key Words
- Data, observation, survey, experiment, grouped data
- Tally, frequency, frequency table, bar chart
- Mean, median, mode and range
- Probability, event, certain, impossible, likely, unlikely

### Points to note
- Three main teaching approaches are being recommended.
  - **Exposition**: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.
  - **Discovery**: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.
  - **Exploration**: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

### Resources
- FOM A1 Student’s Book, Practice Book, Resource Pack – Chapters 5, 16 and 25
- From Teacher’s Laptop
  - C:\Documents and Settings\schools_home\My Documents\Maths Excel Lessons
    - Coins (probability)
    - Mode, mean, median, range
- Resources: Dice; Spinners.
- Internet Links:
  - [http://www.gallup.com](http://www.gallup.com)
  - [http://www.your-nation.com](http://www.your-nation.com)
  - [http://www.science.ntu.ac.uk/rsscse/pose/index.html](http://www.science.ntu.ac.uk/rsscse/pose/index.html)
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<td>Working in groups, students may choose a topic of their interest (e.g.: sports, hobbies) and formulate a set of questions (minimum of 5) which would guide their survey. Students would then be asked to collect data by, for example, asking the questions to the other students in class and later tabulate their data. During these lessons students would compile frequency tables for each question and interpret their data. Finally, students could be asked to draw bar charts to represent their data. The teacher can also ask each group to present their work and findings to the whole class.</td>
<td>7.3 Students will be able to interpret and draw a bar chart using grouped discrete data.</td>
</tr>
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<td>1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; compile and interpret frequency tables for grouped discrete data; draw and interpret bar charts.</td>
<td></td>
<td>7.2 Students will be able to compile a frequency table using grouped discrete data.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.1 Students will be able to compile a frequency table using ungrouped discrete data; interpret and draw a bar chart.</td>
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<td>2. Compute, manually and using a spreadsheet, the mean, median and mode for ungrouped data.</td>
<td>The teacher can ask students to gather numerical data and using the Excel lesson available (Mean, Mode, Median) they can investigate measures of central tendency of their data. Students can be asked to gather numerical data (e.g. week temperatures, height or weights of a group of students, etc.) and using the excel lesson they would be allowed to investigate the mean, median, mode and range of their data. During a whole-class discussion students can present and discuss their results.</td>
<td>6.3 Students will be able to compute manually and use a spreadsheet to the mean, mode and median for ungrouped data.</td>
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<tr>
<td></td>
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<td>7.2 Students will be able to understand and compute manually the mean, mode and median for ungrouped data.</td>
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<td>7.1 Students will be able to understand and compute manually the mean and mode for ungrouped data.</td>
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<td>6.3 Students will be able to understand and compute manually the mode for ungrouped data.</td>
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<td>Description of Objectives</td>
<td>Instructional Approach</td>
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<td>3.</td>
<td>Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event; find the probability by experiment.</td>
<td>Ask students to think of ‘certain’ and ‘impossible’ events and let them argue about the situations presented. Then, let them consider events that are ‘likely’ and ‘unlikely’ to happen. Students eventually come up with their own events and place them on a probability scale from 0 to 1. The teacher can now introduce fractions to work out the probability of events, using examples as throwing a die, tossing a coin etc. Again, they can use the probability scale as a checklist and to stimulate class discussion.</td>
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<td>7.1</td>
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</tr>
<tr>
<td>7.2</td>
<td>Students will be able to describe the probability of an event and mark it on a probability scale; understand and work out the probability of an event.</td>
<td>Students will be able to describe the probability of an event and mark it on a probability scale; understand and work out the probability of an event.</td>
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</table>
Subject: MATHEMATICS

Strand 4: Data Handling

Unit code and title: MTH 7.10 Statistics and Probability (Levels 5.3 – 7.1)

Form: 1 Duration: 9 sessions

OBJECTIVES

The teacher will teach the students to:

1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; draw and interpret bar charts and pictograms.
2. Compute manually the mean and the mode for ungrouped data.
3. Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event; find the probability by experiment.

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<td>Three main teaching approaches are being recommended. <strong>Exposition:</strong> the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. <strong>Discovery:</strong> the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations. <strong>Exploration:</strong> the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>FOM Gold A, Students’ Book, Resource Pack – Chapters 5, 16 and 24. Show-me-board; Plastic euro coins; Spinners Measuring tapes; Rulers; Stop watches; Dice Internet Links: <a href="http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/">http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/</a>, <a href="http://www.mathsisfun.com/data/">http://www.mathsisfun.com/data/</a> Handling data power point - <a href="http://www.schooltrain.info/powerpoint/handling_data.ppt">http://www.schooltrain.info/powerpoint/handling_data.ppt</a></td>
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<td>Tally, frequency, frequency table, bar chart</td>
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<tr>
<td>Mean, mode</td>
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<td>The teacher will teach the students to:</td>
<td>Students work in groups of 4. Each group will choose a topic (e.g.: colours, pets, TV programmes, sports etc) and formulate questions. By moving around class, students ask their set of questions to the other group members. Each group tabulates their data and presents it (together with their conclusions if possible) to the whole class (collecting data through a simple survey). As a H.W. activity, ask students to record the colour of the cars that pass in a 10 minutes time interval and record data on a copy book. During the lesson, students could use the show-me-board to present their results. A whole-class discussion ends the activity (collecting data through observation). The teacher sets the students in pairs. Each group will use a stop watch and within say 2 minutes record how many numbers can be written by their peer. One of the students holds the stopwatch and the other writes the numbers. Afterwards, they check that all numbers written are legible and that they are in sequence. Students interchange roles. Finally, students present their results on the show-me-board for discussion (collecting data through experiment).</td>
<td>7.1 Students will be able to compile a frequency table using ungrouped discrete data; interpret and draw a bar chart for ungrouped discrete data. 6.3 Students will use be able compile a frequency table using ungrouped discrete data. 6.2 Students will be able to interpret and represent pictograms, where the symbol represents a number of units. 6.1 Students will be able to draw pictograms, where the symbol represents one unit. 5.3 Students will be able to interpret pictograms, where the symbol represents one unit.</td>
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<tr>
<td>1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; draw and interpret bar charts and pictograms.</td>
<td>Students work in groups of 4. Each group will choose a topic (e.g.: colours, pets, TV programmes, sports etc) and formulate questions. By moving around class, students ask their set of questions to the other group members. Each group tabulates their data and presents it (together with their conclusions if possible) to the whole class (collecting data through a simple survey). As a H.W. activity, ask students to record the colour of the cars that pass in a 10 minutes time interval and record data on a copy book. During the lesson, students could use the show-me-board to present their results. A whole-class discussion ends the activity (collecting data through observation). The teacher sets the students in pairs. Each group will use a stop watch and within say 2 minutes record how many numbers can be written by their peer. One of the students holds the stopwatch and the other writes the numbers. Afterwards, they check that all numbers written are legible and that they are in sequence. Students interchange roles. Finally, students present their results on the show-me-board for discussion (collecting data through experiment).</td>
<td>7.1 Students will be able to compile a frequency table using ungrouped discrete data; interpret and mode for ungrouped data. 6.3 Students will use be able compile a frequency table using ungrouped discrete data. 6.2 Students will be able to understand the term mode. 6.1 Students will be able to identify the most common data from a list or table of ungrouped data. 5.3 Students will be able to identify the most common data from bar charts and pictograms.</td>
</tr>
<tr>
<td>2. Compute manually the mean and the mode for ungrouped data.</td>
<td>Students work in pairs. One student has 10 plastic euro coins and stands two metres away from a bulls-eye target that is flat on the floor. The student tosses the coins one-by-one aiming for the centre of the target. After all ten coins are tossed, the second student measures the distance that each coin is from the target. Switch roles. Both students then calculate the mean and mode distance from the target (to the nearest cm or mm). A short presentation by each group will then follow. Students are grouped in pairs and using the computer work on some of the links below and where necessary record their work. <a href="http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/measures_average/activity.shtml">http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/measures_average/activity.shtml</a> <a href="http://www.aaastudy.com/sta418x5.htm">http://www.aaastudy.com/sta418x5.htm</a> <a href="http://www.aaastudy.com/sta518x2.htm">http://www.aaastudy.com/sta518x2.htm</a> <a href="http://e-learningforkids.org/Courses/EN/M1001/launch.html">http://e-learningforkids.org/Courses/EN/M1001/launch.html</a> <a href="http://www.bbc.co.uk/education/mathsfile/shockwave/games/train.html">http://www.bbc.co.uk/education/mathsfile/shockwave/games/train.html</a></td>
<td>7.1 Students will be able to understand and compute manually the mean and mode for ungrouped data. 6.3 Students will be able to understand and compute manually the mode for ungrouped data. 6.2 Students will be able to understand the term mode. 6.1 Students will be able to identify the most common data from a list or table of ungrouped data. 5.3 Students will be able to identify the most common data from bar charts and pictograms.</td>
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<td>3.</td>
<td>Describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event occurring; find the probability by experiment.</td>
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<tr>
<td><strong>Students are introduced to description of events and to probability of an event/experiment on the computer using these links:</strong></td>
<td><strong>Students will be able to describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event.</strong></td>
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<tr>
<td><a href="http://www.mathsisfun.com/probability_line.html">http://www.mathsisfun.com/probability_line.html</a></td>
<td>6.3 Students will be able to describe events as certain, impossible, likely, unlikely.</td>
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<td><a href="http://www.mathsisfun.com/data/probability.html">http://www.mathsisfun.com/data/probability.html</a></td>
<td>6.2 Students understand that events may or may not happen and the likelihood of the event happening or not happening lies in between.</td>
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<tr>
<td>Students are set in groups. Different tasks are given to the groups for discussion to describe where the events will occur on the probability line. Then the students will have to quantify the tasks' probability as a fraction. The teacher performs some experiments such as choosing a particular coloured ball/block from bags full of different coloured balls/blocks etc. or choosing different kinds of playing cards from a pack of playing cards etc. Students will then write on the show me boards the probabilities of the experiments performed by the teacher. Students are grouped in pairs to use the computer to work on the links below and where necessary recorded on their work.</td>
<td>6.1 Students will be able to describe events That are certain or impossible to happen.</td>
<td></td>
</tr>
<tr>
<td><a href="http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/probability/activity.shtml">http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/probability/activity.shtml</a></td>
<td>5.3 Students are able to mention events that are certain to happen, and others that will not.</td>
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</tr>
<tr>
<td><a href="http://www.mrnussbaum.com/probfair/">http://www.mrnussbaum.com/probfair/</a></td>
<td>7.1 Students will be able to describe events as certain, impossible, likely, unlikely, etc.; understand and work out the probability of an event.</td>
<td></td>
</tr>
</tbody>
</table>
Subject: MATHEMATICS
Strand 4: Data Handling
Unit code and title: MTH 7.10 Statistics and Probability (Levels 1 – 4)

Form: 1
Duration: 9 sessions

**OBJECTIVES** at attainment levels 5,6,7
1. Collect data using observations, surveys and experiments; compile and interpret frequency tables for ungrouped discrete data; draw and interpret bar charts and pictograms.
2. Compute manually the mean and the mode for ungrouped data.
3. Describe events as certain, impossible, likely, unlikely, etc; understand and work out the probability of an event/experiment.

**OBJECTIVES** at attainment levels 1,2,3,4
1.1 Students will be able to collect information; put data in a table and read data from a table; draw bar charts on a grid and picture charts.
2.1 Students will recognise the most frequent number in a set.
3.1 Students will learn about the chance of something happening and something that will not happen.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
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</thead>
<tbody>
<tr>
<td>Most, largest, least, portion, experiment, tally, table, frequency, bar chart, mode; median, chance, never, always, information.</td>
<td>In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.</td>
<td>New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7Software: ilearn Maths, Calculator, Excel Worksheets Dice, salt, sand and cotton wool trays, number cards, visuals. Internet Links: <a href="http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/">http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/</a> <a href="http://elearningforkids.org/Courses/EN/M1001/launch.html">http://elearningforkids.org/Courses/EN/M1001/launch.html</a> <a href="http://www.mathsisfun.com/data/">http://www.mathsisfun.com/data/</a></td>
</tr>
<tr>
<td>Teaching Objective</td>
<td>Examples of Teaching Experiences and Activities</td>
<td>Indicators of Learning Outcomes</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------</td>
</tr>
</tbody>
</table>
| 1.1 Students will be able to collect data; put data in a table and read data from a table; draw bar charts on a grid and picture charts. | **Starter**: Using the ilearn software, students will be asked to sort different materials, count how much they have of each and talk about how they grouped them.  
Students are shown a picture of mixed electronic items which they have to sort out and count how many of each, e.g. mobiles, tablets, ipod, kindle etc. Students join in putting purchase from a supermarket, such as tin food, frozen food, toiletry into their appropriate places and explain why. Students reinforce tallying on the computer using this site: [http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/collection_recording/activity.shtml](http://www.bbc.co.uk/schools/ks3bitesize/maths/handling_data/collection_recording/activity.shtml)  
Students are shown a selection of video games pictures like PSP, Nintendo, and WII. They sort the categories into the table.  
Same activity can be lowered down for two groupings.  
Students will try to reach for objects to be placed in a matching slot.  
The above activities can be extended bar charts and picture charts as the students will colour the boxes of the bar chart according to the information in the table. | Students will:  
Be able to collect data by counting on and put the sorted data into a table and answer questions related to what is in the table. Eventually, apply the information in the table to a bar and picture chart situation.  
(Level 4)  
Be able to collect data from a set of given pictures by counting on objects up to 9 and classify objects into particular categories and start finding information from the table by counting.  
(Level 3)  
Begin to sort material according to criteria and point to show understanding of the requested object.  
(Level 2)  
Showing interest and responding to an activity through application of information they get. E.g. react negatively to a nod.  
(Level 1) |
| 2.1 Students will experience and recognise the most frequent number in a set. | **Starter**: Students are presented with a set of numbers. They are left to observe them maybe they can notice the repetitions of some numbers.  
Students are invited to a party and they have to pre-order the food. By the end, of this activity the students will be in a position to discuss their results and comment on the most popular choice.  
Students will use the above data to identify the most frequent item.  
Students will be asked repeatedly to give the same object. | Students will:  
Identify and talk about the data at hand e.g. most number shown.  
(Level 4)  
Identify the largest group.  
(Level 3) |
<table>
<thead>
<tr>
<th>Students are presented with two switches with pre-recorded songs. They are allowed to manipulate them and press them even accidentally. They will listen to the song whose switch is pressed mostly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consistently give to an adult the same requested object. (Level 2)</td>
</tr>
<tr>
<td>Respond to sounds and try to activate the object. (Level 1)</td>
</tr>
<tr>
<td><strong>3.1 Students will be able to experience situations involving the occurrence of events.</strong></td>
</tr>
<tr>
<td><strong>Starter:</strong> Students will have the opportunity to show whether and how they react to the presence and absence of objects. Students are shown a coloured spinner with four coloured sections like red, yellow, green and blue. Students respond to questions like, can the spinner stop on a black colour or can the spinner stop on a red colour?</td>
</tr>
<tr>
<td>Students are shown a DVD and then it is taken out of their vision. Sometime later the students are shown the DVD again so they experience the occurrence and absence of an object. Eventually the students will start looking for it even when out of sight.</td>
</tr>
<tr>
<td>Students are presented with a remote control or a cassette player. If they want to switch on the player or the TV or the fan they have to press the button. They will experience that unless they press the button or in the absence of the remote the effect will not happen.</td>
</tr>
<tr>
<td>Students will: Answer questions about the probable outcome of an event by talking about the criteria used for coming up with that response. E.g. it is impossible to find an elephant at home as it is neither a domestic animal nor an animal found in our country. (Level 4)</td>
</tr>
<tr>
<td>Start to respond appropriately to simple questions. (Level 3)</td>
</tr>
<tr>
<td>Are aware of cause and effect. (Level 2)</td>
</tr>
<tr>
<td>Develop the concept of object permanence and try to use emerging means of communication to indicate that the object has gone. (Level 1)</td>
</tr>
</tbody>
</table>
Subject: MATHEMATICS
Strand 2: Algebra
Unit code and title: MTH 7.11 Using Letters instead of Numbers (Levels 7.1 – 8.1)
Duration: 9 sessions

Objectives
The teacher will teach students to:
1. Use letters to represent unknown values.
2. Evaluate simple formulae with positive inputs.
4. Solve linear equations up to two operation, x on one side.
5. Use equations to solve problems.

Key Words
formula (formulae), expression, stand for, variable, integer.
scales, balance, equation, solve, solution.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
FOM A2, Students’ Book, Practice Book, Resource Pack - Chapter 17 and 19
From Teachers’ Laptop
C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons
Variables
Internet Links:
http://www.mathsisfun.com
http://www.ixl.com/math/practice
http://www.waldomaths.com
http://www.learner.org/courses/learningmath
http://www.ngfl-cymru.org.uk/vtc/ngfl/maths

Scales and weights, Sports page newspaper cuttings, Computer Algebra Software (CAS).
<table>
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<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach students to: 1. Use letters to represent unknown values.</td>
<td>The teacher introduces the use of letters for variables by presenting a classification table of a football league. The significance of the letters P, W, D and L is discussed. The teacher gives each group a classification table of a football league from a newspaper article. The students have to work out the total number of points each team has gained. The teacher gives each group a classification table in which some of the entries of the table are missing. The students are asked to fill in the missing entries with clues such as 'Work out the value of ( W + D + L ) for The Lions' and 'What information does the formula ( W + D + L ) give you?' The students access the following site to practice formulating expressions: <a href="http://www.ixl.com/math/practice/grade-6-write-variable-expressions-to-represent-word-problems">http://www.ixl.com/math/practice/grade-6-write-variable-expressions-to-represent-word-problems</a></td>
<td>8.1 Students will be able to use letters to represent two or more unknown values in expressions involving (+/-\times/\div) and squares. 7.3 Students will be able to use letters to represent two or more unknown values in expressions involving (+/-\times/\div). 7.2 Students will be able to use letters to represent two or more unknown values in simple expressions. 7.1 Students will be able to use a letter to represent an unknown value in simple expressions.</td>
</tr>
<tr>
<td>2. Evaluate simple formulae with positive inputs.</td>
<td>The teacher introduces the lesson by giving a practical word problem. The students rewrite the problem in a shorter form using letters, thus producing a formula. The students work in groups. The teacher gives each group a card with the price of cinema tickets, explaining that adults and children are charged differently. The students write formulae for the total cost of different groups of people attending the cinema. They substitute the price of the cinema tickets to evaluate the formulae. The students work in groups. The teacher gives each group a card with the weight of different objects. The students write formulae for the total weight of different groups of objects shown on the cards. They substitute the weight of the objects to evaluate the formulae.</td>
<td>8.1 Students will be able to evaluate a formula involving (+/-\times/\div) and two or more unknown values involving negative numbers. 7.3 Students will be able to evaluate a formula involving (+/-\times/\div) and two or more unknown values being positive integers, fractions or decimal numbers. 7.2 Students will be able to evaluate a formula involving (+/-\times/\div) and two or more unknown values being integers or decimal numbers.</td>
</tr>
</tbody>
</table>
The students work in groups. The teacher gives each group a catalogue with the prices of different items. The students write formulae for the total cost of a number of different items bought. They substitute the price of the items to evaluate the formulae.

The students solve word problems involving two variables by accessing the site [http://www.ixl.com/math/practice/grade-6-solve-word-problems-involving-two-variable-equations](http://www.ixl.com/math/practice/grade-6-solve-word-problems-involving-two-variable-equations)

| 3. Balance and solve linear equations pictorially. | The teacher uses weighing scales to introduce balancing. Two identical objects and some weights are placed on one side and other weights are placed on the other side to balance. The weight of the object is obtained by removing the same weights from both sides. This investigation is repeated with different objects and weights and each time a simple equation is derived.


The teacher provides the students with an investigative card, showing a number of different balanced weighing scales, together with a copy of worksheet SU18 from the Teachers’ Resource Pack A2. The students illustrate each step involved in solving equations and write the equation at each step.

The teacher provides the students with a copy of worksheet WSS9s from the Teachers’ Resource Pack A2 to find the values of the symbols and the missing totals. | 7.1 Students will be able to evaluate a formula involving two or more unknown integral values in simple expressions.

| 8.1 Students will be able to write down and solve the equation using up to three operations from a pictorial representation involving an unknown and integers/fraction on both sides. | 7.3 Students will be able to write down and solve the equation using up to three operations from a pictorial representation involving an unknown and integers on both sides.

| 7.2 Students will be able to write down and solve equations using up to three operations by drawing scales at each stage in their working. | 7.1 Students will be able to solve equations in up to two operations by drawing scales at each stage in their working. |
4. Solve linear equations up to two operations, \( x \) on one side.

| The teacher enables the students to learn about the process of writing simple linear equations involving mystery numbers. The pictorial process used during the previous lesson, is applied to solve equations by adding/subtracting/dividing both sides by an amount. The students are given a simple mystery number puzzle involving one operation and they are asked to write the equation representing it. The mystery number is found by an ‘undoing’ operation. The students are asked to find a way of checking their answer. The students are divided in groups of three. One student thinks of a number and states the puzzle, another student formulates an equation for the puzzle and solves it to find the mystery number, the third student checks whether the answer is correct. The students may practise solving equations on the Maths Excel Lessons - Variables, on the Teachers’ Laptop. The teacher may use the following site to solve equations by adding/subtracting/dividing both sides by an amount. [http://www.waldomaths.com/Equation2NL.jsp](http://www.waldomaths.com/Equation2NL.jsp) The students play a domino game in groups. Each domino consists of an equation on one side and a solution of another equation on the other side. This game may be applied to equations involving either one or two operations, according to the students’ ability. |

| 8.1 Students will be able to solve an equation involving up to three operations and integers only. |

| 7.3 Students will be able to solve an equation involving up to two operations, with \( x \) on one side. |

| 7.2 Students will be able to solve an equation involving one operation. |

| 7.1 Students will be able to write an equation algebraically from pictorial representation. |
5. Use equations to solve problems.

| The students are given cards showing different triangles with the size of some of the angles given in terms of $x$. They are asked to form an equation and solve it to find the size of each angle. As a conclusion the students decide whether the triangle is isosceles or scalene. |
| The students are given cards showing different quadrilaterals with the length of some of the sides given in terms of $x$. They are asked to form an equation and solve to find the length of each side. As a conclusion they decide whether the quadrilateral is a square, a rectangle, a kite or neither. |
| The following site enables the students to form an equation from a given problem. [http://www.ixl.com/math/practice/grade-8-write-and-solve-equations-that-represent-diagrams](http://www.ixl.com/math/practice/grade-8-write-and-solve-equations-that-represent-diagrams) |

8.1 Students will be able to express information from a practical situation in the form of an equation and solving it in up to three operations.

7.3 Students will be able to formulate an equation given a problem and solve it in up to two operations involving an unknown and integers only.

7.2 Students will be able to formulate an equation given a simple problem in up to one operation.

7.1 Students will be able to interpret the solution of an equation.
Technology can be used to give access to large quantities of data and provides tools to represent it in a variety of ways. When using these tools students can put forward hypotheses, represent, interpret and discuss data. Students can collect primary and secondary data and plan carefully how to use various sources. Equipment for data collection such as data loggers and sensors should not be confined to science labs but made available during Math to gather first hand data. Secondary sources such as databases and the Internet will provide students with evidence to support their enquiries.

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be asked to create quizzes for others and publish them or design games using the multiple choice component in http://hotpot.uvic.ca/index.php#downloads

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1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
**Subject:** MATHEMATICS  
**Strand 2:** Algebra  
**Unit code and title:** MTH 7.11 Using Letters instead of Numbers *(Levels 6.3 – 7.3)*  
**Form 1**  
**Duration:** 9 sessions

<table>
<thead>
<tr>
<th>Key Words</th>
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</table>
| formula (formulae), expression, stand for, variable, integer, scales, balance, equation, solve, solution. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics | FOM A1, Students’ Book, Practice Book, Resource Pack - Chapter 17 and 19  
From Teachers’ Laptop  
C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons  
Variables  
Internet Links:  
http://www.mathsisfun.com  
http://www.ixl.com/math/practice  
http://www.waldomaths.com  
http://www.learner.org/courses/learningmath  
http://www.ngfl-cymru.org.uk/vtc/ngfl/maths  
Scales and weights, Sports page newspaper cuttings, Computer Algebra Software (CAS). |
<table>
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</thead>
<tbody>
<tr>
<td>The teacher will teach students to:</td>
<td>The teacher gives the students a list of products e.g. fruit and their cost. As a shorthand method the cost of each fruit is denoted by a letter, e.g. cost in cent of apples is denoted by $a$. The students are given a list of products to be bought, such as 5 apples and 4 bananas. The students have to write the total cost in cent using the shorthand system, i.e. $5a + 4b$.</td>
<td>7.3 Students will be able to use letters to represent two or more unknown values in expressions involving addition / subtraction / multiplication and division.</td>
</tr>
<tr>
<td>1. Use letters to represent unknown values.</td>
<td>The teacher introduces the use of letters for variables by presenting a classification table of a football league. The significance of the letters $P$, $W$, $D$ and $L$ is discussed.</td>
<td>7.2 Students will be able to use letters to represent two or more unknown values in simple expressions.</td>
</tr>
<tr>
<td></td>
<td>The teacher gives each group a classification table from a newspaper article. The students have to work out the total number of points each team has gained.</td>
<td>7.1 Students will be able to use a letter to represent an unknown value in simple expressions.</td>
</tr>
<tr>
<td></td>
<td>The teacher gives each group a classification table in which some of the entries of the table are missing. The students are asked to fill in the missing entries with clues such ‘Work out the value of $W + D + L$ for The Lions’ and ‘What information does the formula $W + D + L$ give you?’</td>
<td>6.3 Students will be able to represent an unknown by means of an empty box or picture in simple expressions.</td>
</tr>
<tr>
<td></td>
<td>The students access one of the following sites to practice formulating expressions. <a href="http://www.ixl.com/math/practice/grade-6-write-variable-expressions-to-represent-word-problems">http://www.ixl.com/math/practice/grade-6-write-variable-expressions-to-represent-word-problems</a></td>
<td></td>
</tr>
</tbody>
</table>

The teacher will teach students to:

1. Use letters to represent unknown values.
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
</table>
| 2. Evaluate simple formulae with up to two positive inputs. | The teacher gives the students a list of products e.g. fruit and their cost. The teacher provides the students with an expression representing the total cost of two different products in the shorthand method form used above, such as $5a + 4b$. The students calculate the total cost of the products.  
  
The students work in groups. The teacher gives each group a card with the price of cinema tickets, explaining that adults and children are charged differently. The students write formulae for the total cost of different groups of people attending the cinema. They substitute the price of the cinema tickets to evaluate the formulae.  
  
The students work in groups. The teacher gives each group a card with the weight of different objects. The students write formulae for the total weight of different groups of objects shown on the cards. They substitute the weight of the objects to evaluate the formulae.  
  
The students work in groups. The teacher gives each group a catalogue with the prices of different items. The students write formulae for the total cost of a number of different items bought. They substitute the price of the items to evaluate the formulae.  
  
The teacher makes use of Worksheet WS78s to provide the students with practice in substituting up to two positive integers in expressions.  
  
The students solve word problems involving two variables by accessing one of the following sites  
  
http://www.ixl.com/math/practice/grade-6-solve-word-problems-involving-two-variable-equations  
http://www.aaamath.com/g816a-evaluate-1variable.html |
| 7.3 Students will be able to evaluate a formula involving $+/-\times/\div$ and two or more unknown values being positive integers, fractions or decimal numbers. |  
  
7.2 Students will be able to evaluate a formula involving $+/-\times/\div$ and two or more unknown values being integer or decimal numbers.  
  
7.1 Students will be able to evaluate a formula involving two or more unknown integral values in simple expressions.  
  
6.3 Students will be able to evaluate a formula involving a letter to represent an unknown integral value in simple expressions, involving brackets. |
### 3. Balance and solve linear equations pictorially.

The teacher uses weighing scales to introduce balancing. Two identical objects and some weights are placed on one side and other weights are placed on the other side to balance. The weight of the object is obtained by removing the same weights from both sides. This investigation is repeated with different objects and weights and each time a simple equation is derived.

The teacher presents the students with investigative cards. Each card illustrates one set of balanced scales showing weights and packages, together with a series of empty scales to be filled in. The students fill in the empty scales to illustrate the steps involved in finding the weight of a package. One student in each group checks the solution.

The students access one of the following sites to practice balancing equations pictorially depending on level:

### 4. Solve linear equations up to two operations, x on one side.

The students are given a simple mystery number puzzle involving one operation and they are asked to write the equation representing it. The mystery number is found by applying the ‘undoing’ operation keeping in mind the balancing process. The students are asked to find a way of checking their answer.

The teacher gives the students a mystery number puzzle involving two operations. They are asked to write the equation representing it and apply the ‘undoing’ operation to solve it. The students are asked to check the answer by back substitution.

The students are divided into groups of three. One student thinks of a number and states the puzzle, another student formulates an equation for the puzzle and solves it to find the mystery number, while the third student checks whether the answer is correct.

The students may practice solving equations on the Maths Excel Lessons - Variables, on the Teachers’ Laptop.
The teacher may use the following site to solve equations by adding/subtracting/dividing both sides by an amount.
http://www.waldomaths.com/Equation2NL.jsp

The students play a domino game in groups. Each domino consists of an equation on one side and a solution of another equation on the other side. This game may be applied to equations involving either one or two operations, according to the students' ability.

The teacher divides the students in pairs. Each group is given an equation where the unknown is represented by a shape or symbol, such as $5 \times \bullet + 3 = 18$. One of the students finds the value represented by the shape $\bullet$. The other student checks the answer.
Subject: MATHEMATICS

Strand 2: Algebra

Unit code and title: MTH 7.11 Using Letters instead of Numbers (Levels 5.3 – 7.1)

Objectives
The teacher will teach the students to:
1. Evaluate simple formulae with up to two positive inputs.
2. Understand and use simple formulae.

### Key Words
- Evaluate, formula, input, output, value, letters, unknown, substitute, substitution, variable, expression, symbol, pattern, sequence, less than, more than, increase, result

### Points to Note
- Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypothesis and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

### Resources
- Formula One Maths Gold A, Students’ Book, Resource Pack – Chapter 17
- Microsoft Excel
- Internet Links:
  - http://www.ixl.com/math/grade-6
  - http://www.algebra4children.com
  - http://www.primaryresources.co.uk
  - http://nrich.maths.org
### Teaching Objective

The teacher will teach students to:

1. Evaluate simple formulae with up to two positive inputs.

### Examples of teaching experiences and activities

<table>
<thead>
<tr>
<th>Examples of teaching experiences and activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher uses this site as an introduction for the use of formulae to find the unknown value: <a href="http://www.primaryresources.co.uk/online/missing.swf">http://www.primaryresources.co.uk/online/missing.swf</a></td>
</tr>
<tr>
<td>The teacher uses this website as an introduction on the language of expressions: <a href="http://www.themathpage.com/alg/algebraic-expressions.html#expressions">http://www.themathpage.com/alg/algebraic-expressions.html#expressions</a></td>
</tr>
</tbody>
</table>
| Dominos / Follow me  
This game can be played in groups or as a class. Each card has a formula with substituting values written on the left hand side and an answer for another formula written on the right hand side. Cards need to fit together as the common dominoes game. |
| Quiz  
The teacher projects the following site which consists of a quiz on substitution. Students can be divided in a number of groups with each group taking one quiz. [http://www.algebra4children.com/topics_pre-algebra.html](http://www.algebra4children.com/topics_pre-algebra.html) |
| Group game  
Each group is given a set of cards with a formula each involving one/two or three variables, and a dice. Students have to pick up one of the cards and throw the dice to determine the value of each variable. Then they evaluate the formula. The answer is the number of points obtained in that round. After a number of rounds, each group finds the total number of points and the winning group is determined.  
This same game can be changed into a 4 in a row game. The teacher needs to prepare boards with different numbers, which will eventually be the values of the expressions. Alternatively a cross number puzzle can be created, giving formulae and |

### Indicators of Learning outcomes

<table>
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<tbody>
<tr>
<td>7.1 Students will be able to evaluate a formula involving two or more unknown integral values in simple expressions.</td>
</tr>
<tr>
<td>6.3 Students will be able to evaluate a formula involving a letter to represent an unknown integral value in simple expressions, involving brackets.</td>
</tr>
<tr>
<td>6.2 Students will be able to evaluate formulae involving a letter representing an unknown integral value in simple expressions involving one operation.</td>
</tr>
<tr>
<td>6.1 Students will be able to substitute small integral values for pictures (or words) to evaluate a formula involving one operation.</td>
</tr>
<tr>
<td>5.3 Students will be able to represent an unknown by means of an empty box or picture in simple expressions.</td>
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<tr>
<td>---</td>
</tr>
</tbody>
</table>
| substitution values as the clues. Students play this game individually online as revision of substitution: [http://www.10ticks.co.uk/PacAlgebra/AlgebraPacMath.aspx](http://www.10ticks.co.uk/PacAlgebra/AlgebraPacMath.aspx)  
Group work activity. The teacher downloads handouts from this website to play a game of substitution with dice [http://www.bbc.co.uk/education/mathsfile/printoff_alg.html](http://www.bbc.co.uk/education/mathsfile/printoff_alg.html)  
Cryptarithms. The teacher projects this site: [http://nrich.maths.org/1071](http://nrich.maths.org/1071) Students solve the puzzle in pairs. The following site provides a simpler version of the above puzzle: [http://nrich.maths.org/1053](http://nrich.maths.org/1053) Students play this game online: [http://www.bbc.co.uk/education/mathsfile/shockwave/games/postie.html](http://www.bbc.co.uk/education/mathsfile/shockwave/games/postie.html)  
Excel Activity The teacher prepares a handout in which students have to use the excel programme. They are given instructions to write down a formula and eventually substitute values in the cells used to get different outputs for the same formula.  
Puzzle Students work individually to solve the puzzle on this site: [http://nrich.maths.org/2189](http://nrich.maths.org/2189) |   |
2. Understand and use simple formulae.

The teacher makes use of this power point as an introduction:
http://www.authorstream.com/Presentation/hiratufail-68799-algebra-education-ppt-powerpoint/

The teacher projects this website on the interactive whiteboard and students take turns to do the exercises:
http://www.shmoop.com/basic-algebra/algebraic-expressions.html

Matching Game
The students work in pairs. Each pair is given a set of cards with a formula each and another corresponding set of cards with a statement each. The students have to match each statement to a formula.

The Bill game
Different themes can be used for this game, such as ‘at the grocer’, ‘at the fashion shop’, ‘Visiting Museums’ and ‘at the fun park’. The teacher divides the students in a number of groups. Each group is given a set of cards with expressions such as $2a + 3c + d$, and the key of values for each letter used. One student in each group is the shopkeeper. Each other student in turn chooses a card and gives it to the shopkeeper to calculate the bill by substitution.

Variation of this game: Plastic money can be used to pay the shopkeeper.

Alternatively the teacher plans this same activity in a shopping outlet. Each group of students is given a set of instructions in the form of formula/expression together with the key (ex: $f$ for a bag of flour, $p$ for 1kg of pasta...). The students have to go round the outlet to find the value of their formulae/expressions.

An activity using plastic money coins in groups. Each group is given a set of laminated cards with the problems written on them and a space on which to write the solutions.

This is an example of the problems to solve:

List down all the possible ways in which you can make 100 cent using only 5 cent coins and 20 cent coins.

A solution for this problem can be: $2 \times 20c + 12 \times 5c$

Students work in pairs on the following excel sheet from teacher’s laptop Maths Excel Lessons: Grocer.xls

7.1 Students will be able to write a formula from a statement and use it to find the missing variable.

6.3 Students will be able to complete a formula according to a given statement and use it to find the missing variable.

6.2 Students will be able to add backwards to find the value of the variable in a given worded formula.

6.1 Students will be able to understand and use a formula written in words using up to two operations.

5.3 Students will be able to understand and use a formula written in words and pictures using only one operation.
The teacher projects this site on the interactive whiteboard:
http://www.ixl.com/math/grade-6/solve-word-problems-involving-two-variable-equations

The teacher gives the students some time to work it out individually. Then, one of the students comes out and marks the correct answer on the board.

Alternatively this can be transformed into a group work activity, thus encouraging discussions on each posed problem.

Bingo
Students are provided with a 3x3 (or other) grid with an expression in each space. The teacher then reads a statement at a time. The students have to find an expression or formula on their grid that matches the statement and cover it with a counter (or a piece of paper). The winner is the first one to cover 3 (or other) in a row or column.

The teacher projects this site with a problem for the students to solve individually: 
http://nrich.maths.org/278

Calculator Game
The students can play this game in pairs using a simple calculator
http://nrich.maths.org/5651

The teacher uses the following websites for games to be played either individually, in pairs or in groups:
http://classroom.jc-schools.net/basic/math-algebra.html
http://www.quia.com/mc/319817.html
Subject: MATHEMATICS
Strand 2: ALGEBRA
Unit code and Title: MTH 7.11 Using letters instead of numbers (Levels 1 – 4)

Duration: 9 sessions

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Find out, What is missing? value, scales, balance, What’s next?, same colour, copy, draw, shape, pattern.          | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7
Software: iLearn Maths, Calculator, Excel
Worksheets

OBJECTIVES at attainment levels 5,6,7
1. Evaluate simple formulae with positive inputs.
2. Understand and use simple formulae.

OBJECTIVES at attainment levels 1,2,3,4
1.1 Students will discuss how different rules make different sequences.
2.1 Students will use addition and subtraction to solve equations pictorially.
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| 1.1 Students will discuss how different rules make different sequences. | **Starter:** Students are given three sequences and they have to identify and talk about what is happening.  
Teacher asks the students to think of a number from 1 to 10. From a pile of cards, they pick a card containing the rule, and they make its sequence. Alternatively, they are given the sequence and have to write the missing number.  
Students are given a set of pictures. Teacher spells out a rule e.g. select the persons with yellow hair. By following the rule, the students observe the different sequences.  
Teacher gives out an instruction—all seated- or—all up-. Students respond accordingly.  
A set of jars or anything that can be opened and be closed. Students observe and possibly follow the rule of open and closed.  
| Students will:  
Count in 2’s, 5’s and 10’s and by recognising the pattern they will complete a sequence.  
(Level 4)  
Understand the rule and arrange information accordingly.  
(Level 3)  
Understand and apply information through their actions.  
(Level 2)  
Show an interest in the activity by sustaining attention and possibly by initial interaction with adults.  
(Level 1) |
| 2.2 Students will use addition and subtraction to solve equations pictorially. | **Starter:** Teacher says a statement like, I bought 4 waffles but I would like to have 5, how much more do I need?  
Students are given dominoes containing a number of dots on one side and a blank slot on the other side. For e.g.  
Students have to fill in the blank side.  
Students will work with sets of objects; they find the value and match it to the corresponding number.  
Students will match pictures with pictures but observe the taking away or adding on activity so they can match the new situation with its equal.  
Students will be exposed to an online balance and they observe the adults putting on and taking away items. If the screen is a touch one, they can interact with it too.  
| Students will:  
Find the missing quantity by using addition and subtraction skills.  
(Level 4)  
Match a group of pictures to its number value.  
(Level 3)  
Match pictures with pictures.  
(Level 2)  
Be involved in activities involving changing in quantities.  
(Level 1) |
Subject: MATHEMATICS
Strand: Number/Algebra
Unit code and title: MTH 7.12 Directed Numbers and Expressions (Levels 7.1 – 8.1)

Duration: 9 sessions

Objectives
The teacher will teach students to:
1. Recognise and understand positive/negative integers through real-life situations, represent them on a number line and compare the value of two or more integers.
2. Add, subtract, multiply and divide directed numbers.
3. Make correct use of brackets involving the four rules and substitute two positive inputs in simple expressions and evaluate.
4. Use the BIDMAS rule to work out operations in the correct order.
5. Multiply a single term over a bracket and simplify algebraic expressions by collecting like terms.

Key Words
- number line, positive, negative, integers, zero, consecutive, directed numbers, °C (Celsius), thermometer, below, above, increase, decrease, greater than, less than.
- brackets, operations, power/index, BIDMAS, like terms, expression, equation, simplify, inverse operation.

Points to note
- Three main teaching approaches are being recommended.
  - **Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.
  - **Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.
  - **Exploration:** the teacher integrates an inquiry based learning approach that enhances the students' understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
- FOM A2, Students’ Book, Practice Book, Resource Pack - Chapters 18 and 27
- From Teachers’ Laptop C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons
- LADDER and Variables
- Internet Links:
  - http://skola.gov.mt/maths/resources.htm
  - www.funbrain.com/linejump/index.html
  - www.funbrain.com/guess2/index.html
  - www.mathsisfun.com

- Number line, thermometer, calculator, Computer Algebra Software (CAS).
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach students to: 1. Recognise and understand positive/negative integers through real-life situations, represent them on a number line and compare the value of two or more integers.</td>
<td>The teacher introduces the concept of negative numbers through practical examples such as: walking forward/backwards, going up/down the stairs, lifts, having a sum of money or owing it, temperature above/below zero. The teacher shows a number line with missing integers. Students are given a card with a positive/negative number which they place in the correct space. The students access the following site to place positive and negative numbers on a number line. <a href="http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/negativenumbers/flash1.shtml">http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/negativenumbers/flash1.shtml</a> The teacher shows a picture of a thermometer marked from −10°C to 10°C. The students give a higher/lower temperature than the one indicated. The teacher shows a number line marked from −10 to 10. A statement such as ‘−2 is greater than −1’ is given and the students show up a card indicating True or False. The value of two or more negative numbers may be compared by accessing the site <a href="http://www.ixl.com/math/practice/grade-8-compare-and-order-integers">http://www.ixl.com/math/practice/grade-8-compare-and-order-integers</a></td>
<td>8.1 Students will be able to use the number line to illustrate simple examples of inequalities. 7.3 Students will be able to compare the value of two or more positive/negative integers. 7.2 Students will be able to recognise and understand negative integers represented on a number line. 7.1 Students will be able to recognise the significance of negative integers in practical situations</td>
</tr>
<tr>
<td>2. a) Add directed numbers.</td>
<td>The teacher makes use of the practical examples such as: going up/down the stairs, lifts, having or owing a sum of money and temperature, to add two directed numbers. A number line is placed on the floor and students are asked to move forwards and backwards using such terms as ‘move forward/backwards 2 steps’. The teacher gives a statement such as ‘4 more than −3 is 1’ and the students show up a card indicating True or False. The students are divided in groups. The teacher shows a number line marked from −10 to 10. Statements such as ‘4 more than’, ‘add 2’ or ‘add −2’ are given and the students show up a card indicating the result of the addition. The excel worksheet -The Number Line, may be accessed on <a href="http://skola.gov.mt/maths/resources.htm">http://skola.gov.mt/maths/resources.htm</a></td>
<td>8.1 Students will apply addition of directed numbers to a simple algebraic expression. 7.3 Students will add more than two directed numbers. 7.2 Students will add two directed numbers. 7.1 Students will add two directed numbers with the use of a number line</td>
</tr>
</tbody>
</table>
2. b) Subtract directed numbers.

The teacher makes use of the practical examples such as: going up/down the stairs, lifts, having or owing a sum of money and temperature, to subtract two negative numbers.

The teacher gives a statement such as ‘3 less than −2 is −5’ and the students show up a card indicating True or False.

The teacher leads the students through discussion to establish that \(-(-\text{number}) = +\text{number}\). This is done through pattern recognition, for example:

\[
\begin{align*}
5 - 2 & = 3 \\
5 - 1 & = 4 \\
5 - 0 & = 5 \\
5 - (-1) & = 6 \\
5 - (-2) & = 7 \\
5 - (-3) & = 8
\end{align*}
\]

The students are divided in groups. The teacher shows a number line marked from −10 to 10. Statements such as ‘3 less than’, ‘subtract 2’ or ‘subtract −3’ are given and the students show up a card indicating the result of the subtraction.

The excel worksheet -The Number Line, may be accessed on http://skola.gov.mt/maths/resources.htm
2. c) Multiply and divide directed numbers.

| 2. c) Multiply and divide directed numbers. | The teacher makes use of practical examples such as an amount owed for 2 chocolate bars at 25 cent each. i.e. $2 \times (-25) = -50$ cent.  
The teacher uses the following site for a pictorial explain of multiplication of negatives. [http://www.mathsisfun.com/multiplying-negatives.html](http://www.mathsisfun.com/multiplying-negatives.html)  
The teacher leads the students through discussion to establish that (+number) $\times$ (−number) = (−number). This is done through pattern recognition, for example:  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>$5 \times 2 = 10$</td>
<td>$5 \times (-1) = -5$</td>
</tr>
<tr>
<td>$5 \times 1 = 5$</td>
<td>$5 \times (-2) = -10$</td>
</tr>
<tr>
<td>$5 \times 0 = 0$</td>
<td>$5 \times (-3) = -15$</td>
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</tbody>
</table>

Further practice on multiplication and division can be done on the sites | 8.1 Students will apply multiplication/division of directed numbers to a simple algebraic expression.  
| 7.3 Students will multiply/divide more than two directed numbers. | 7.2 Students will multiply/divide two directed numbers.  
<p>| 7.1 Students will multiply/divide a directed number by a positive number |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>3. Make correct use of brackets involving the four rules and substitute two positive inputs in simple expressions and evaluate.</td>
<td>The students are divided in groups and are given cards showing examples such as $2 + (3 \times 5), (2 + 3) \times 5$. They work them out using a scientific calculator and they realise that the contents of the brackets must be worked first. The teacher uses the following site to explain expansion of brackets. <a href="http://www.mathsisfun.com/algebra/expanding.html">http://www.mathsisfun.com/algebra/expanding.html</a> The students may be involved in a quiz by accessing the site <a href="http://www.ixl.com/math/practice/grade-5-simplify-expressions-using-order-of-operations-and-parentheses">http://www.ixl.com/math/practice/grade-5-simplify-expressions-using-order-of-operations-and-parentheses</a></td>
<td>8.1 Students will use brackets to apply the four rules for calculations to a simple algebraic expression. 7.3 Students will substitute two positive inputs in simple expressions and evaluate the answer. 7.2 Students will work out multiple operations involving two sets of brackets. 7.1 Students will work out two operations involving one set of brackets.</td>
</tr>
<tr>
<td>4. Use the BIDMAS rule to work out operations in the correct order.</td>
<td>The students are given the puzzle on worksheet SU43 from the FOM Resource Pack. This puzzle is to some extent self-checking since every digit features in two answers. The students are given cards with historical dates to match. Cards with dates in the form $1 \times 10^3 + 9 \times 10^2 + 5 \times 10 + 6$ are matched with cards having date in the form 1956. The students access the following site to work out calculations involving BIDMAS rule. <a href="http://www.mathsisfun.com/operation-order-bodmas.html">http://www.mathsisfun.com/operation-order-bodmas.html</a></td>
<td>8.1 Students will apply the BIDMAS rule to a simple algebraic expression. 7.3 Students will substitute two positive inputs in expressions involving indices and evaluate the answer. 7.2 Students will apply the BIDMAS to evaluate expressions involving multiple operations. 7.1 Students will apply the BIDMAS to evaluate expressions involving two operations.</td>
</tr>
<tr>
<td>5. Multiply a single term over a bracket and simplify algebraic expressions by collecting like terms.</td>
<td>The teacher gives the students a practical example involving a school outing. Students may choose to attend one of the two activities planned, such as bowling or skating. The total number of students attending each activity is obtained by adding the number of students attending bowling or skating in each class. The teacher uses the grid method to explain the multiplication of a single term over a bracket.</td>
<td>8.1 Students will recognise and collect like terms in a non-linear expression. 7.3 Students will recognise and collect like terms in an expression involving more than two different terms, and will multiply a single term over a bracket and collect like terms. 7.2 Students will recognise and collect like terms.</td>
</tr>
</tbody>
</table>
The students match a set of domino cards having an expression on one end and a simplified expression on the other end.

The students access the following site to practice adding and subtracting like terms. [http://www.ixl.com/math/practice/grade-8-add-and-subtract-like-terms](http://www.ixl.com/math/practice/grade-8-add-and-subtract-like-terms)

7.1 Students will be able to collect terms in an expression involving like terms.

Terms in an expression involving two different terms, and will multiply a single term over a bracket.
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.12 Directed Numbers and Expressions

Technology can be used to give access to large quantities of data and provides tools to represent it in a variety of ways. When using these tools students can put forward hypotheses, represent, interpret and discuss data. Students can collect primary and secondary data and plan carefully how to use various sources. Equipment for data collection such as data loggers and sensors should not be confined to science labs but made available during Math to gather first hand data. Secondary sources such as databases and the Internet will provide students with evidence to support their enquiries.

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be asked to create quizzes for others and publish them or design games using the multiple choice component in http://hotpot.uvic.ca/index.php#downloads

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1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Number /Algebra
Unit code and title: MTH 7.12 Directed Numbers and Expressions (Levels 6.3 – 7.3)  Form 1
Duration: 9 sessions

Objectives
The teacher will teach students to:
1. Recognise and understand positive/negative integers through real-life situations, represent them on a number line and compare the value of two or more integers.
2. Add directed numbers.
3. Subtract directed numbers.
4. Make correct use of brackets involving the four rules and substitute two positive inputs in simple expressions and evaluate.
5. Use the BIDMAS rule to work out operations in the correct order.
6. Multiply a single term over a bracket and simplify algebraic expressions by collecting like terms.

Key Words
number line, positive, negative, integers, zero, consecutive, directed numbers, °C (Celsius), thermometer, below, above, increase, decrease, greater than, less than.
brackets, operations, power/index, BIDMAS, like terms, expression, equation, simplify, inverse operation.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
From Teachers’ Laptop C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons LADDER and Variables
Internet Links:
http://skola.gov.mt/maths/resources.htm
www.funbrain.com/linejump/index.html
www.algebra.freeservers.com/springridge/.html
www.funbrain.com/guess2/index.html
www.mathsisfun.com
http://www.ixl.com/math/practice
Number line, thermometer, calculator, Computer Algebra Software (CAS).
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>The teacher will teach students to:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1. Recognise and understand positive/negative integers through real-life situations, represent them on a number line and compare the value of two or more integers.</strong></td>
<td>The teacher introduces the concept of negative numbers through practical examples such as: walking forward/backwards, going up/down the stairs, lifts, having a sum of money or owing it, temperature above/below zero. The teacher shows a number line with missing integers. Students are given a card with a positive/negative number which they place in the correct space. The students access the following site to place positive and negative numbers on a number line. <a href="http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/negativenumbers/flash1.shtml">http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whatarenumbers/negativenumbers/flash1.shtml</a> The teacher shows a picture of a thermometer marked from −10°C to 10°C. The students give a higher/lower temperature than the one indicated. The teacher shows a number line marked from −10 to 10. A statement such as ‘−2 is greater than −1’ is given and the students show up a card indicating True or False. The value of two or more negative numbers may be compared by accessing the site <a href="http://www.ixl.com/math/practice/grade-8-compare-and-order-integers">http://www.ixl.com/math/practice/grade-8-compare-and-order-integers</a></td>
<td>7.3 Students will be able to compare the value of two or more positive/negative integers. 7.2 Students will be able to recognise and understand negative integers represented on a number line. 7.1 Students will be able to recognise the significance of negative integers in practical situations.</td>
</tr>
<tr>
<td><strong>2. Add directed numbers.</strong></td>
<td>The teacher makes use of the practical examples such as: going up/down the stairs, lifts, having or owing a sum of money and temperature, to add two negative numbers. A number line is placed on the floor and students are asked to move forwards and backwards using such terms as ‘move forward/backwards 2 steps’. The teacher gives a statement such as ‘4 more than −3 is 1’ and the students show up a card indicating True or False.</td>
<td>7.3 Students will be able to add more than two directed numbers. 7.2 Students will be able to add two directed numbers. 7.1 Students will be able to add two directed numbers with the use of a number line.</td>
</tr>
</tbody>
</table>
| 3. Subtract directed numbers. | The teacher makes use of the practical examples such as: going up/down the stairs, lifts, having or owing a sum of money and temperature, to subtract two negative numbers. The teacher gives a statement such as ‘3 less than −2 is −5’ and the students show up a card indicating True or False. The teacher leads the students through discussion to establish that −(−number) = +number. This is done through pattern recognition, for example:

$5 - 2 = 3$
$5 - 1 = 4$
$5 - 0 = 5$
$5 - (-1) = 6$
$5 - (-2) = 7$
$5 - (-3) = 8$

The students are divided in groups. The teacher shows a number line marked from −10 to 10. Statements such as ‘3 less than’, ‘subtract 2’ or ‘subtract –3’ are given and the students show up a card indicating the result of the subtraction. The excel worksheet -The Number Line, may be accessed on http://skola.gov.mt/maths/resources.htm |
| 6.3 Students will be able to add two positive numbers. | 7.3 Students will be able to add/subtract more than two directed numbers. 7.2 Students will be able to subtract two directed numbers. 7.1 Students will be able to subtract a positive number from a directed number. 6.3 Students will be able to subtract two positive numbers, using a number line in the case of a negative result. |
4. Make correct use of brackets involving the four rules and substitute two positive inputs in simple expressions and evaluate.

The students are divided in groups and are given cards showing examples such as $2 + (3 \times 5)$, $(2 + 3) \times 5$. They work them out using a scientific calculator and they realise that the contents of the brackets must be worked first.

The teacher uses the following site to explain expansion of brackets. [http://www.mathsisfun.com/algebra/expanding.html](http://www.mathsisfun.com/algebra/expanding.html)


7.3 Students will substitute two positive inputs in simple expressions and evaluate the answer.

7.2 Students will work out multiple operations involving two sets of brackets.

7.1 Students will work out two operations involving one set of brackets.

6.3 Students will evaluate a single operation involving two positive inputs.

5. Use the BIDMAS rule to work out operations in the correct order.

The students are given a number puzzle such as the Task on FOM A1, Students’ Book, p. 240. The puzzle is to some extent self-checking since every digit features in two answers.

The students are given cards with historical dates to match. Cards with dates in the form $1\times10^3 + 9 \times 10^2 + 5 \times 10 + 6$ are matched with cards having date in the form 1956.

The students access the following site to work out calculations involving BIDMAS rule. [http://www.mathsisfun.com/operation-order-bodmas.html](http://www.mathsisfun.com/operation-order-bodmas.html)

7.3 Students will substitute two positive inputs in expressions involving indices and evaluate the answer.

7.2 Students will apply the BIDMAS to evaluate expressions involving multiple operations.

7.1 Students will apply the BIDMAS to evaluate expressions involving two operations.

6.3 Students will be able to use the BIDMAS rule to work out calculations in two operations, excluding the use of brackets.
| 6. Multiply a single term over a bracket and simplify algebraic expressions by collecting like terms. | The teacher gives the students a practical example involving a school outing. Students may choose to attend one of the two activities planned such as bowling or skating, the total number of students attending each activity is obtained by adding the number of students attending bowling or skating in each class.

The teacher uses the grid method to explain the multiplication of a single term over a bracket.

\[
\begin{array}{c|c|c}
\text{a} & b & c \\
\hline
ab & & ac \\
\end{array}
\]

The students match a set of domino cards having an expression on one end and a simplified expression on the other end.

The students access the following site to work out calculations involving BIDMAS rule.


<table>
<thead>
<tr>
<th>7. Students will recognise and collect like terms in an expression involving more than two different terms, and will multiply a single term over a bracket and collect like terms.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2 Students will recognise and collect like terms in an expression involving two different terms, and will multiply a single term over a bracket.</td>
</tr>
<tr>
<td>7.1 Students will be able to collect terms in an expression involving like terms.</td>
</tr>
<tr>
<td>6.3 Students will be able to recognise and collect like terms from a set of pictures.</td>
</tr>
</tbody>
</table>
**Subject:** MATHEMATICS  
*Strand:* Number / Algebra  
*Form:* 1  
*Unit code and title:* MTH 7.12 Directed Numbers and Expressions *(Levels 5.3 – 7.1)*  
*Duration:* 9 sessions

### Objectives

The teacher will teach the students to:

1. Understand the meaning of positive and negative numbers (directed numbers) and represent these on a number line.
2. Recognise and understand negative integers through practical examples.
3. Use the four rules for calculations with positive integers including the correct order of carrying out operations.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Integers, positive, negative, zero, number line, more than, less than, higher, lower, brackets, indices, division, multiplication, addition, subtraction. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics. | FOM A Gold Chapters 18 and 25  
**Positive and negative numbers** [http://www.lexington1.net/technology/instruct/ppts/mathppts/Numeracy%20-%20Concepts/integers1.ppt;ppt#264,2,Definition](http://www.lexington1.net/technology/instruct/ppts/mathppts/Numeracy%20-%20Concepts/integers1.ppt#264,2,Definition)  
[http://www.primaryresources.co.uk/online/negnumorder.swf](http://www.primaryresources.co.uk/online/negnumorder.swf)  
[http://chmaths.wikispaces.com/file/view/BIDMAs.ppt](http://chmaths.wikispaces.com/file/view/BIDMAs.ppt)  
**Representing them on a number line**  
**Operations on positive numbers** [http://chmaths.wikispaces.com/file/view/BIDMA5.ppt](http://chmaths.wikispaces.com/file/view/BIDMA5.ppt) |
<table>
<thead>
<tr>
<th><strong>Teaching Objective</strong></th>
<th><strong>Examples of teaching experiments and activities</strong></th>
<th><strong>Indicators of Learning Outcomes</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach students to:</td>
<td>Students are given a card with a word on it and are instructed to find the student with the card with the opposite on it, first with common concrete terms such as “hot” and “cold,” then with more abstract mathematical ideas such as “above” and “below,” “3 more than” and “3 less than,” “plus” and “minus” and finally the opposite of “positive”. In order to visualise negative and positive numbers, the teacher could use the idea of sandcastles/mounds and holes. This power point presentation can help with this explanation. <a href="http://www.mrbartonmaths.com/resources/keystage3/number/Sandcastles.ppt">http://www.mrbartonmaths.com/resources/keystage3/number/Sandcastles.ppt</a> In order to learn how to put directed numbers in order, students are each given a card with a number on it (negative or positive). Then they are asked to form a line in ascending or descending order. The following games can be used to check for students’ understanding <a href="http://www.primaryresources.co.uk/online/negnumorder.swf">http://www.primaryresources.co.uk/online/negnumorder.swf</a> <a href="http://www.free-training-tutorial.com/negative-numbers/number-balls.html">http://www.free-training-tutorial.com/negative-numbers/number-balls.html</a> To introduce the idea of a number line the following image can be used <a href="http://nrich.maths.org/content/id/5929/SeaBed4.jpg">http://nrich.maths.org/content/id/5929/SeaBed4.jpg</a> In this picture there are black markings all the way up the lighthouse and going down to the sea bed. The markings are 1 metre apart. In pairs, the students can continue the numbering. They should be left to realise that they should use “0” to mark sea level, positive numbers while going up to the lighthouse, and negative on the way down. After this activity, the students can use this game: <a href="http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whattrenumbers/negativenumbers/flash1.shtml">http://www.bbc.co.uk/skillswise/numbers/wholenumbers/whattrenumbers/negativenumbers/flash1.shtml</a> to represent directed numbers on the number line. This number line: <a href="http://www.teacherled.com/resources/negnumberline/negnumlineload.html">http://www.teacherled.com/resources/negnumberline/negnumlineload.html</a> can be shown on the interactive whiteboard to show the students how directed numbers are represented on the number line.</td>
<td>7.1 Students will be able to recognise the significance of negative integers as expressed by practical statements such as “a debt of €2”, “5m below sea water level”, etc. 6.3 Students will be able to indicate negative numbers on thermometers, lift buttons, etc. 6.2 Students will be able to write a negative number shown on a thermometer or any other display. 6.1 Students will be able to understand that negative integers are used to show temperatures below 0°C, building levels below ground level, lift buttons, below sea water level and debt representations in bank accounts. 5.3 Students will be able to understand that in real life we use both negative and positive numbers.</td>
</tr>
</tbody>
</table>
| 2. Recognise and understand negative integers through practical examples. | To introduce the lesson, the teacher fills two beakers- one with crushed ice and the other one with warm water and places a thermometer in each beaker.  

The teacher then launches the following site on the interactive whiteboard: [http://www.teacherled.com/resources/eurotemps/eurotempsload.html](http://www.teacherled.com/resources/eurotemps/eurotempsload.html)  

A map of Europe is presented on the whiteboard. Clicking on a country produces a note showing the name of the country and its average January temperature. Clicking on a second country produces the same for it allowing the temperatures to be compared. Europe’s widely varying winter temperatures allows the teacher to question students on the difference between given negative and positive numbers.  

The following presentation about thermometers and sea level can be used as an exercise for the students to work out. [http://www.whiteboardmaths.com/downloads/cd7c2a230f6bba7574cc9a5eebbede5.zip](http://www.whiteboardmaths.com/downloads/cd7c2a230f6bba7574cc9a5eebbede5.zip)  

Additionally, this game represents another practical situation (lifts): [http://www.interactiveessentials.co.uk/software/Numeracy/NegativeNumbersLoader.swf](http://www.interactiveessentials.co.uk/software/Numeracy/NegativeNumbersLoader.swf)  

As a conclusion, the students can be asked to find other practical situations where negative numbers are used and do some research on that particular situation.  

Then the following video can be used to summarise the important situations where negative numbers are used in everyday life. [http://www.youtube.com/watch?v=ihSG9mbF3js&feature=player_detailpage](http://www.youtube.com/watch?v=ihSG9mbF3js&feature=player_detailpage) |
| --- | --- |
| 7.1 Students will be able to understand the meaning of directed numbers. Students will be able to represent all directed numbers on the number line.  

6.3 Students will be able to put the integers in order of size on a number line.  

6.2 Students will know that negative numbers are less than zero while positive numbers are more than zero.  

6.1 Students will be able to understand that on a number line, the positive numbers are found on the right hand side of zero while the negative numbers are found on the left hand side.  

5.3 Students will understand that positive numbers carry a “+” sign while negative numbers carry a “−” sign. |
3. Use the four rules for calculations with positive integers including the correct order of carrying out operations.

In order to revise Addition skills the teacher can launch this game. [http://www.amblesideprimary.com/ambleweb/mentalmaths/additiontest.html](http://www.amblesideprimary.com/ambleweb/mentalmaths/additiontest.html)

In order to revise subtraction skills the teacher can launch this subtraction game: [http://www.ictgames.com/countonconvict.html](http://www.ictgames.com/countonconvict.html)

This game is aimed towards teaching students how to find the difference when subtracting by counting on (jumping method)

Alternatively the students can play the following game which has three different levels (from easy to harder levels) [http://www.amblesideprimary.com/ambleweb/mentalmaths/subtractiontest.html](http://www.amblesideprimary.com/ambleweb/mentalmaths/subtractiontest.html)

The following game helps to revise short and long multiplication: [http://www.prongo.com/math/multiplication.html](http://www.prongo.com/math/multiplication.html)

This game also includes 3 different levels, similar to the previous game.

The following site helps students to understand the use of brackets: [http://www.sums.co.uk/playground/c5a/playground.htm](http://www.sums.co.uk/playground/c5a/playground.htm)

To teach the students the correct order of carrying out the above operations, the teacher can use this presentation [http://chmaths.wikispaces.com/file/view/BIDMAS.ppt](http://chmaths.wikispaces.com/file/view/BIDMAS.ppt)

The following worksheet helps students to practice the use of BIDMAS [http://www.c-m-g.co.uk/pgce/louiseburns/Worksheet%209MW%20BIDMAS.doc](http://www.c-m-g.co.uk/pgce/louiseburns/Worksheet%209MW%20BIDMAS.doc)

Bidmas Blaster is a game/exercise to collect the four important operations and test that the students know the BIDMAS rule. [http://www.mangahigh.com/en_us/games/bidmasblaster](http://www.mangahigh.com/en_us/games/bidmasblaster)

7.1 Students will know how to add subtract, multiply and divide and know how to use brackets even with decimal numbers, all in the correct order.

6.3 Students will know how to add and subtract. They know how to carry out short multiplications and divisions. They will also know how to carry out these operations in the correct order.

6.2 Students will know that multiplications and divisions must be worked out before additions and subtractions.

6.1 Students will know how to add and subtract up to two digit numbers. They know how to carry out multiplications and divisions by 10, 100, and 1 000.

5.3 Students will use vocabulary and symbols, involved in addition and subtraction and use them in practical situations. Students understand and use the operations of multiplication and division, including multiply any integer by 10 or 100.
Subject: MATHEMATICS

Strand 1: Number

Unit code and title: MTH 7.12 Directed Numbers and Expressions (Levels 1 – 4)

Duration: 9 sessions

OBJECTIVES at attainment levels 5,6,7,

1. Understand the meaning of positive and negative numbers (directed numbers) and represent these on a number line.
2. Recognise and understand negative integers through practical examples.
3. Use the four rules for calculations with positive integers including the correct order of carrying out operations.

OBJECTIVES at attainment levels 1,2,3,4

1.1 Students become aware of the existence of different forms of numbers in the real environment.
2.1 Students will have a basic idea of the meaning of negative numbers through practical games.
3.1 Students will follow instructions to work out sums with simple operations.

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to Note</th>
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<tbody>
<tr>
<td>Positive, negative, zero, number line, more than, less than, higher, lower, backwards, down, up, forward, division, multiplication, addition, subtraction, minus.</td>
<td>In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.</td>
<td>New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7 Software: Ilearn Maths, Calculator, Excel Worksheets Internet Links: <a href="http://www.sparklebox2.co.uk">www.sparklebox2.co.uk</a> <a href="http://www.whiteboardmaths.com/downloads/cd7c2a2306bb7574cc9a5eebdedce5.zip">http://www.whiteboardmaths.com/downloads/cd7c2a2306bb7574cc9a5eebdedce5.zip</a> <a href="http://www.amblesideprimary.com/ampleweb/mentalmaths/additiontest.html">http://www.amblesideprimary.com/ampleweb/mentalmaths/additiontest.html</a> <a href="http://www.ictgames.com/countonconvict.html">http://www.ictgames.com/countonconvict.html</a> <a href="http://www.sumsprimary.co.uk/twomilehill/">http://www.sumsprimary.co.uk/twomilehill/</a></td>
</tr>
<tr>
<td>Teaching Objectives</td>
<td>Examples of teaching experiments and activities</td>
<td>Indicators of Learning Outcomes</td>
</tr>
<tr>
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<td>--------------------------------</td>
</tr>
<tr>
<td>1.1 Students become aware of the existence of different forms of numbers and recognise them in the real world environment.</td>
<td><strong>Starter:</strong> Students are shown a positive and a negative number and they have to point or talk about the difference. Students will play UNO or any other board game through which they will encounter cards with +2 (taking 2 more cards from the pile) and -2 (implying give out 2 cards from your handful of cards). A card with zero implies no cards can be taken. Students will be involving in a moving back or forward game. They are given a dice and if the outcome is a number with a – infront of it then they move back otherwise they move forward. Students work on number discrimination by sorting the positive and negative numbers in different containers. Eventually they can be asked to colour the different numbers using different colours. Students are taken to the school lift to observe, touch the numbered buttons on the lift and experience their effect of going up and down when they press the different numbers.</td>
<td>Students will: Become aware of the meaning of zero (nothing), numbers with a minus (less, or move down or move to the left) and those with a positive sign in different real contexts. (Level 4) Start associating terms like moving back as a reversing action and we need to use different number presentations. (Level 3) Discriminate between different number representations and sort them by their representation. (Level 2) Perform actions and observe the result of own actions when pressing the lift. They will react to different temperature sensitivity. (Level 1)</td>
</tr>
<tr>
<td>2.1 Students will have a basic idea of the meaning of negative numbers through practical games.</td>
<td><strong>Starter:</strong> Students are presented with an empty number line. They are given positive numbers and they have to sort them out on the right side of the number line. The teacher gets two beakers with just boiled water, warm water, cold water and iced water. She places a thermometer inside each beaker and the students read the readings. Then they will discuss the results and begin to understand that the colder the water or the weather the lower the value of the temperature is. Students are presented with different temperate readings and they have to match them with their numbers on the number line. Students will sort numbers with a symbol in front of them (negative numbers) and those with non. Students are presented with a touch screen or switch activity in which they will: Discuss and compare different numbers. They are shown that the colder the weather the less the temperature is. (Level 4) Differentiate between the two number representations by colouring a negative number in red and a positive number in blue (a model example is shown). (Level 3) Be able to match the negative numbers with the negative numbers and the positive with the positive.</td>
<td></td>
</tr>
</tbody>
</table>
| 3.1 Students will follow instructions to work out sums with simple operations. | **Starter**: Students have a go on a computer game so the teacher can check whether they can follow instructions or not.  
Teacher writes a set of simple sums on the board and they follow the instructions as to which one they should work out first.  
Students are presented with a board game activity. They follow the teacher as she recites the numbers whilst moving a counter through it. The teacher can say move one, two and three and show the three on her fingers. The student is allowed to move the counter herself.  
Using the beebot students suggest the path that the beebot needs to take to get to the final destination. They have to count the number of steps needed to move up, down, left or right.  
Students will follow the above activities by sustaining longer attention and by showing some kind of reaction to the reciting of numbers. | (Level 2)  
Follow a slow moving object on the screen and turn head to look for a disappeared object.  
(Level 1)  
Students will:  
Begin to use the vocabulary involved in adding and subtracting.  
(Level 4)  
Start applying adding and subtracting in practical situations.  
(Level 3)  
Will show an interest in number activities and join in rote counting and familiar number activities up to 3.  
(Level 2).  
Watch their hands when it moves and maybe laugh at the one two three movements.  
(Level 1) |
Subject: MATHEMATICS  
Strand: Algebra  
Unit code and title: MTH 7.13 Straight Line Graphs (Levels 7.1 – 8.1)  
Form 1  
Duration: 9 sessions

**Objectives**
The teacher will teach students to:
1. Draw straight-line graphs from a set of ordered pairs including lines parallel to the x and y axes.
2. Write the equation of a straight-line from the relationship between the x and y coordinates (given the line graph or the coordinates) and verify whether a line passes through a point. Restrict to equations of the form \( y = mx + c \) or equivalent where \( m \) and \( c \) are integers and either \( m \) or \( c \) is zero.
3. Write down the coordinates of a set of points given the equation of a straight-line, restricting the equation to the form \( y = mx + c \) or equivalent where \( m \) and \( c \) are integers and either \( m \) or \( c \) is zero. (Exclude the use of tables to plot graphs).

<table>
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</tr>
</thead>
</table>
| \( x \) axis, \( y \) axis , origin, \( x \) coordinate, \( y \)-coordinate, scale, straight-line, plot, graph, pattern, steepness, equation. | Three main teaching approaches are being recommended.  
**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.  
**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.  
**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics. | FOM A2, Students’ Book, Practice Book, Resource Pack - Chapters 21.  
From Teachers’ Laptop  
C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons  
- Straight Line  
Internet Links:  
http://www.ngfl-cymru.org.uk  
http://www.mathsisfun.com  
http://www.ixl.com/math/practice  
Graph board, graph paper, Computer Algebra Software (CAS), spreadsheet, squared paper, Dynamic Geometry Software. |
<table>
<thead>
<tr>
<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher will teach students to:</td>
<td>Each student is given a grid with a scale from 0 to 6 on both axes and an activity card with a number of clues such as ‘Mark the point that is 2 above (4, 2)’ and ‘What point is midway between (2, 3) and (4, 3)’. The students mark the points on the grid and join them to form a line.</td>
<td>8.1 Students will be able to draw a straight line graph from a linear relationship between two quantities.</td>
</tr>
<tr>
<td>1. Draw straight-line graphs from a set of ordered pairs including lines parallel to the x and y axes.</td>
<td>The students are divided in groups of four to play coordinate bingo. A grid with a scale from 0 to 6 on both axes is given. Four lines (having equations such as $x = 1$, $y = 2$, $y = x$ and $x + y = 4$) are drawn on the grid. The students write their name on one of the lines and take turns to pick a card from a pack of 49 cards (on worksheet SU30 from the Teachers’ Resource Pack A2). The ordered pair on the card picked is marked with a cross. The winner is the one who completes the line with 4 crosses.</td>
<td>7.3 Students will be able to read and plot a set of ordered pairs in all four quadrants to obtain a straight-line graph.</td>
</tr>
<tr>
<td></td>
<td>The students are given a map of a fun park on a grid. The students have to mark on the grid a set of ordered pairs corresponding to the position of a number of attractions. The points representing the attractions are joined to form a path (i.e. a straight-line)</td>
<td>7.2 Students will be able to read and plot a set of ordered pairs in the first quadrant to obtain a straight-line graph.</td>
</tr>
<tr>
<td></td>
<td>The students plot a set of ordered pairs on the graph provided on <a href="http://www.ngfl-cymru.org.uk/vtc/ngfl/maths/25/Coordinates/coordinates.xls">http://www.ngfl-cymru.org.uk/vtc/ngfl/maths/25/Coordinates/coordinates.xls</a></td>
<td>7.1 Students will be able to read the positive number line and mark any number on it.</td>
</tr>
<tr>
<td></td>
<td>The following site gives the equation of the line and the straight-line graph when two sets of ordered pairs are entered. <a href="http://www.mathsisfun.com/straight-line-graph-calculate.html">http://www.mathsisfun.com/straight-line-graph-calculate.html</a></td>
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</tbody>
</table>
2. Write the equation of a straight-line from the relationship between the $x$ and $y$ coordinates (given the line graph or the coordinates) and verify whether a line passes through a point. Restrict to equations of the form $y = mx + c$ or equivalent where $m$ and $c$ are integers and either $m$ or $c$ is zero.

<p>|   | The students are given a set of coordinates of the form $(a, a)$. They have to investigate the relationship between the $x$-coordinate and the $y$-coordinate to obtain the equation $y = x$. Another set of coordinates of the form $(a, 2a)$ and $(a, 3a)$ are given. Each time the student has to notice the pattern to obtain the equations $y = 2x$ and $y = 3x$. The students plot the three sets of coordinates given in the above investigation to obtain three lines. By comparing all three lines the students should notice that $y = 3x$ is the steepest. The above activities may be carried out with the use of the Maths Excel Lessons - Equation of a Straight Line, on the Teachers’ Laptop. The students are given a map of a fun park on a grid showing a number of attractions. The students are given an equation of a straight line to represent a path. Each student has to check whether the path (equation of the line) leads to the attraction. On the following site the students may check whether a point lies on a given line. <a href="http://www.ixl.com/math/practice/grade-6-does-x-y-satisfy-an-equation">http://www.ixl.com/math/practice/grade-6-does-x-y-satisfy-an-equation</a> |
|---|---|---|
|   | Students are given an equation of a line. They have to complete a set of ordered pairs having a missing $x$- or $y$-coordinate. Students work in pairs. They are given a set of cards, each having the equation of a line written on it. A student picks a card and writes the coordinates of 5 points lying on the given line. The other student checks whether the coordinates found are correct. On this site, the students select points on the graph to plot a given line. <a href="http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation">http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation</a> | 8.1 Students understand that for the equation $y = x + c$ the graph cuts the $y$ axis at $c$. 7.3 Students will understand that for the equation $y = mx$ the value of $m$ determines the steepness of the graph. 7.2 Students will be able to verify whether a line passes through a point. Students will be able to write the equation of a straight-line from the relationship between the $x$- and $y$-coordinates. Restrict to equations of the form $y = mx + c$ or equivalent where $m$ and $c$ are integers and either $m$ or $c$ is zero. 7.1 Students will be able to identify a simple relationship between two numbers such as one number is double the other or one number is 1 more than the other. |
| 3. Write down the coordinates of a set of points given the equation of a straight-line, restricting the equation to the form $y = mx + c$ or equivalent where $m$ and $c$ are integers. (Exclude the use of tables to plot graphs). | Students are given an equation of a line. They have to complete a set of ordered pairs having a missing $x$- or $y$-coordinate. Students work in pairs. They are given a set of cards, each having the equation of a line written on it. A student picks a card and writes the coordinates of 5 points lying on the given line. The other student checks whether the coordinates found are correct. On this site, the students select points on the graph to plot a given line. <a href="http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation">http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation</a> | 8.1 Students will be able to write the coordinates of a set of points given the equation of the form $y = mx + c$ where $m$ and $c$ are integers. 7.3 Students will be able to write the coordinates of a set of points given the equation of the form $y = mx + c$ where $m$ and $c$ are integers and either $m$ or $c$ is zero. |</p>
<table>
<thead>
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</thead>
<tbody>
<tr>
<td>7.1 Students will be able to write the coordinates of a set of points given the equation of a line parallel to the x or y-axis.</td>
<td></td>
</tr>
<tr>
<td>7.2 Students will be able to write the coordinates of a set of points given the equation of a straight line of the form ( y = mx ).</td>
<td></td>
</tr>
</tbody>
</table>
**Digital Technology Enhanced Learning - Maths eLearning Entitlement**

**Unit MTH 7.13 Straight Line Graphs**

Students can use computers to manipulate diagrams dynamically. This encourages them to develop the capability to generate their own mental images. Sites as listed below can generate many examples which help students to notice what happens when one variable is changed and enables them to formulate their own definitions. Graph plotters like this free site [http://www.intmath.com/functions-and-graphs/graphs-using-svg.php#graph](http://www.intmath.com/functions-and-graphs/graphs-using-svg.php#graph) or this free applet [http://www.waldomaths.com/Linear1NL.jsp](http://www.waldomaths.com/Linear1NL.jsp) can help students explore the idea of a variable. This is a valuable way of exploring generality as one would do in exploring say m or c in the equation y=mx+c or for simple linear equations [http://www.waldomaths.com/index1116.jsp](http://www.waldomaths.com/index1116.jsp) where the students tries to balance each side by changing one item at a time.

Students can explore the effects of changing m and c in equations of the form y=mx+c. The students can be shown how to let m take a range of values to produce straight line graphs. They can then explore the c value and observe the differences in the graphs produced.

Geogebra [http://www.geogebra.org/cms](http://www.geogebra.org/cms), Cabri and similar software offers the opportunity to students to obtain an understanding of straight line graphs. The software enables learners to generate many examples while varying values and observing the effect on the graph. More examples can also be seen at [http://www.waldomaths.com/index1116.jsp](http://www.waldomaths.com/index1116.jsp).

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Algebra
Unit code and title: MTH 7.13 Straight Line Graphs (Levels 6.3 – 7.3)  Duration: 9 sessions

Objectives
The teacher will teach students to:

1. Draw straight-line graphs from a set of ordered pairs including lines parallel to the x and y axes.
2. Write the equation of a straight-line from the relationship between the x and y coordinates (given the line graph or the coordinates) and verify whether a line passes through a point. Restrict to equations of the form \( y = mx + c \) or equivalent where \( m \) and \( c \) are integers and either \( m \) or \( c \) is zero.
3. Write down the coordinates of a set of points given the equation of a straight-line, restricting the equation to the form \( y = mx + c \) or equivalent where \( m \) and \( c \) are integers and either \( m \) or \( c \) is zero. (Exclude the use of tables to plot graphs).

<table>
<thead>
<tr>
<th>Key Words</th>
<th>Points to note</th>
<th>Resources</th>
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<tbody>
<tr>
<td>x axes, ( y ) axes, origin, ( x )-coordinate, ( y )-coordinate, scale, straight-line, plot, graph, pattern, steepness, equation.</td>
<td>Three main teaching approaches are being recommended. Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations. Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
<td>FOM A1, Students’ Book, Practice Book, Resource Pack - Chapters 21. From Teachers’ Laptop C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons • Straight Line Internet Links: <a href="http://www.ngfl-cymru.org.uk">http://www.ngfl-cymru.org.uk</a> <a href="http://www.mathsisfun.com">http://www.mathsisfun.com</a> <a href="http://www.ixl.com/math/practice">http://www.ixl.com/math/practice</a> <a href="http://www.gcsemathstutor.com/gg-ss-reflect-01.php">http://www.gcsemathstutor.com/gg-ss-reflect-01.php</a> Graph board, graph paper, Computer Algebra Software (CAS), spreadsheet, squared paper, Dynamic Geometry Software.</td>
</tr>
<tr>
<td>Teaching Objective</td>
<td>Examples of Teaching Experiences and Activities</td>
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<tr>
<td>The teacher will teach students to:</td>
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<tr>
<td>1. Draw straight-line graphs from a set of ordered pairs including lines parallel to the x and y axes.</td>
<td>As a starter to the topic each student is given a grid with a scale from 0 to 6 on both axes and an activity card with a number of clues such as ‘Mark the point that is 2 above (4, 2)’ and ‘What point is midway between (2, 3) and (4, 3)’. The students mark the points on the grid and join them to form a line. The students are divided in groups of four to play coordinate bingo. A grid with a scale from 0 to 6 on both axes is given. Four lines (having equations such as ( x = 1, y = 2, y = x ) and ( x + y = 4 )) are drawn on the grid. The students write their name on one of the lines and take turns to pick a card from a pack of 49 cards (on worksheet SU18 from the Teachers’ Resource Pack A1). The ordered pair on the card picked is marked with a cross. The winner is the one who completes the line with 4 crosses. The students are given a map of a fun park on a grid. The students have to mark on the grid a set of ordered pairs corresponding to the position of a number of attractions. The points representing the attractions are joined to form a path (i.e. a straight-line) The students plot a set of ordered pairs on the graph provided on <a href="http://www.ngflcyrmru.org.uk/vtc/ngfl/maths/25/Coordinates/coordinates.xls">http://www.ngflcyrmru.org.uk/vtc/ngfl/maths/25/Coordinates/coordinates.xls</a> The following site gives the equation of the line and the straight-line graph when two sets of ordered pairs are entered. <a href="http://www.mathsisfun.com/straight-line-graph-calculate.html">http://www.mathsisfun.com/straight-line-graph-calculate.html</a></td>
<td>7.3 Students will be able to read and plot a set of ordered pairs in all four quadrants to obtain a straight-line graph. 7.2 Students will be able to read and plot a set of ordered pairs in the first quadrant to obtain a straight-line graph. 7.1 Students will be able to read the positive number line and mark any number on it. 6.3 Students will be able to read the positive number line and mark any integer on it.</td>
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<tr>
<td>2.</td>
<td>Write the equation of a straight-line from the relationship between the ( x ) and ( y ) coordinates (given the line graph or the coordinates) and verify whether a line passes through a point. Restrict to equations of the form ( y = mx + c ) or equivalent where ( m ) and ( c ) are integers and either ( m ) or ( c ) is zero.</td>
<td>The students are given a set of coordinates of the form ((a, a)). They have to investigate the relationship between the ( x )-coordinate and the ( y )-coordinate to obtain the equation ( y = x ). Another set of coordinates of the form ((a, 2a)) and ((a, 3a)) are given. Each time the student has to notice the pattern to obtain the equations ( y = 2x ) and ( y = 3x ). The students plot the three sets of coordinates given in the above investigation to obtain three lines. By comparing all three lines the students should notice that ( y = 3x ) is the steepest. The students are given the coordinates of points on the lines ( y = x + 1 ), ( y = x + 3 ), and ( y = x - 2 ). By drawing and comparing all three lines the students should notice that ‘the lines are all parallel’ or ‘the lines are all of the same steepness’. The above activities may be carried out with the use of the Maths Excel Lessons - Equation of a Straight Line, on the Teachers’ Laptop. The students are given a map of a fun park on a grid showing a number of attractions. The students are given an equation of a straight line to represent a path. Each student has to check whether the path (equation of the line) leads to the attraction.</td>
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<tr>
<td>3.</td>
<td>Write down the coordinates of a set of points given the equation of a straight-line, restricting the equation to the form ( y = mx + c ) or equivalent where ( m ) and ( c ) are integers and either ( m ) or ( c ) is zero. (Exclude the use of tables to plot graphs).</td>
<td>Students are given an equation of a line. They have to complete a set of ordered pairs having a missing ( x )- or ( y )-coordinate. Students work in pairs. They are given a set of cards, each having the equation of a line written on it. A student picks a card and writes the coordinates of 5 points lying on the given line. The other student checks whether the coordinates found are correct. On this site, the students select points on the graph to plot a given line. <a href="http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation">http://www.ixl.com/math/practice/grade-8-graph-a-line-from-an-equation</a></td>
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<td>7.2 Students will understand that for the equation ( y = mx ) the value of ( m ) determines the steepness of the graph.</td>
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</tbody>
</table>
Subject: MATHEMATICS
Strand: Algebra
Unit code and title: MTH 7.13 - Straight Line Graphs (Levels 5.3 – 7.1)
Duration: 9 sessions

### Objectives
The teacher will teach students to:
1. Interpret line graphs arising from real life situations.
2. Draw line graphs from simple relationships.
3. Interpret conversion graphs.

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<tbody>
<tr>
<td>Values, table, data, axis, scale, coordinates, chart/graph, points, straight lines, units, conversion.</td>
<td>Three main teaching approaches are being recommended.</td>
<td>FOM Gold A, Students’ Book, Resource Pack – Chapter 20</td>
</tr>
<tr>
<td>Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.</td>
<td></td>
<td>Internet Links: <a href="http://www.ixl.com/math/grade-5/line-graphs">http://www.ixl.com/math/grade-5/line-graphs</a> <a href="http://exchange.smarttech.com">http://exchange.smarttech.com</a> <a href="http://www.mathsisfun.com">http://www.mathsisfun.com</a> <a href="http://www.tes.co.uk/">http://www.tes.co.uk/</a> <a href="http://www.amazon.co.uk">http://www.amazon.co.uk</a> <a href="http://www.play.com">http://www.play.com</a> <a href="http://www.mathgoodies.com">http://www.mathgoodies.com</a> <a href="http://www.flashymaths.co.uk">http://www.flashymaths.co.uk</a> <a href="http://www.teacherled.com">http://www.teacherled.com</a> <a href="http://www.ictteachers.co.uk">http://www.ictteachers.co.uk</a> <a href="http://www.subtangent.com">http://www.subtangent.com</a> <a href="http://www.bbc.co.uk">http://www.bbc.co.uk</a></td>
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<tr>
<td>Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.</td>
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<td>Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.</td>
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<td>Graph board, graph paper, spreadsheet, squared paper, rotational symmetry boards</td>
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<td>Teaching Objectives</td>
<td>Examples of teaching experiences and activities</td>
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<tr>
<td>The teacher will teach students to:</td>
<td></td>
<td>7.1 Students will be able to compare and contrast information extracted from two or more line graphs arising from real life situations.</td>
</tr>
<tr>
<td>1. Interpret line graphs arising from real life situations.</td>
<td>The teacher projects the site: <a href="http://www.ixl.com/math/grade-5/line-graphs">http://www.ixl.com/math/grade-5/line-graphs</a> Students go out on the interactive whiteboard and take turns to answer questions in relation to the graphs shown. Teacher sets students in pairs and work activities found at: <a href="http://www.ixl.com/math/grade-6/interpretlinegraphs">http://www.ixl.com/math/grade-6/interpretlinegraphs</a> Students are divided in groups of four and teacher provides each group with two sets of cards: one illustrating graphs and second set with corresponding data tables. Each group will be asked to match the graphs with their respective data table. Other examples can be found: <a href="http://exchange.smarttech.com/search.html?q=line%20graph">http://exchange.smarttech.com/search.html?q=line%20graph</a> As a concluding exercise students are set in groups of four and work graded activities in appropriate worksheets.</td>
<td>6.3 Students will be able to interpret information represented in line graphs arising from real life situations.</td>
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<td>6.2 Students will be able to extract information from a real life situation graph having vertical axis with a scale of 2, 5 10 20 or 100 units per interval.</td>
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<td>6.1 Students will be able to read information from a real life situation graph having vertical axis with a scale of 2, 5 10 or 20 units per interval.</td>
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<tr>
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<td>5.3 Students will be able to read information from a real life situation graph having vertical axis with a scale of 1 or 2 units per interval.</td>
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<tr>
<td>2. Draw line graphs from simple relationships.</td>
<td>Teacher projects the site: <a href="http://www.ixl.com/math/grade-5/create-linegraphs">http://www.ixl.com/math/grade-5/create-linegraphs</a> Students pair up and answer to questions posed. The teacher sets the students in pairs and work the activity which can be accessed at: <a href="http://www.ixl.com/math/grade-6/create-line-graphs">http://www.ixl.com/math/grade-6/create-line-graphs</a> Students group in fours and work the activity proposed in the site: <a href="http://www.mathsisfun.com/data/data-graph.php">http://www.mathsisfun.com/data/data-graph.php</a> Students (individually or in pairs) work on drawing line graphs using appropriate graded worksheets.</td>
<td>7.1 Students will be able to draw a simple line graph of the form ( y = x + c ).</td>
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<td>6.3 Students will be able to draw simple lines parallel to the ( x ) and ( y ) axis, given their equation.</td>
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<td>6.2 Students will be able to draw a simple line graph by plotting and joining two given points on a grid in all 4 quadrants.</td>
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<tr>
<td></td>
<td></td>
<td>6.1 Students will be able to draw a simple line graph of the form ( y = x + c ).</td>
</tr>
<tr>
<td>3. Interpret conversion graphs.</td>
<td>Working in groups, students use excel software to plot graphs of simple relationships.</td>
<td>Students will be able to draw a simple line graph by plotting and joining two given points on a grid in the 1st quadrant.</td>
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</table>
| 3. Interpret conversion graphs. | As a starter to the topic teacher downloads conversion graph introduction presentation from site:  
http://www.tes.co.uk/resoruseDetail.aspx?storyCode=6034340  
Students go out on the interactive whiteboard and use the projected graph to answer questions posed.  
Students sit in pairs and each pair is given two cards:  
One with the temperature of a patient in °F/ °C and the other with a conversion graph from °F to °C. Using the conversion graph provided, students are asked to convert patient’s temperature readings to °C or vice versa.  
Students are placed in groups of four and asked to find the cost in £ and € of a number of items using the sites:  
http://www.amazon.co.uk and http://www.play.com  
Provided with a conversion graph students exchange between currencies.  
Students work a number of activities on appropriate worksheets downloadable from:  
http://www.tes.co.uk/Resources?storyCode=6034340  
Another possible activity can be accessed at the site:  
http://www.mathgoodies.com/lessons/graphs/line.html | 6.3 Students will be able to use simple conversion graphs to convert from one particular measure unit to another using decimal values. (Ex. The cost of 2.5g of chocolate.)  
6.2 Students will be able to use simple conversion graphs to convert from one particular measure value to another, using only integer values.  
6.1 Students will be able to use very simple conversion graphs to convert from one particular measure value to another, restricting the rate of conversion to multiples of 10 (Ex cm to mm) | 5.3 Students understand what the axes of the conversion graph represent. |
**Subject:** MATHEMATICS  

**Strand 3:** Shapes, Space and Measures  

**Unit Code and Title:** MTH 7.13 Straight Line Graphs *(Levels 1 – 4)*  

**Form:** 1  

**Duration:** 9 sessions

### OBJECTIVES at attainment levels 5,6,7

The teacher will teach students to:
1. Interpret line graphs arising from real life situations
2. Draw line graphs from simple relationships
3. Interpret conversion graphs

### OBJECTIVES at attainment levels 1,2,3,4

1.1 Students will read and get data from a grid and eventually input data into a grid.
2.1 Students will join dots or squares to form line or a shape.
3.1 Students will become aware that a shape can be rotated but still looks the same as if not rotated.

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| Values, table, data, coordinates, points, graph/chart, straight lines, units, shapes, rotation, position. | In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally. | New Maths Frame Working-Step Up Workbook.  
Oxford Framework Maths 7  
Software: Ilearn Maths, Calculator, Excel  
Worksheets  

Internet Links:  
http://www.mathsisfun.com  
http://www.tes.co.uk/  
http://www.play.com  
http://www.bbc.co.uk  
http://www.mathgoodies.com  
http://www.flashymaths.co.uk  
http://www.teacherled.com  
http://www.ictteachers.co.uk  
http://www.primaryresources.co.uk/maths/mathS6E6.htm  
http://www.sparklebox2.co.uk/numeracy/ssm/coord.html |
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<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
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<tbody>
<tr>
<td>1.1 Students will read and get data from a grid and eventually input data into a grid.</td>
<td><strong>Starter:</strong> Students are shown a picture and they have to find the places requested by the teacher. Students are given a 4X5 pictorial grid. Students have to find and name the object in that square. Eventually, they will be asked to put an object in the grid given its position. Students are given a 2X2 table with familiar pictures in it. They have to locate and identify what is in box 2. Similarly, the teacher might ask, in which is the Wii picture and they say the number of the box. Level 3 activity can be adapted to level 2 by using it as a matching bingo activity. Level 2 activity can be lowered down to two tangible and the students follow the teacher as says and points to the objects.</td>
<td>Students will be able to: Locate the position of an object on a grid. (Level 4) Locate the object and say the number of its position in a four picture table. (Level 3) Locate the position of an object by matching. (Level 2) Make and sustain eye contact with the object being named. (Level 1)</td>
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<tr>
<td>2.1 Students will join dots or squares to form line or a shape.</td>
<td><strong>Starter:</strong> A set of number or lettered dots are shown on the boards and they have to join them thus the teacher can identify whether they can follow a numbered or lettered sequence. Students will play a battle ship kind of game. One of them has the grid with the picture positions on it and he gives the position of the points of the whole picture. The other has to mark correctly the said points and guess the shape or object. Students will be presented with a grid and they will follow simple instructions like, ‘Go to the red square, move one and colour this square red too. Instructions are to be given in steps, one at a time. Students can have the same grid as in level 3 but this time they apply the concept of matching through one to one correspondence. Students will use painting activities to move a number of places and form a shape.</td>
<td>Students will: Listen to the instructions, find the said positions, and join these points to form a shape. (Level 4) Find the requested object and be able to apply the concept of counting in one. (Level 3) Find the position through matching by one to one. (Level 2) Move their finger and stop at a particular position. (Level 1)</td>
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</table>
3.1 Students will become aware that a shape can be rotated but still looks the same as if not rotated.

**Starter:** Students are shown a spinner or a circle. It is rotated and they comment about the new positions.

Students are presented with a square whose one side is in different colour from the others. This square is placed on a square background. Then the same square is turned so that the coloured side is not in the same position but the students observe how the shape still remains the same. They talk about this with the teacher.

Students will be given a spinner and they observe, talk about and point to the numbers as they change position.

Students will be given 3 spinners each one having the numbers or colours in different positions. They have to match the colours on the respective spinners each time the colour is in a different position. Students will experience the different positions of the same object.

<table>
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<tr>
<td>Talk about the format of the shape whilst being rotated and possibly count the number of times it has turned till the coloured side has returned to its original position. (Level 4)</td>
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<tr>
<td>Identify the new position of the numbers despite the shape of the object remains unchanged. (Level 3)</td>
</tr>
<tr>
<td>Find the position of the colours or numbers through matching. (Level 2)</td>
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<tr>
<td>Be involved in activities involving different positions of the same object. (Level 1)</td>
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</table>
Subject: MATHEMATICS

Strand: Shape, Space and Measures

Unit code and title: MTH 7.14 Perimeter and Area (Levels 7.1 – 8.1)

Objectives
The teachers will teach students to:

1. Find the perimeter of simple shapes by adding the lengths of the sides.
2. Find the area of simple shapes by adding unit squares and understand and use units of area: mm², cm² and m².
3. Find the area of a rectangle by counting unit squares/using formula and derive the area of a triangle given the area of a rectangle.
4. Find the area of a triangle using the formula: half (base × perpendicular height).
5. Find the area of composite shapes.

Key Words
polygon, flat shape, around, measurement, length, width, perimeter, formula, linear units, square, rectangle, triangle, cover surface, square units, area, composite shape, base, height, perpendicular height, estimate, regular, irregular, symmetry.

Points to note
Three main teaching approaches are being recommended.

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

Resources
- FOM A2, Students’ Book, Practice Book, Resource Pack - Chapter 22
- From Teachers’ Laptop
- C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons
- Fixed Perimeter
- Square paper

Internet Links:
- http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&A2=3A15=1&INSTUCT=1
- http://www.shodor.org/interactivate/activities
- http://www.bbc.co.uk/schools/gcsebitesize/maths
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<tbody>
<tr>
<td>The teachers will teach students to:</td>
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<td>8.1 Students find a missing side/s, given other sides and the perimeter of irregular polygons having 1 or 2 lines of symmetry.</td>
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<tr>
<td>1. Find the perimeter of simple shapes by adding the lengths of the sides.</td>
<td>The students work in pairs and measure the perimeter of 4 or 5 different objects (regular and irregular polygons) around the room using different units: hands, feet, pencils, strings, in cm, etc. Finally we compare how different groups arrived at the result. Grouped students are given an equal number of sticks of equal length and asked to form different polygons using all sticks. A sample from each group is shown to the whole class. Deduce that all the shapes have same perimeter, although different shape. The weaker students access the following site to practice finding the perimeter by going round a shape counting sides <a href="http://www.ixl.com/math/practice/grade-5-perimeter">http://www.ixl.com/math/practice/grade-5-perimeter</a> More advanced students are given shapes with 1 or 2 lines of symmetry (e.g. kite). They are given some lengths and the perimeter and are asked to find the missing lengths. The following site is accessed by more advanced students: <a href="http://www.mathgoodies.com/lessons/vol1/perimeter.html">http://www.mathgoodies.com/lessons/vol1/perimeter.html</a> Given the perimeter, the students find a missing side by accessing: <a href="http://www.ixl.com/math/practice/grade-6-perimeter">http://www.ixl.com/math/practice/grade-6-perimeter</a></td>
<td>7.3 Students find the length of one side, given the perimeter of regular polygons. 7.2 Students find the perimeter of regular flat shapes by multiplying the length of one side by the number of sides. 7.1 Students find the perimeter of flat shapes by adding the lengths of all sides. The students practice their addition skills as they learn how to find the perimeter of a figure.</td>
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<tr>
<td>2. Find the area of simple shapes by adding unit squares and understand and use units of area: mm², cm² and m².</td>
<td>Finding perimeter and area of shapes by counting squares by accessing: <a href="http://www.shodor.org/interactivate/activities/PerimeterExplorer/">http://www.shodor.org/interactivate/activities/PerimeterExplorer/</a> Further finding perimeter and area of shapes by counting squares by accessing: <a href="http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&amp;A2=3A15=1&amp;INSTUCT=1">http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&amp;A2=3A15=1&amp;INSTUCT=1</a> Grouped students are given an equal number of cut off squares of equal size to form shapes, using all the squares. A sample from each group is shown to the whole class. Deduce that all the shapes have same area, although different shape. The perimeter of each shape is also investigated and</td>
<td>8.1 Students find the area of flat shapes by adding unit squares and fractions of a square. 7.3 Students understand the difference between linear and square units, and when to use which. 7.2 Students identify the most appropriate unit to be used when finding the area of spaces in real life. Example: area of a field.</td>
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<td>Directive</td>
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<td>Discuss and students distinguish between perimeter and area units (linear and square units). On board, sides of shapes are measured in mm and cm. Area of shapes are calculated in mm² and cm². Students suggest which unit is most appropriate in measuring areas of different objects e.g. football ground, paper, stamp, etc. By using a tape measure or ruler students take dimensions of different flat shapes (teacher desk, student desk, page of book, classroom floor, etc). Then grouped students find area of assigned objects and decide the most appropriate unit to be used.</td>
<td>7.1 Students find the area of flat shapes by adding squares on a grid. Students use only cm² as unit for area.</td>
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<td></td>
<td>8.1 Students find the missing side of a rectangle given the area and other side.</td>
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<td>7.3 Students work out the area of a right-angled or non-right angled triangle as half the area of a rectangle.</td>
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<td>7.2 Students find the area of a rectangle by using formula.</td>
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<tr>
<td></td>
<td>7.1 Students work out the area of a right-angled triangle as half the area of a rectangle.</td>
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<tr>
<td>3. Find the area of a rectangle by counting unit squares/using formula and derive the area of a triangle given the area of a rectangle.</td>
<td>Students find area of rectangles by counting squares and then finding the area of half of it. Thus concluding that the area of a right angled-triangle is half that of the rectangle having the same base and height. More advanced students apply this also to triangles which are not right-angled. Students practice finding area of rectangles using formula by accessing: <a href="http://www.ixl.com/math/practice/grade-5-area-of-squares-and-rectangles">http://www.ixl.com/math/practice/grade-5-area-of-squares-and-rectangles</a></td>
<td></td>
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<tr>
<td>4. Find the area of a triangle using the formula: half (base × perpendicular height).</td>
<td>Finding area of shapes by counting squares and deduce formula by accessing: <a href="http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/">http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/</a> Practice finding area of triangles by using the formula by accessing: <a href="http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/">http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/</a> Further practice finding area of triangles by using the formula by accessing: <a href="http://www.ixl.com/math/practice/grade-6-area">http://www.ixl.com/math/practice/grade-6-area</a> Further Practice finding area of triangles by using the formula by accessing: <a href="http://www.mathgoodies.com/lessons/vol1/area_triangle.html">http://www.mathgoodies.com/lessons/vol1/area_triangle.html</a> Students deduce the correlation between the size of the perimeter and the number of different possible areas that can be contained within that perimeter.</td>
<td>8.1 Students find the size of base/height of a triangle given the height/base and area of triangles which are not right-angled.</td>
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<td>7.3 Students find the area of a triangle by using formula.</td>
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<td>7.2 Students work out the area of a triangle given the area of a rectangle.</td>
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<td></td>
<td>7.1 Students find the area of a right-angled triangle as half the area of a rectangle.</td>
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</table>
and the affect the shape of the perimeter has on the area of the object.

Further site available for correlation between perimeter and area:

From Teachers' Laptop
C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons - Fixed Perimeter

| 5. Find the area of composite shapes. | Students shown composite shapes and students suggest different how they can be split in squares/rectangles. The area of the composite shape is calculated using different suggested arrangements, concluding that the result is the same. Students are given composite shapes which can be split into right-angled triangles and squares/rectangles and the area is again calculated. Students are given composite shapes which can be split into triangles which need not be right-angled and squares/rectangles and the area is again calculated. Students access site: [http://www.suffolkmaths.co.uk/pages/Lesson%20Resources/Shape/20%20Mensuration/Questions%20-%20Composite%20Shapes%20056.pdf](http://www.suffolkmaths.co.uk/pages/Lesson%20Resources/Shape/20%20Mensuration/Questions%20-%20Composite%20Shapes%20056.pdf) | 8.1 Students find the area of composite shapes formed of squares/rectangles and triangles which need not be right-angled, using formulae. 7.3 Students find the area of composite shapes which can be split into right-angled triangles and squares/rectangles, using formulae. 7.2 Students find the area of composite shapes which can be split into squares/rectangles, using formulae. 7.1 Students find the area of composite shapes which can be split into right-angled triangles and squares/rectangles by counting squares. |
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.14 Perimeter and Area

Technology can be used to give access to large quantities of data and provides tools to represent it in a variety of ways. When using these tools students can put forward hypotheses, represent, interpret and discuss data. Students can collect primary and secondary data and plan carefully how to use various sources. Equipment for data collection such as data loggers and sensors should not be confined to science labs but made available during Math to gather first hand data. Secondary sources such as databases and the Internet will provide students with evidence to support their enquiries.

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be asked to create quizzes for others and publish them or design games using the multiple choice component in http://hotpot.uvic.ca/index.php#downloads

1 License available from CMeLD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Shape, Space and Measures
Unit code and title: MTH 7.14. Area and Perimeter (Level 6.3 – 7.3)
Duration: 9 sessions

Objectives
The teacher will teach the students to:
1. Find the perimeter of simple shapes by adding the lengths of the sides.
2. Find the area of simple shapes by adding unit squares and understand and use units of area: mm², cm² and m².
3. Find the area of a rectangle by counting unit squares/using formula and derive the area of a triangle given the area of a rectangle.
4. Find the area of composite shapes.

Key Words
polygon, flat shape, around, measurement, length, width, perimeter, formula, linear units, square, rectangle, triangle, cover surface, square units, area, composite shape, base, height, perpendicular height, estimate, regular, irregular, symmetry.

Points to note

Exposition: the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

Discovery: the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

Exploration: the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

Resources
FOM A1, Students’ Book, Practice Book, Resource Pack - Chapter 22
From Teachers’ Laptop
C:\Documents and Settings\seclap211\My Documents\Maths Excel Lessons
Fixed Perimeter
Squared paper

Internet Links:
http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&A2=3A15=1&INSTRUCT=1
http://www.ixl.com/math/practice
http://www.shodor.org/interactivate/activities
http://www.bbc.co.uk/schools/gcsebitesize/maths
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<th>Teaching Objective</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
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<tr>
<td>1. Find the perimeter of simple shapes by adding the lengths of the sides.</td>
<td>The students work in pairs and measure the perimeter of 4 or 5 different objects (regular and irregular polygons) around the room using different units: hands, feet, pencils, strings, in cm, etc. Finally we compare how different groups arrived at the result. Grouped students are given an equal number of sticks (geo sticks) of equal length and asked to form different polygons using all sticks. A sample from each group is shown to the whole class. Deduce that all the shapes have same perimeter, although different shape. The less able students access the following site to practice finding the perimeter by going round a shape counting sides <a href="http://www.ixl.com/math/practice/grade-5-perimeter">http://www.ixl.com/math/practice/grade-5-perimeter</a> More able students are given shapes with 1 or 2 lines of symmetry (e.g. kite). They are given some lengths and the perimeter and are asked to find the missing lengths. The following site is accessed by more advanced students: <a href="http://www.mathgoodies.com/lessons/vol1/perimeter.html">http://www.mathgoodies.com/lessons/vol1/perimeter.html</a> Given the perimeter, the students find a missing side by accessing: <a href="http://www.ixl.com/math/practice/grade-6-perimeter">http://www.ixl.com/math/practice/grade-6-perimeter</a></td>
<td>7.3 Students find the length of one side, given the perimeter of regular polygons. 7.2 Students find the perimeter of regular flat shapes by multiplying the length of one side by the number of sides. 7.1 Students find the perimeter of flat shapes by adding the lengths of all sides. The students practice their addition skills as they learn how to find the perimeter of a figure. 6.3 Students will find the perimeter of composite shapes drawn on a grid, by counting unit squares on each side of each flat shape.</td>
</tr>
<tr>
<td>2. Find the area of simple shapes by adding unit squares and understand and use units of area: mm², cm² and m².</td>
<td>Finding the area of shapes by counting squares by accessing: <a href="http://www.shodor.org/interactivate/activities/PerimeterExplorer/">http://www.shodor.org/interactivate/activities/PerimeterExplorer/</a> Further finding the area of shapes by counting squares by accessing: <a href="http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&amp;A2=3&amp;A15=1&amp;INSTUCT=1">http://www.funbrain.com/cgi-bin/poly.cgi?A1=s&amp;A2=3&amp;A15=1&amp;INSTUCT=1</a> Grouped students are given an equal number of cut off squares of equal size to form shapes, using all the squares. A sample from each group is shown to the whole class. Deduce that all the shapes have same area, although different shape. The perimeter of each shape is also investigated and</td>
<td>7.3 Students understand the difference between linear and square units, and when to use which. 7.2 Students identify the most appropriate unit to be used when finding the area of spaces in real life. Example: area of a field.</td>
</tr>
</tbody>
</table>
| 3. Find the area of a rectangle by counting unit squares/using formula and derive the area of a triangle given the area of a rectangle. | Students find area of different rectangles of various lengths and breadths by counting squares.  
Students are led to deduce the formula for the area of a rectangle.  
Students find the area of a right angled-triangle by adding unit squares on a grid.  
Students discover the method of finding the area of a triangle by cutting along the diagonal of various cardboard rectangles and observing that the two resulting triangles are equal in area.  
Students work out the area of a triangle by completing the rectangle, finding its area and dividing by two. | 7.1 Students find the area of flat shapes by adding squares on a grid.  
Students use only cm² as unit for area.  
6.3 Students will compare two or more flat shapes and decide which has the largest/smallest area. | 7.3 Students work out the area of a right-angled or non-right angled triangle as half the area of a rectangle.  
7.2 Students find the area of a rectangle by using formula.  
7.1 Students work out the area of a right-angled triangle as half the area of a rectangle.  
6.3 Students will find the area of a rectangle/square by adding unit squares on a grid. |
4. Find the area of composite shapes.

| Students shown composite shapes and students suggest different how they can be split in squares/rectangles. The area of the composite shape is calculated using different suggested arrangements, concluding that the result is the same. |
| Students are given composite shapes which can be split into right-angled triangles and squares/rectangles and the area is again calculated. |
| Students are given composite shapes which can be split into triangles which need not be right-angled and squares/rectangles and the area is again calculated. |
| Students access site: [http://www.suffolkmaths.co.uk/pages/Lesson%20Resources/Shape/20%20Mensuration/Questions%20-%20Composite%20Shapes%20056.pdf](http://www.suffolkmaths.co.uk/pages/Lesson%20Resources/Shape/20%20Mensuration/Questions%20-%20Composite%20Shapes%20056.pdf) |

| 7.3 Students find the area of composite shapes which can be split into right-angled triangles and squares/rectangles, using formulae. |
| 7.2 Students find the area of composite shapes which can be split into squares/rectangles, using formulae. |
| 7.1 Students find the area of composite shapes which can be split into right-angled triangles and squares/rectangles by counting squares. |
| 6.3 Students will find the area of composite shapes which can be split in squares / rectangles, by counting squares on a grid. |
**Subject:** MATHEMATICS  
**Strand:** Shape, Space and Measures  
**Unit code and title:** MTH 7.14 Perimeter and Area *(Levels 5.3 – 7.1)*

### Objectives

The teacher will teach the students to:

1. Find the perimeter of simple shapes by adding the lengths of the sides.
2. Find the area of a rectangle/square by counting unit squares and understand and use the unit of area: cm$^2$
3. Find the area of a right angled triangle as half the area of a rectangle or square.
4. Find the area of simple composite shapes by counting unit squares.

### Key Words

- perimeter, area, counting, squares, grid, length, add, multiply, units, cm$^2$, sides, rectangle, square, diagonal, half, whole, triangle, composite shapes, right angled triangle.

### Points to Note

Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics.

### Resources

- FOM Gold A Student's Book and Resource File - Chapter 21
- Internet Links:
  - [http://pbskids.org/cyberchase/games/perimeterarea.html](http://pbskids.org/cyberchase/games/perimeterarea.html)
  - [http://www.superteacherworksheets.com/geometry/area-perimeter.pdf](http://www.superteacherworksheets.com/geometry/area-perimeter.pdf)
  - [http://gwydir.demon.co.uk/jo/tess/bigsq.htm](http://gwydir.demon.co.uk/jo/tess/bigsq.htm)
  - [http://www.superteacherworksheets.com](http://www.superteacherworksheets.com)
<table>
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<th>Teaching Objectives</th>
<th>Examples of Teaching Experiences and Activities</th>
<th>Indicators of Learning Outcomes</th>
</tr>
</thead>
</table>
| 1. Find the perimeter of simple shapes by adding the lengths of the sides.        | The teacher discusses the following practical examples with the whole class to elicit the meaning of perimeter.  
  ➢ length of ribbon needed to surround a photo (in centimetre),  
  ➢ buying skirting for the classroom (in metre)  
  ➢ buying fencing for a field (in metre).  
  The students can be asked beforehand to bring a photo and a ribbon. Each student is asked to find the perimeter of the photo and surround it with the ribbon.  
  Students are placed in groups of three. Students are given different cardboard-made composite shapes (irregular polygons – length of sides must be whole numbers). Students must in turn have the following roles: using a ruler, one student measures the sides of the shape, another one checks the measurement and the third student writes the measurement on a piece of paper. Then together they must add the sides to find the perimeter of the shape.  
  The teacher divides the students into two groups. Then he/she projects the site on the interactive whiteboard by clicking [http://www.bgfl.org/bgfl/custom/resources_ftp/clientftp/ks2/maths/perimeter_and_area/index.html](http://www.bgfl.org/bgfl/custom/resources_ftp/clientftp/ks2/maths/perimeter_and_area/index.html) (under perimeter). The teacher asks each leader of each group to give the answers in the form of a quiz. | 7.1 Students find the perimeter of flat shapes by adding the lengths of all sides. The students practice their addition skills as they learn how to find the perimeter of a figure.  
  6.3 Students will find the perimeter of composite shapes drawn on a grid, by counting unit squares on each side of each flat shape.  
  6.2 Students will find the perimeter of rectangles/squares drawn on a grid, by counting unit squares on each side.  
  6.1 Students will understand that perimeter is a linear measurement. Restrict to cm and mm.  
  5.3 Students will understand the notion of perimeter as adding all sides. |
| 2. Find the area of a rectangle/square by counting the squares and understand and use the unit of area: cm² | The teacher projects the following site: [http://www.superteacherworksheets.com/geometry/graph-area.pdf](http://www.superteacherworksheets.com/geometry/graph-area.pdf) on the interactive whiteboard and asks the students to work out the area of the first three rectangles. After understanding the concept of finding the area by counting the squares, the students can work the other examples. Alternatively, the teacher can show the following site: [http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html](http://www.bgfl.org/bgfl/custom/resources_ftp/client_ftp/ks2/maths/perimeter_and_area/index.html). Click only on level one. The students are divided in groups of four and are asked to work out each area as a group.  
  Game: Divide the children into three groups A, B and C. The teacher gives 12 | 7.1 Students find the area of flat shapes by adding squares on a grid. Students use only cm² as unit for area.  
  6.3 Students will compare two or more flat shapes and decide which has the largest/smallest area.  
  6.2 Students will understand that 1cm² represents 1cm shaded square. |
<table>
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<tr>
<th>Cardboard squares to group A, 24 cardboard squares to group B and 30 cardboard squares to group C. In 15 minutes students in each group have to form as many different rectangles as they can and record the different measurements on their copybooks. Afterwards the teacher discusses the results of each group with the whole class to consolidate the area of rectangles with different measurements. The teacher asks the students to bring a $1cm \times 1cm$ squared sheet or copybook, ruler and colours. He/she divides the students in pairs and asks them to measure the length and the width of one square from the copybook, shade it and write down its area in square cm ($cm^2$). Afterwards they are asked to form rectangles with different dimensions such as: $1cm$ by $2cm$, $2cm$ by $3cm$, colour each rectangle and write the area in units. Students work individually. The teacher prints a $10 \times 10$ grid (<a href="http://etc.usf.edu/clipart/42600/42674/grid_42674.htm">http://etc.usf.edu/clipart/42600/42674/grid_42674.htm</a>) and gives the students different ready-made rectangles on transparencies with different measurements. Using the grid as a background, the students are asked to find the area in square centimetres.</th>
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<tbody>
<tr>
<td>Students will find the area of a rectangle/square by adding unit squares on a grid.</td>
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<tr>
<td>Students will know that area is the space covering the shape.</td>
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| Students should practice the fact that the area of a square is made up of two triangles by the following activities found at: [http://nhes.dadeschools.net/sf/mathg5/se/products/0-328-09561-3/ch09/548.html](http://nhes.dadeschools.net/sf/mathg5/se/products/0-328-09561-3/ch09/548.html) With these activities students should recognize that a rectangle is made up of two triangles: 

- [http://nzmaths.co.nz/resource/triangles](http://nzmaths.co.nz/resource/triangles)
- [http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/areaandperimeterrev1.shtml](http://www.bbc.co.uk/schools/gcsebitesize/maths/shapes/areaandperimeterrev1.shtml) Students should be seated in a circle to play the following game: Three squares and rectangles of different dimensions on squared cardboard and triangles half the area of the respective squares and rectangles are to be rotated among the students for 1 minute. Then the teacher asks who has a square of a particular area. S/He then asks the students who own the right angled triangle with half the area of the square. This should be repeated with the rest of the shapes. |
| Students work out the area of a right-angled triangle as half the area of a rectangle. |
| Students will find the area of a rectangle/square by adding unit squares on a grid. |

| Students understand that a right angled triangle can be drawn by dividing a rectangle along its diagonal. |
| Students will find the area of an isosceles right angled-triangle by adding unit and half unit squares on a grid. |
| Students will recognize that two $\frac{1}{2}$ squares make 1 whole square. |

3. Find the area of a right angled triangle as half the area of a rectangle or square.
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<tr>
<td>4. <strong>Find the area of simple composite shapes by counting squares</strong></td>
<td>The students are divided into groups of four and they play the game that can be accessed at: <a href="http://www.ixl.com/math/practice/grade-3-area">http://www.ixl.com/math/practice/grade-3-area</a> Students are put in groups of two and use the computer to work on the following site: <a href="http://www.shodor.org/interactivate/activities/AreaExplorer/">http://www.shodor.org/interactivate/activities/AreaExplorer/</a> They are asked to find the area of composite shapes. The teacher provides a number of composite shapes on squared paper. Students are given a set of composite shapes including L-shapes, T-shapes, squares and right angled triangles, rectangles and right angled triangles. They are asked to find the area of the shapes by first cutting the composite shapes into simpler basic shapes and then find the area by counting the squares.</td>
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<tr>
<td>7.1 <strong>Students find the area of composite shapes which can be split into right-angled triangles and squares/rectangles by counting squares.</strong></td>
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<tr>
<td>6.3 <strong>Students will find the area of composite shapes which can be split in squares / rectangles, by counting squares on a grid.</strong></td>
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<tr>
<td>6.2 <strong>Students will understand that the area of composite shapes is found by adding the area of simpler shapes.</strong></td>
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<tr>
<td>6.1 <strong>Students will know how to split composite shapes into simpler ones.</strong></td>
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<tr>
<td>5.3 <strong>Students will know how to find the area of very simple composite shapes, by counting units squares, without splitting into simpler shapes.</strong></td>
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</table>
### OBJECTIVES at attainment levels 5,6,7

1. Find the perimeter of simple shapes by adding the lengths of the sides.
2. Find the area of a rectangle by counting squares and understand and use units of area: $\text{cm}^2$.
3. Find the area of a right angled triangle as half the area of a rectangle or square.
4. Find the area of simple composite shapes by counting squares.

### OBJECTIVES at attainment levels 1,2,3,4

1. Students will gain knowledge about the space covered by the boundary.
2. Students will gain knowledge about the space covered within the shape and be familiar with standard measurement tools.
3. Students are exposed to the idea that a triangle is half of a rectangle.
4. Students will be involved in simple addition problems of composite shapes.

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<tr>
<th>Key Words</th>
<th>Points to Note</th>
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<td>Counting, squares, length, add, sides, square, half, whole, triangle, parts, greater or less than, cut in two, share equally.</td>
<td>In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.</td>
<td>New Maths Frame Working-Step Up Workbook. Oxford Framework Maths 7 Software: Ilearn Maths, Calculator, Excel Worksheets Perimeter and Area <a href="http://www.superteacherworksheets.com/geometry/area-perimeter.pdf">http://www.superteacherworksheets.com/geometry/area-perimeter.pdf</a> Area <a href="http://www.brainpopjr.com/math/measurement/area/grownups.weml#teachers">http://www.brainpopjr.com/math/measurement/area/grownups.weml#teachers</a> <a href="http://www.studyzone.org/testprep/math4/k/squaresp.cfm">http://www.studyzone.org/testprep/math4/k/squaresp.cfm</a> <a href="http://www.brainpopjr.com/math/measurement/area/activity/">http://www.brainpopjr.com/math/measurement/area/activity/</a> Square Grid <a href="http://gwydir.demon.co.uk/jo/tess/bigsq.htm">http://gwydir.demon.co.uk/jo/tess/bigsq.htm</a></td>
</tr>
<tr>
<td>Teaching Objective</td>
<td>Teaching Examples</td>
<td>Indicators of Learning outcomes</td>
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</tr>
<tr>
<td>1.1 Students will gain knowledge about the space covered by the boundary</td>
<td><strong>Starter:</strong> Students are given shapes or pictures and they are asked to point, talk about the length and height of each shape. Students are presented with a shape divided into squares and they have to count the boxes covering the length and the boxes covering the height. Then they can compare the sizes and talk about the space covered. Students are presented with shape objects and they are asked to count the number of sides per object and talk about the differences in the number of sides such that a shape with a larger boundary is covering more space. Level 3 activity can be lowered down to just surrounding the sides of the shape with blocks or any other material thus the children will observe that the smaller the shape the less blocks needed. Using [<a href="http://www.priorywoods.middlesbrough.sch.uk/page_viewer.asp?page=Free">http://www.priorywoods.middlesbrough.sch.uk/page_viewer.asp?page=Free</a> Program Resources&amp;pid=161](<a href="http://www.priorywoods.middlesbrough.sch.uk/page_viewer.asp?page=Free">http://www.priorywoods.middlesbrough.sch.uk/page_viewer.asp?page=Free</a> Program Resources&amp;pid=161) the students just observe the different shapes on the screen and they maintain attention for a short period of time. The shapes on the screen are also presented to the students to observe and manipulate.</td>
<td>Students will: Use counting on to find out the length and height covered by a shape. (Level 4) Count the number of sides per shape and compare the size of each shape. (Level 3) Develop awareness of distance and direction when placing objects in the surrounding path. (Level 2) Touch an object and sustain concentration for short periods. (Level 1)</td>
</tr>
<tr>
<td>2.1 Students will gain knowledge about the space covered within the shape and be familiar with standard measurement tools.</td>
<td><strong>Starter:</strong> Students are given objects or pictures and they have to point or talk about the space inside a shape or picture. Students will be given a grid. They are asked to draw a number of shapes each with ten squares. Eventually, they are presented with objects varying in size and they have to colour or circle the object which has the largest inside space, thus largest area. Students are presented with a grid containing coloured squares. They have to count the number of coloured squares on the grid. Then, they can have a try to draw their own shape given the number of squares to be coloured. Students are presented with squared shapes and they have to match like with like through one to one correspondence. Students are presented with different shapes like shoe box, match box, a cone shape. They are asked to put their hand in and take out the objects inside whilst touching an object and sustaining concentration for short periods. (Level 1)</td>
<td>Students will: Use counting to calculate the space covered by a shape and eventually they will use their knowledge of size to compare two objects and identify the one with the largest area. (Level 4) Become aware of the different spaces an object covers through counting. (Level 3) Match shapes with the same area. (Level 2) Tip in and pour out contents from a container whilst touching an object and sustaining concentration for short periods. (Level 1)</td>
</tr>
</tbody>
</table>
| 3.1 Students are exposed to the idea that a triangle is half of a rectangle. | **Starter:** Students are presented with a whole object and half of this object. They are left to explore and manipulate them.  
Students are asked to draw a rectangle and a square. Then they are asked to draw a diagonal line like the one modelled by the teacher and cut along this line. Eventually, they will discuss the outcome.  
Students are given a series of triangles and rectangles. They distinguish between the two by colouring triangles in red and rectangles in blue. Eventually, they are given shape cards and they have to fill the shape boundary by matching the foam shapes. Students will sort triangles and rectangles into two different groups.  
Students are presented with a rectangular box containing a diagonal divider. Students transfer objects from one section of the container to the other. | Students will:  
Recognise and talk about the fact that a shape is made up of a combination of other shapes put together. (Level 4)  
Pick out shapes from a set of shapes to fill a border. (Level 3)  
Sort triangles and rectangles. (Level 2)  
Grasp an object and transfer it from one place to the other. (Level 1) |
| 4.1 Find the area of simple composite shapes by counting squares | **Starter:** Students are presented with a composite shape and they are left to explore and manipulate it.  
Students are given a set of shapes or blocks and with that amount they have to build | Students will:  
Create pictures by using different shapes and count the number of squares inside the picture made. (Level 4) |
up different pictures using a combination of shapes. They will count the number of whole squares used and talk about the different shapes used.

Students are given a template made up of a combination of shapes and they count the number of different shapes whilst naming them.

Students are presented with L, T and U shape templates. Using wool, sand paper, self-designed hard paper they do a collage activity to fill the space inside the shape.

Students are presented with a template of simple composite shapes on a square grid. Using the priory wood website http://www.priorywoods.middlesbrough.sch.uk/page_viewer.asp?page=Free Program Resources&pid=161 students try to reproduce the shape on the screen.

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</tr>
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</table>

Name basic shapes and participate in counting of a number of objects. (Level 3)

Participate in craft activities dealing with the inside space of a shape. (Level 2)

Student moves their body to go around an object. (Level 1)
Subject: MATHEMATICS
Strand: Shapes, Space and Measures
Unit code and title: MTH 7.15 Solid Shapes and Volume (Levels 7.1 – 8.1)

Objectives
The teacher will teach students to:
1. Make cubes and cuboids from their nets.
2. Identify faces, vertices and edges of simple solids.
3. Find the volume of a cube and cuboid by counting unit cubes and using the formula.
4. Understand and use units of volume: mm³, cm³, m³.
5. Find the volume of compound shapes involving cubes and cuboids.

<table>
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<th>Key Words</th>
<th>Points to note</th>
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</table>
| Solid shape, face, edge, vertex (vertices), net, dimensions length, width, height, formula, volume, cubic units, cube, cuboid, compound shape. | Three main teaching approaches are being recommended. **Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations. **Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations. **Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting ideas and concepts, and expressing results by using the precise language of mathematics. | FOM A2, Students’ Book, Practice Book, Resource Pack - Chapters 20 and 22
Internet Links:
www.funbrain.com/linejump/index.html
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http://illuminations.nctm.org
http://www.ngfl-cymru.org.uk
http://www.whiteboardmaths.com
http://www.mathsisfun.com
http://www.bbc.co.uk/skillswise
http://www.cimt.plymouth.ac.uk
Models of 3D shapes, nets of cubes and cuboids, food packets, wooden cubes, squared paper. |
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<th>Examples of Teaching Experiences and Activities</th>
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<tr>
<td>The teacher will teach students to:</td>
<td></td>
<td>8.1 Students will be able to identify possible and impossible nets of cubes and cuboids.</td>
</tr>
<tr>
<td>1. Make cubes and cuboids from their nets.</td>
<td>Students bring to school a number of packets in the shape of a cube or cuboid. Each packet is opened flat to obtain the net of the packet. The number of faces, edges and vertices of various packets is compared. The teacher provides the students with the net of a cube and cuboid and the students have to build up the shape. Nets of cube and cuboids may be obtained from the following site: <a href="http://www.senteacher.org/Worksheet/12/NetsPolyhedra.xhtml">http://www.senteacher.org/Worksheet/12/NetsPolyhedra.xhtml</a> Students are given a handout with different nets of a cube (or cuboid) and they have to choose which nets form a cube (or a cuboid). Students access this site to choose which nets form a cube. <a href="http://illuminations.nctm.org/ActivityDetail.aspx?ID=84">http://illuminations.nctm.org/ActivityDetail.aspx?ID=84</a> Students are given the dimensions of various closed cubes and cuboids. They have to draw a net for each shape on centimetre squared paper. The net is cut out and the required cube (or cuboid) is constructed. In this way the students can verify whether the net drawn was correct.</td>
<td>7.3 Students will be able to identify different nets of a closed cube or cuboid. Students will be able to draw the net of a closed cube or cuboid, given its dimensions. 7.2 Students will be able to identify the identical faces of the net of a cuboid. 7.1 Students will be able to make a cube and cuboids from their nets.</td>
</tr>
<tr>
<td>2. Identify faces, vertices and edges of simple solids.</td>
<td>Students bring to school a number of packets consisting of different 3D shapes. The number of faces, edges and vertices of various packets is compared. The students are given a set of 3D shapes and they have to fill in a table to show the number of faces, vertices and edges. Students are given a handout with nets of simple 3D shapes. They have to identify the 3D shape from its net and find the number of faces, vertices and edges. Activity on <a href="http://www.ngfl-cymru.org.uk/vtc/castle_shapes/eng/Introduction/Default.htm">http://www.ngfl-cymru.org.uk/vtc/castle_shapes/eng/Introduction/Default.htm</a></td>
<td>8.1 Students will be able to identify and count faces, vertices and edges of a compound solid shape. 7.3 Students will be able to identify faces, vertices and edges of simple solids, including various prisms other than triangular, such as hexagonal, octagonal. 7.2 Students will be able to identify curved faces, vertices and edges of simple solids, including spheres and cones. 7.1 Students will be able to identify faces, vertices and edges of simple solids, such as cubes, cuboids, triangular prisms and pyramids.</td>
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</table>
3. Find the volume of a cube and cuboid by counting unit cubes and using the formula.

| The students draw the net of a cuboid on centimetre squared paper and add the flaps to make a solid shape from their net. The dimensions of their cuboid are obtained by counting the number of 1 cm squares on each edge. The number of cubes making up the cuboid is equivalent to value of the volume of the cuboid obtained by calculation. Students view the following powerpoint on volume: http://www.whiteboardmaths.com/content/samples/df11683bb425d8a08bd5ba406797ba1c.ppt

The students bring to school a number of boxes, such as cereal packets, pasta packets etc. and they measure the lengths of the sides and find the volume of the box.

The students may use this site as a volume calculator or they can find the dimensions of a cuboid given the volume: http://www.mathsisfun.com/cuboid.html

The site http://www.bbc.co.uk/skillswise/numbers/measuring/volume/index.shtml provides the teacher with notes, online tests and worksheets on finding the volume of a cube and cuboid.

The students may practice finding the volume of a cuboid using the formula on the site: http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i22/bk7_22i3.htm |

| 8.1 Students will be able to find a missing side of a cube or cuboid given the two other sides and the volume.

7.3 Students will be able to find the volume of a cube or cuboid by using the formula.

7.2 Students will be able to understand that the volume of a cube or cuboid can be found by multiplying the base area by the height of the cube or cuboid.

7.1 Students will be able to understand that when multiplying the number of unit cubes in the base by the number of unit cubes in the height, it gives the volume of the cube or cuboid. |
| 4. Understand and use units of volume: mm³, cm³, m³. | The students are shown a 1 centimetre cube and they are asked to measure the length of its edges. The teacher initiates a discussion with questions such as ‘Do you think you can handle a 1 mm cube with your fingers?’ and ‘Do you think you can handle a 1 metre cube with your fingers?’ The discussion enables the students to appreciate the difference in dimensions.  

The students are given an investigative worksheet aimed at discovering the number of 1 centimetre cubes required to fill a 1 metre of space.  

The students are shown pictures of various items in the shape of a cuboid such as a matchstick box, a lunch box, a water tank, a room, a swimming pool, etc. The students have to identify the unit that best suites the picture. |
| --- | --- |
| 8.1 Students will be able to relate capacity to cm³.  
7.3 Students will be able to calculate the volume of an object even when the dimensions are expressed in different units.  
7.2 Students will be able to use the proper cubic units according to the object whose volume is to be found. Eg. Finding the volume of a water tank in m³.  
7.1 Students will be able to visualise the size of 1 mm³, 1 cm³ and 1 m³. |

| 5. Find the volume of compound shapes involving cubes and cuboids. | The students are divided in groups. The teacher provides each group with a worksheet involving compound shapes made up of cubes and cuboids. Students have to split the shapes in cuboids (or cubes), find the dimensions of each and finally calculate the total volume of the compound shape.  

Students play a domino game involving compound shapes. The students have to match the compound shape on one domino to its volume on another domino.  

The students may practice finding the volume of a compound shapes involving cubes and cuboids on the site: [http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7j22/bk7_22i3.htm](http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7j22/bk7_22i3.htm) |
| --- | --- |
| 8.1 Students will be able to find the volume of compound shapes involving more than 2 components (cubes/cuboids).  
7.3 Students will be able to find the volume of compound shapes involving 2 components (cubes/cuboids).  
7.2 Students will be able to identify the dimensions of the components (cubes/cuboids) of a compound shape.  
7.1 Students will be able to identify the components (cubes/cuboids) making up a compound shape. |
Digital Technology Enhanced Learning - Maths eLearning Entitlement

Unit MTH 7.15 Solid Shapes and Volume

Technology can be used to give access to large quantities of data and provides tools to represent it in a variety of ways. When using these tools students can put forward hypotheses, represent, interpret and discuss data. Students can collect primary and secondary data and plan carefully how to use various sources. Equipment for data collection such as data loggers and sensors should not be confined to science labs but made available during Math to gather first hand data. Secondary sources such as databases and the Internet will provide students with evidence to support their enquiries.

This unit offers a number of resources that can be used by the students. All the suggested resources can be accessed online and do not require signing in.

Since learning is a social process it is suggested that teachers include an element of collaboration in their lesson. Student-teacher interaction can be extended to interactions among students. Students can take on a ‘teaching’ role and explain to others less knowledgeable using the collaborative tools such as blogs and wikis. Through these interactions students come to acquire not only knowledge but also routines for managing their acquisition and use of that knowledge.

Students may be asked to create quizzes for others and publish them, design their own solids using Google sketchup and create games using the multiple choice component in http://hotpot.uvic.ca/index.php#downloads 4

1 License available from CMELD.
2 Public cloud. Signing up required.
3 Public cloud. No signing in required.
4 Downloadable program.
Subject: MATHEMATICS
Strand: Shapes, Space AND Measures
Unit code and title: MTH 7.15 Solid Shapes and Volume (Levels 6.3 – 7.3)

Objectives
The teacher will teach students to:
1. Make cubes and cuboids from their nets.
2. Identify faces, vertices and edges of simple solids.
3. Find the volume of a cube or cuboid by counting unit cubes and using the formula.
4. Understand and use units of volume: mm$^3$, cm$^3$, m$^3$.
5. Find the volume of compound shapes involving cubes and cuboids.

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http://www.whiteboardmaths.com
http://www.mathsisfun.com
http://www.mathsishere.com
http://www.bbc.co.uk/skillswise
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Models of 3D shapes, nets of cubes and cuboids, food packets, wooden cubes, squared paper. |
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<td>Students bring to school a number of packets consisting of different 3D shapes. The number of faces, edges and vertices of various packets is compared. The students are given a set of 3D shapes and they have to fill in a table to show the number of faces, vertices and edges. Students are given a handout with nets of simple 3D shapes. They have to identify the 3D shape from its net and find the number of faces, vertices and edges. Activity on <a href="http://www.ngflcymru.org.uk/vtc/castle_shapes/eng/Introduction/Default.htm">http://www.ngflcymru.org.uk/vtc/castle_shapes/eng/Introduction/Default.htm</a></td>
<td>7.3 Students will be able to identify faces, vertices and edges of simple solids, including various prisms other than triangular, such as hexagonal, octagonal. 7.2 Students will be able to identify curved faces, vertices and edges of simple solids, including sphere and cone. 7.1 Students will be able to identify faces, vertices and edges of simple solids, such as cubes, cuboids, triangular prisms and pyramids. 6.3 Students should be able to identify faces, vertices and edges of cubes, cuboids and pyramids.</td>
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3. Find the volume of a cube or cuboid by counting unit cubes and using the formula.

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<td><strong>The students draw the net of a cuboid on centimetre squared paper and add the flaps to make a solid shape from their net. The dimensions of their cuboid are obtained by counting the number of 1 cm squares on each edge. The number of cubes making up the cuboid is equivalent to value of the volume of the cuboid obtained by calculation.</strong></td>
<td><strong>Students view the following powerpoint on volume <a href="http://www.whiteboardmaths.com/content/samples/df11683bb425d8a08bd5ba406797ba1c.ppt">http://www.whiteboardmaths.com/content/samples/df11683bb425d8a08bd5ba406797ba1c.ppt</a></strong></td>
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</table>
4. Understand and use units of volume: mm³, cm³, m³.

The students are shown a 1 centimetre cube and they are asked to measure the length of its edges. The teacher initiates a discussion with questions such as ‘Do you think you can handle a 1 mm cube with your fingers?’ and ‘Do you think you can handle a 1 metre cube with your fingers?’ The discussion enables the students to appreciate the difference in dimensions.

The students are given an investigative worksheet aimed at discovering the number of 1 centimetre cubes required to fill a 1 metre of space.

The students are shown pictures of various items in the shape of a cuboid such as a matchstick box, a lunch box, a water tank, a room, a swimming pool, etc. The students have to identify the unit that best suites the picture.

5. Find the volume of compound shapes involving cubes and cuboids.

The students are divided in groups. The teacher provides each group with a worksheet involving compound shapes made up of cubes and cuboids. Students have to split the shapes in cuboids (or cubes), find the dimensions of each and finally calculate the total volume of the compound shape.

Students play a domino game involving compound shapes. The students have to match the compound shape on one domino to its volume on another domino.

The students may practice finding the volume of a compound shapes involving cubes and cuboids on the site:
http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i22/bk7_22i3.htm

7.3 Students will be able to calculate the volume of an object even when the dimensions of the solid are expressed in different units.

7.2 Students will be able to use the proper cubic units according to the object whose volume is to be found. Eg. Finding the volume of a water tank in m³.

7.1 Students will be able to visualise the size of 1 mm³, 1 cm³ and 1 m³.

6.3 Students will be able to visualise the size of 1 cm³.

Students will be able to calculate the volume of simple compound shapes given the description of its 2 components.
**Subject:** MATHEMATICS  
**Strand 3:** Shape, Space and Measurement  
**Unit code and title:** MTH 7.15 Solid Shapes and Volume *(Levels 5.3 – 7.1)*

**Form:** 1  
**Duration:** 9 sessions

### Objectives

The teacher will teach the students to:

1. Make cubes and cuboids from their nets.
2. Identify faces, vertices and edges of simple solids.
3. Find the volume of a cube or cuboid by counting unit cubes.
4. Understand and use units of volume: e.g. cm³
5. Find the volume of compound shapes involving cubes and cuboids by counting cubes.

### Key Words

- 3-D, three-dimensional, side, edge, face, vertex, vertices, nets, cube, cuboid, solid shape, cubic units, cubic centimetre, compound shape

### Points to Note

Three main teaching approaches are being recommended.

**Exposition:** the teacher states the objectives of the lesson and may use ICT software for students to practise new knowledge. This is consolidated by setting students tasks that offer students the opportunity to apply mathematics to a variety of real life situations.

**Discovery:** the teacher can set group tasks in which students discuss and construct mathematical knowledge. Students may become active learners while testing hypotheses and/or making generalisations.

**Exploration:** the teacher integrates an inquiry based learning approach that enhances the students’ understanding of concepts. These tasks might employ the processes of reasoning, problem solving, investigations, connecting idea and concepts, and expressing results by using the precise language of mathematics.

### Resources

- FOM Gold A, Students’ Book and Resource Pack - Chapters 19 and 21
- Internet Links: [http://illuminations.nctm.org/LessonDetail.aspx?id=L609](http://illuminations.nctm.org/LessonDetail.aspx?id=L609)  
  [http://www.primaryresources.co.uk/maths/mathsE3.htm#3](http://www.primaryresources.co.uk/maths/mathsE3.htm#3)  
  [http://www.homeschoolmath.net/online/geometry.php#solids](http://www.homeschoolmath.net/online/geometry.php#solids)  
  [http://www.whiteboardmaths.com](http://www.whiteboardmaths.com)  
  [http://www.mathsisfun.com](http://www.mathsisfun.com)  
  [http://www.bbc.co.uk/skillswise](http://www.bbc.co.uk/skillswise)  
  [http://www.cimt.plymouth.ac.uk](http://www.cimt.plymouth.ac.uk)

- Models of 3D shapes, nets of cubes and cuboids, cereal packets, wooden or plastic cubes, wiki sticks, plasticene, squared paper, smiley face stickers, flip cards, toothpicks and gumdrops.
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</thead>
<tbody>
<tr>
<td>1. Make cubes and cuboids from their nets.</td>
<td>The teacher can show the following video found on <a href="http://www.learningpod.com/index.php/Free-trial-lessons/Mathematics-trial-lessons/formulae-in-symbols-1.html">http://www.learningpod.com/index.php/Free-trial-lessons/Mathematics-trial-lessons/formulae-in-symbols-1.html</a> to the students so they get a better idea of 3D objects and see their nets formed. The teacher explains to the students that any 3D object especially cubes and cuboids can be dismantled. In fact the teacher dismantles a cube to show how it is constructed. Thus presenting the students with their first ‘net’ of a cube. The students bring 3D shapes found in real life like cereal boxes, tea boxes, card board tubes etc... The students are asked to to dismantle and reassemble the shape nets to understand what a net is and how various nets are constructed. Students exposed to the nets of cubes from the website <a href="http://nrich.maths.org/public/viewer.php?obj_id=974">http://nrich.maths.org/public/viewer.php?obj_id=974</a>. Students can also be given cube printables by entering the following websites <a href="http://www.senteacher.org/wk/3dshape.php">http://www.senteacher.org/wk/3dshape.php</a> <a href="http://www.learner.org/interactives/geometry/print_cube.html">http://www.learner.org/interactives/geometry/print_cube.html</a> They can print, and fold the net and form a cube. An activity using the IWB or a computer for each pair of students could be to find eleven different nets to form a cube from the website <a href="http://gwydir.demon.co.uk/joy/solid/cube.htm">http://gwydir.demon.co.uk/joy/solid/cube.htm</a>. Students can draw the nets on a squared paper cut them and join them in cubes. Another activity could be done by using a set of suggested nets, investigate which nets will make a cube and which will not. The students should be able to explain why a net does not result in a cube. They have to test each net out and be able to say why a net will not make a cube. Students get a better idea of cuboids and their nets using the site: <a href="http://www.technologystudent.com/designpro/cuboid1.html">http://www.technologystudent.com/designpro/cuboid1.html</a> Then students can work in pairs to form cuboids from their nets. Cuboid printables can be found on the website <a href="http://www.senteacher.org/wk/3dshape.php">http://www.senteacher.org/wk/3dshape.php</a></td>
<td>7.1 Students will be able to make cubes and cuboids from their nets. 6.3 Students will be able to recognise the difference between the net of a cube and that of a cuboid. 6.2 Students will able to identify the identical faces of a cuboid from a 3D model. 6.1 Students will be able to recognise a cube as a special cuboid where all the faces are squares. 5.3 Students will be able to recognise from a set of solid shapes.</td>
</tr>
</tbody>
</table>
Students then cut the net and fold it to form a cuboid.

Students can be divided in groups to form as many cuboids with different nets and record their work. The group that shows the largest number of different cuboids done wins.

2. Identify faces, vertices and edges of simple solids.

The teacher prepares a number of cardboard made simple solids, such as; cubes and cuboids with different sides, pyramids, etc... The students are grouped and each group is given the same number of solids to follow the teacher’s explanation.

Students are able to investigate which 3D shapes can be made from a given set of vertices and edges. In groups students use art straws and plasticine to construct nets of cubes and cuboids and record properties in terms of mathematical vocabulary. The teacher can challenge the students with different number of art straws and balls of plasticine. The following questions have to be answered by the students:

- Can you make the shape?
- How many balls of modeling clay and how many straws does it take to make the cube?
- How many faces does it have?
- How many edges? How many corners (vertices)?

Another activity is by creating ‘what am I?’ flip cards. Students have to choose any 3D shapes (in this case; cubes, cuboids and triangular prisms) and make a list of all the properties using key vocabulary and other features e.g. all the faces are squares etc.. They write the name an aim to draw the 3D shape inside the flip card. When finished record the number of faces, edges and vertices for the 3D shapes.

The teacher can show the edges, vertices and faces of solid shapes very clearly in 3D by clicking on the following website:

http://www.learner.org/interactives/geometry/platonic.html

The teacher can organize class quizzes which can be found at:

http://www.ixl.com/math/grade-2/compare-sides-vertices-edges-faces,
http://www.ixl.com/math/grade-2/count-sides-vertices-edges-faces,

7.1 Students will be able to identify faces, vertices and edges of simple solids, such as cubes, cuboids, triangular prisms and pyramids.

6.3 Students should be able to identify faces, vertices and edges of cubes, cuboids and pyramids.

6.2 Students will be able to identify faces, vertices and edges of cubes and cuboids.

6.1 Students will be familiar with the terms faces, edges and vertices of 3D shapes.

5.3 Students will be able to recognize and distinguish between 3D and 2D shapes.
3. Find the volume of a cube or cuboid by counting unit cubes.

| The teacher shows the following video on volume:  
| http://www.youtube.com/watch?v=VASC2aeehWc&feature=related 
| The teacher shows the students different containers explaining that each has volume, but at different amounts.
| Students are divided in groups and try to do cubes and cuboids with different measurements using a set of cubes.
| Students access the following websites to investigate the volume of different types of cuboids by counting the cubes in the different types of cuboids  
| http://www.teacherled.com/resources/cuboidexplode/cuboidexplodeload.html  
| http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/ and  
| http://www.mathopenref.com/cubevolume.html 
| Quizzes can be done by using the following websites:  

4. Understand and use units of volume e.g. cm$^3$

| The teacher using centimetre cubes shows the students that each cube is 3 D since the cube has a flat face and a height. Then the student access the following website:  
| http://www.cimt.plymouth.ac.uk/projects/mepres/book7/bk7i22/bk7_22i1.htm 
| The teacher explains that each small cube is said to be 1 cubic centimetre which could be written also as 1cm$^3$. Therefore if the teacher has 2 cubic centimetres near each other, then s/he has 2 cubic centimetres hence 2cm$^3$, and so on.
| The teacher gives a set of 1cm$^3$ cubes and the students construct a solid and write how many 1cm$^3$ cubes they use or in other words the volume of the solid in cm$^3$. 

| 7.1 Students will be able to understand that when multiplying the number of unit cubes in the base by the number of unit cubes in the height, it gives the volume of the cube or cuboid. 
| 6.3 Students will be able to find the capacity of a cube and cuboid by counting unit cubes. 
| 6.2 Students will be able to find the capacity of a cube or cuboid which has the height of 1 unit cube. 
| 6.1 Students will recognize that different cuboids may have the same capacity. 
| 5.3 Students will understand that capacity is the amount of space that an object takes up. 
| 7.1 Students will be able to visualise the size of 1 mm$^3$, 1 cm$^3$ and 1 m$^3$. 
| 6.3 Students will be able to visualise the size of 1 cm$^3$. 
| 6.2 Students will be able to distinguish between the length, area and volume. 
| 6.1 Students will be able to understand that capacity is measured in cubic units. 
<p>| 5.3 Students will know that the capacity is the amount of space that an object takes up. |</p>
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<td>5. Find the volume of compound shapes involving cubes and cuboids by counting cubes.</td>
<td>The students access the website: <a href="http://pbskids.org/curiousgeorge/video/video_pop.html?clip=interstitials/108B&amp;title=Volume%20and%20Shapes&amp;ar=16:9&amp;filetype=wmv&amp;bandwidth=hi">http://pbskids.org/curiousgeorge/video/video_pop.html?clip=interstitials/108B&amp;title=Volume%20and%20Shapes&amp;ar=16:9&amp;filetype=wmv&amp;bandwidth=hi</a> which shows how to find the volume of a compound shape by counting the cubes inside. Working in pairs on a computer the students, investigate the volume of compound shapes by counting cubes, by accessing the following website: <a href="http://www.teacherled.com/resources/isoexplode/isoexplodeload.html">http://www.teacherled.com/resources/isoexplode/isoexplodeload.html</a> The following worksheets from the following websites: <a href="http://www.superteacherworksheets.com/geometry/volume-cubes-easy.pdf">http://www.superteacherworksheets.com/geometry/volume-cubes-easy.pdf</a>, <a href="http://www.eduplace.com/math/mthexp/g3/challenge/pdf/cm_g3_f_2.pdf">http://www.eduplace.com/math/mthexp/g3/challenge/pdf/cm_g3_f_2.pdf</a> and <a href="http://www.teachingideas.co.uk/maths/files/volumeofcubes.pdf">http://www.teachingideas.co.uk/maths/files/volumeofcubes.pdf</a> can be done in class as group work, pair work or individually. These could be printed and be given as homework as well.</td>
<td>7.1 Students will be able to identify the components (cubes/cuboids) making up a compound shape. 6.3 Students will be able to calculate the volume of simple compound shapes given the description of its 2 components. 6.2 Students will be able to find the volume of the different components by adding unit cubes, and add both volumes to give the volume of the compound shape. 6.1 Students will be able to understand which two components (cubes or cuboids) make up the compound shape. 5.3 Students will be able to find the volume of a compound shape by counting cubes.</td>
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Subject: MATHEMATICS
Strand 1: Shape, Space and Measurement
Unit Code and Title: MTH 7.15 Solid Shapes and Volume (Levels 1 – 4)

OBJECTIVES at attainment levels 5,6,7
1. Make cubes and cuboids from their nets.
2. Identify faces, vertices and edges of simple solid
3. Find the volume of a cuboid by counting cubes.
4. Understand and use units of volume: e.g. cm³
5. Find the volume of compound shapes involving cubes and cuboids by counting cubes.
The mainstream objectives 4, 5 are not relevant at level of attainment below so they are not included in the list below.

OBJECTIVES at attainment levels 1,2,3,4
1.1 Students identify, distinguish and sort simple 3D shapes.
2.1 Students explore properties of a 3D shape.
3.1 Students explore and compare the use of space in a 3D shape.

Key Words
Side, edge, face, cube, solid shape, cylinder, cone, flat, corner

Points to Note
In addition to the points to note recommended for students performing at Level 5 or higher, it is very important for the teacher to allow time for the students to respond. This response can take the form of unaided and/or aided means of communication and the teacher needs to provide adequate scaffolding techniques to enable the students to respond affectively or intentionally.

Resources
New Maths Frame Working-Step Up Workbook.
Oxford Framework Maths 7
Software: Ilearn Maths, Calculator, Excel Worksheets
Models of 3D shapes; cereal packets etc

Internet Links:
http://www.primaryresources.co.uk/maths/mathE3.htm#3
http://www.homeschoolmath.net/online/geometry.php#solids
http://www.ngfl-cymru.org.uk
http://www.whiteboardmaths.com
http://www.mathsisfun.com
http://www.bbc.co.uk/skillswise
http://www.sparklebox2.co.uk/thumbs86-90/s2b87.html
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<th>Teaching Objectives</th>
<th>Examples of teaching experiences and activities</th>
<th>Indicators of Learning Outcomes</th>
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<td>1.1 Students identify, distinguish and sort simple 3D shapes.</td>
<td>Starter: Students are presented with 2D and a 3D shape. They are left to explore it or talk about the differences. Students are shown common 3D solid shapes and pictures of real environment objects. Then, they match or link the object to the shape whilst naming the 3D shapes. Students are presented with a shoe box, broth gravy boxes, a match box, a dice and puzzle cubes. Students will be asked to sort them into the respective categories and then the teacher fixes a flashcard on top of each category. Unpacking shopping – students explore different 3D shapes whilst unpacking after a shopping activity. They sort and group items according to shape. Reinforcement can be done through <a href="http://www.primaryresources.co.uk/maths/powerpoint/3D_Shapes.ppt#256">http://www.primaryresources.co.uk/maths/powerpoint/3D_Shapes.ppt#256</a>. Students search for and food items and other objects of interest that have been hidden.</td>
<td>Students will: Link real environment objects with 3D solid shapes. (Level 4) Identify, sort and match similar shapes together. (Level 3) Grasp, hold, explore and put objects in the belonging category. (Level 2) Get interested in 3D shapes by searching for known objects that have gone out of sight, hear or touch. (Level 1)</td>
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<td>2.1 Students explore properties of 3D shapes.</td>
<td>Starter: Students are presented with various 3D shapes to explore and manipulate. Students are given real solid shapes. They can also see them on the IWB using the iLearn software. They will name them and then put them in a table according to the appropriate heading. Students are given plasticine and they have to make small ball forms which will eventually fix to the edges. Eventually they will count how many plasticine balls they have fixed. Students are presented with 3 different simple solid shapes like cube, cuboid and a cone. Starting with the cube the students are presented with template coloured 2D squares and they have to glue and fix one on each face. Then the students join in rote counting the number of squares. Same activity is repeated for the other two solids. Students will sort between 3 different 3D shapes.</td>
<td>Students will: Name 3D shapes and classify them according to particular properties. (Level 4) Begin to recognise different properties of a 3D shape. (Level 3) Sort amongst 3D shapes. (Level 2) Interact with several objects at a time by visual inspection and hand touch feeling. (Level 1)</td>
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Students are presented with basic 3D shapes like cube, cuboid and cone. The edges, vertices and faces are covered with different textures e.g. plasticine balls at the vertices, felt at the edges. Students grasp, hold and look at the object whilst feeling the different characteristics.

### 3.1 Students explore and compare the use of space of a 3D shape.

**Starter:** Students are presented with two different sizes of the same 3D shape. They explore, manipulate and talk about them.

Students can be involved in problem solving situations about the space of a box. For instance, a box holds 2 layers of books. If one layer takes 6 books, how many books are there in all in the box?

Students are presented with a big and a small shoe box. They talk about the size of the shape and its inside space to identify which box would need the most cubes to fill.

In a cooking activity, students are given baking trays with modelled shapes to fill in with mixture. First students are helped to fill in a cone shape tube with the mixture and then by pressing they fill the shapes in the baking tray whilst observing the different amounts needed according the size of the shape.

Students will:

- Use addition facts in problem solving situations about shapes. (Level 4)
- Start to compare sizes and quantities in relation to shapes. (Level 3)
- Start developing knowledge of shape and its size in terms of the amount needed to fill a space. (Level 2)
- Explore objects for an extended period of time through their whole body interaction with the object. (Level 1)