

## Teaching guide Area of trapezoid teaching method

### Purpose

- To develop various ideas for teachers/student teachers in use of teaching method efficiently and apply in there locations appropriately.
- To develop skill of production and use of teaching material appropriately and efficiently.

### Content

#### 1. Area of trapezoid teaching method

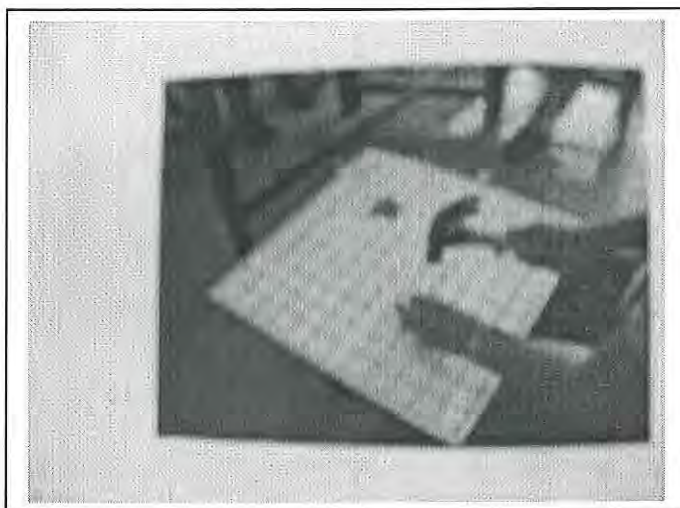
Teacher has to make student in thinking variously for problem solving, and avoiding the memorising. Teacher has to make student in finding formulas by him or herself by use of methods and teaching materials which are available and appropriate for their location.

#### 2. How to produce and apply

There are geo board, big paper (squared pattern on the paper) and some papers (six trapezoids on each paper).

#### A. How to produce the geo board (see figure)

- Nine millimetre width of wood
- Cutting the wood into square with 45 cm size
- Clean the square by sandpaper
- Paint colour based on your need
- Leave/empty frame of the square with 1.5 cm
- Drawing square with 3 cm size on the square
- Nailing on points required



#### B. How to use

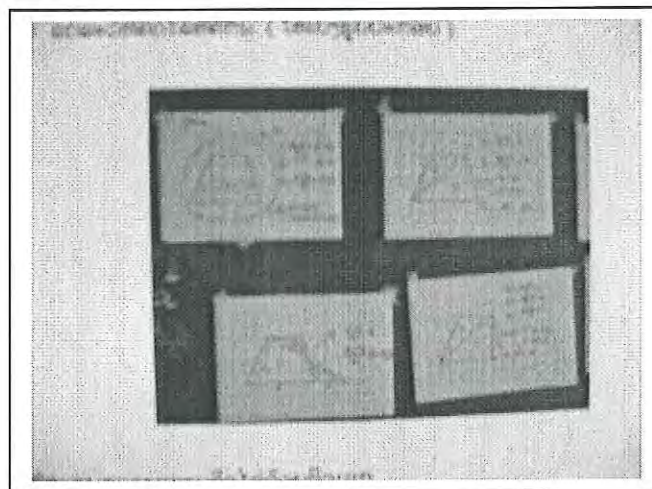
Making a trapezoid with two sides of its base:  $a=3$  squares and  $b=6$  squares and  $h=4$  squares (high), by use of different colour of Yangbouang.

3. Teaching process method

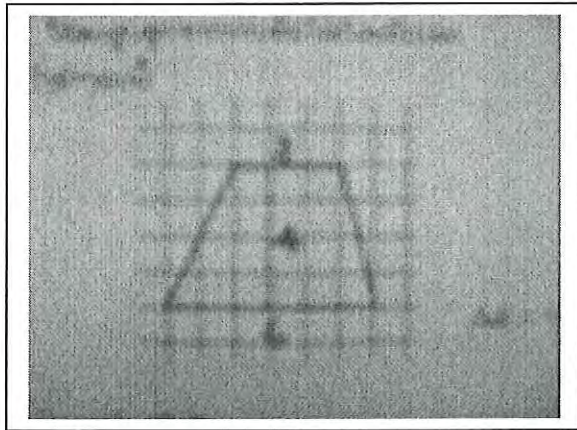
- Teacher has to distribute the trapezoid paper to each student in same format.
- Side of the trapezoid is counted by square. Example: smaller base side = 3 squares, bigger base side = 6 squares and high=4 squares.
- In supposition, one square is equal to 1 cm.
- If we use the Geo board, we count it by nails one by one like we count on the paper (see the picture below).



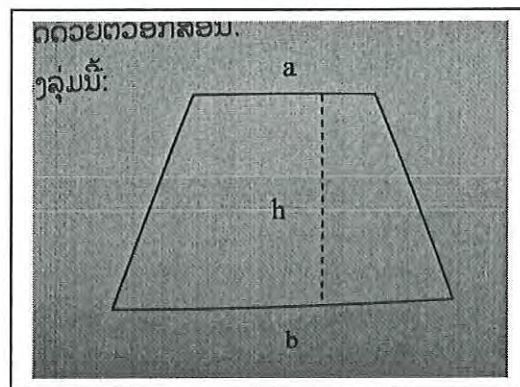
- When students stick their summarised papers on the blackboard, teacher has to group into easy and complex categories (see the picture below).



- Summarising formula from calculating the numbers as below.



- Summarising formula by alphabet as below.






## Lesson plan

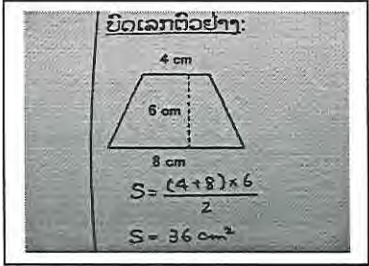
Subject: Mathematics  
 Chapter: 57  
 Topic: How to find area of a trapezoid

Grade: 5  
 Date of teaching: \_\_\_/\_\_\_/\_\_\_  
 Time used: 50 minutes

| Purpose   | Content  | Teaching-learning activity   | Material   | Time | Assessment  |
|---|--|--|--|------|---|
| Students have abilities:<br>1. Thinking in many ways for calculating area of trapezoid. | Chapter: 57<br>Finding area of trapezoid<br><br> | <b>❖ Introduction</b><br>Review previous lesson<br>➤ Ask students how to calculate area of shapes: square, rectangle, parallelogram and triangle.<br>➤ Students write down each shape formula on the blackboard.   | Square, rectangle, triangle and parallelogram.                 | 5    |   |
|   |  | <b>❖ Process</b><br>Teacher distributes one trapezoid paper to each student. Teacher asks students thinking of how to calculate area of trapezoid in many ways as much as possible. Teacher observes and monitors students thinking, and should not speak on the time (if students really don't understand, teacher can use the Geo board to help them).<br><br>▪ Students think and find many ways of calculating | Geo board, trapezoid paper and big paper with squared pattern. | 25   | Observe:<br>Students thinking<br><br><br>Number of shapes that students can |



| Purpose   | Content   | Teaching-learning activity   | Material | Time      | Assessment                                     |
|---|---|--|----------|-----------|--|
| <p>3. Use of the formula for calculating area of trapezoid.</p> | <div data-bbox="459 391 842 667" data-label="Image"> </div> <p>Area=<br/> <math display="block">\frac{(\text{Smaller base side} + \text{Bigger base side}) \times \text{High}}{2}</math></p> <p><math display="block">S = \frac{(a+b) \times h}{2}</math></p> | <p>of calculation based on the given numbers.</p> <ul style="list-style-type: none"> <li>▪ Teacher sticks trapezoid shape with its sides marked by a, b and h on the blackboard.</li> <li>▪ Students write down area of trapezoid formula based on the alphabet.</li> </ul> <p>❖ <b>Summary</b><br/>           Teacher and students summary the area of trapezoid formula.</p> <ul style="list-style-type: none"> <li>▪ Teacher solves sample problems to students.</li> <li>▪ Students understand how to use the formula.</li> </ul> <p>Teacher tells students solving exercise, item 2, in textbook.</p> |          | <p>15</p> | <p>Presentation on formula of calculation.</p> |

| Purpose | Content   | Teaching-learning activity  | Material | Time     | Assessment  |
|---------|---|---|----------|----------|---|
|         | <p>Sample:</p>  $S = \frac{(4+8) \times 6}{2}$ $S = 36 \text{ cm}^2$ | <p>❖ <b>Assessment</b><br/>           Teacher gives students homework.<br/>           a =12cm, b=20cm, h=6cm<br/>           S=?</p> |          | <p>5</p> | <p>Students understanding on use of formula and their homework.</p> |



## **Teaching guide**

### **Teaching method for using of multiplication tables**

#### **1. Purpose**

- To develop teachers and students at teacher education institutions (TEIs) in using of teaching method appropriately in their locations. Making student leaning efficiently.
- To develop knowledge and understanding of the TEIs teachers and students in using of local materials for producing teaching materials appropriately.

#### **2. Content**

While teaching process of using multiplication tables, teacher has to guide students in learning and understanding of using the multiplication tables through process of using multiplication board and playing multiplication game by themselves.

#### **3. Materials**

- Snow, bamboo, grain, small wood/glass ball, etc. or some available materials in location.
- Rubber string (string)
- Wood; 3cm x 3 cm x 40cm
- Wood; 3cm x 3 cm x 45cm
- Plywood; 3mm x 40 cm x 45cm
- Iron point for making hole in wood
- Metal nail 2
- Big white paper
- Big thick paper
- Hacksaw/thing for cutting steel
- Metre measurement tool
- Scissors/cutter
- Pencil
- Maker
- Permanent marker

#### **4. How to produce and use of teaching material**

##### **4.1 How to produce multiplication board**

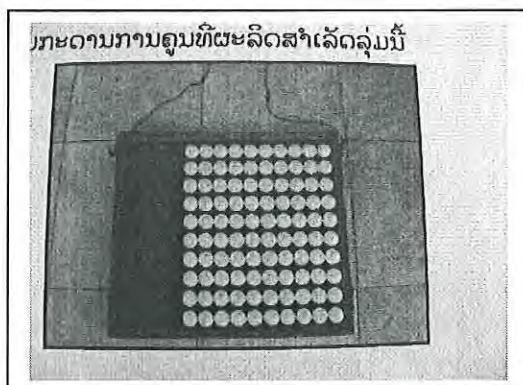
- Using a saw for cutting two woods (3cm x 3 cm x 40cm; 3cm x 3 cm x 45cm) in the way of long side (two pieces a wood) into four pieces.
- Dividing the pieces (the wood: 3cm x 3 cm x 40cm) into 11 intervals. After that, making ten holes for each piece fitting with the rubber string.
- Using the woods (3cm x 3 cm x 40cm; 3cm x 3 cm x 45cm) for the production as the picture below,





- Putting the plywood (3mm x 40 cm x 45cm) on the back of the multiplication board.
- Hanging on the ten holed glass balls per string row (100 ball total).
- Stressing the strings
- Making a cover in front of the multiplication board.
- Making a string for hanging the multiplication board.

See the multiplication board as below,



#### 4.2 How to produce multiplication card

- Making 100 thick papers. Size of each one is 8 cm x 17 cm.
- Writing down the multiplication tables from 1 to 10 on each thick paper (Write down the multiplication in front of the paper, and write down its product on the back of the paper).

2 X 3

Front side

6

Back side

### 4.3 How to produce multiplication tables

- One big paper.
- Drawing 11 squares (5 cm x 5 cm). Symbolising by “X”, where an intersection between row 1 and column 1. After that, writing down numbers 1, 2 until 10 on rows and columns. See the table as below,

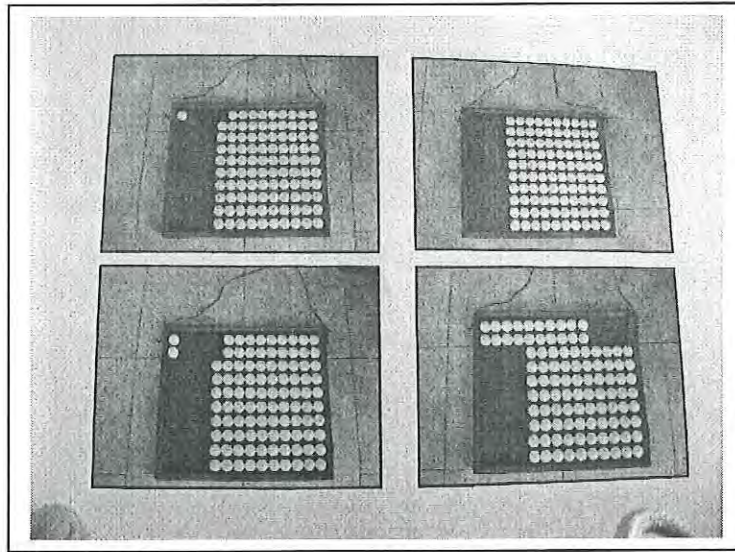
**Multiplication tables**

|    |    |    |    |    |    |    |    |    |    |     |
|----|----|----|----|----|----|----|----|----|----|-----|
| X  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 1  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  |
| 2  | 2  | 4  | 6  | 8  | 10 | 12 | 14 | 16 | 18 | 20  |
| 3  | 3  | 6  | 9  | 12 | 15 | 18 | 21 | 24 | 27 | 30  |
| 4  | 4  | 8  | 12 | 16 | 20 | 24 | 28 | 32 | 36 | 40  |
| 5  | 5  | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50  |
| 6  | 6  | 12 | 18 | 24 | 30 | 36 | 42 | 48 | 54 | 60  |
| 7  | 7  | 14 | 21 | 28 | 35 | 42 | 49 | 56 | 63 | 70  |
| 8  | 8  | 16 | 24 | 32 | 40 | 48 | 56 | 64 | 72 | 80  |
| 9  | 9  | 18 | 27 | 36 | 45 | 54 | 63 | 72 | 81 | 90  |
| 10 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |

## 5. How to use of teaching material

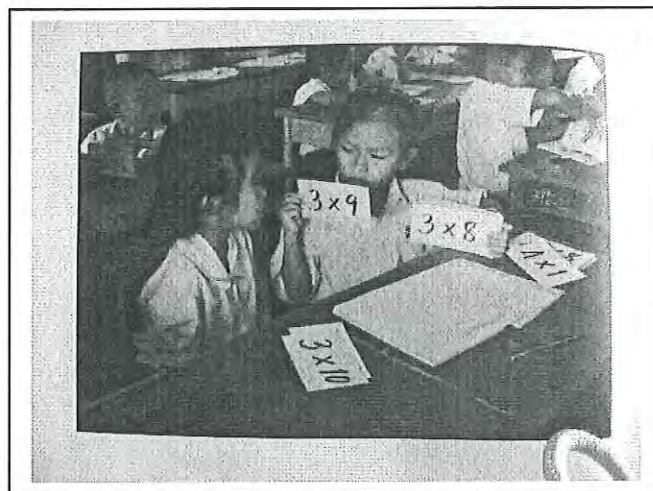
### 5.1 Multiplication board

- Hanging the multiplication board on blackboard where students can see clearly.
- Opening up the cover, in front of the multiplication board.
- Teacher uses a ruler or other things for moving the ball to show the multiplication
- If we move the balls in each row completely, we have to move back the balls. We continue move the balls until ten (see the picture as below).



### 5.2 Multiplication card

- Playing multiplication game by use of the card.
- Combining the multiplication cards at least from number 5
- Putting up card (one by one) appropriately to ensure that answers can see it clearly.
- Placing correct answers in different place of wrong answers for easy summarising. See the picture as below,



### 5.3 Multiplication tables

We use it during stage of introduction and summary about 2-3 minutes





Mathematics: Grade 2

Topic: Using multiplication tables

Time: 50 minutes

**1. Goal**

1.1 Students have knowledge, understand and memorise the multiplication tables by themselves.

1.2 Students are able to use of the multiplication tables into their daily lives.

**2. Purpose of teaching in classroom**

2.1 To make students are able to tell each multiplication table in the multiplication board correctly.

2.2 To make students are able to tell product of multiplication in the multiplication card correctly.

2.3 To train students in skill of answering quickly during play game.

**3. Content of teaching**

Teacher teaches students to memorise the multiplication tables from 1 until 10 without seeing the tables.

**4. Teaching process**

| Teacher activity   | Student activity   | Time (minute) | Teaching material     | Assessment  |
|--|--|---------------|-----------------------|---|
| <p><b>1. Introduction</b></p> <p>- Teacher sticks a big multiplication tables paper on blackboard (previous lesson).</p> <p>- Teacher hides the table, then ask them about 2-3 persons to memorise multiplication tables (encouraging them by clap).</p> | <p>Students observe the multiplication tables and try to remember in their minds.</p> <p>About 2 – 3 students memorise them (clap for student who correct answer).</p> | 3             | Multiplication tables | Observing students while they memorise multiplication tables. |
| <p><b>2. New lesson</b></p> <p>- Teacher writes down 'chapter 54: use of multiplication</p>  |  | 30            |                       | Observing students answers (individual and whole classroom    |



| Teacher activity   | Student activity   | Time (minute) | Teaching material          | Assessment                               |
|--|--|---------------|----------------------------|--|
| <p>- Teacher hangs on the multiplication card and asks all students answer at the same time (clap).</p> <p>- Teacher advises students before they play a game: grouping students (three people a group) and dividing their tasks such as hanging on the card, answering and recording. Each person has to do every task. Correct and wrong answers are placed differently for counting score easily. Time for the playing is 2 minutes per one person. If each person in each group answers, then they have to summary. After that, they stick it on the blackboard.</p> <p>- Teacher tells students group (three a group), and they start to play game.</p> <p>- Teacher monitors each group</p> <p>- Teacher tells students stick result of playing game on blackboard, and orders the</p> | <p>About 5 -7 students answer (clap)</p> <p>Students listen to the teacher about introduction of play game</p> |               | <p>Multiplication card</p> | <p>To observe students understanding</p> |

| Teacher activity   | Student activity   | Time (minute) | Teaching material     | Assessment                       |
|--|--|---------------|-----------------------|----------------------------------|
| scores (clap for students who get no1, no2 and no3).   |  |               |                       |                                  |
| <p><b>3. Summary</b></p> <p>- Teacher opens up the cover of the multiplication tables and summarises it: use of multiplication tables through multiplication board and playing games. Teacher tells students memorise the multiplication tables from 1 to 10 fluently (at the beginning of the class, teacher tells about 3-4 students memorise the multiplication tables for every day until 1-2 months).</p> | <p>Students listen the summary</p> <p>All students memorise the multiplication tables from 1 to 10</p>   | 7             | Multiplication tables | Observing students participation |
| <p><b>4. Assessment</b></p> <p>- Teacher asks 4 or 5 students about:</p> <p>1 Counting product of these <math>7 \times 6</math>, <math>7 \times 8</math>, <math>9 \times 3</math>, and <math>5 \times 7</math>.</p> <p>2 Telling the multiplication between two numbers. There product is 40; 28</p>   | <p>Students answer</p> <p>1 42; 56; 27; 35</p> <p>2 40 is a product of <math>4 \times 10</math>, <math>10 \times 4</math>, <math>8 \times 5</math>, <math>5 \times 8</math></p> <p>28 is a product of <math>4 \times 7</math>, <math>7 \times 4</math></p> | 10            |                       | Observing students answers       |



## **Teaching guide**

### **Using similarity of triangles to find high of a tree**

#### **1. Purpose**

- 1.1 To develop TEIs teachers and students in teaching method in order to encourage students to solve problems by themselves.
- 1.2 To develop and create TEIs teachers and students in knowledge and understanding of using teaching materials and in order to encourage learners learn efficiently.

#### **2. Content**

- 2.1 Before teaching process, teacher has to prepare equipments and teaching materials fully.
- 2.2 Advising students to apply formula of relation between triangles for calculation. Advising them to read measurement values and record the values into experimental table correctly.

#### **3. Materials**

- Wood (2cm x 2cm x 3cm)
- Wood (1,5cm x 1,5cm x 1.5cm)
- Latex glue
- PVC tab
- Bolt
- Tape
- A paper, is copied from metre rolling
- A3 paper
- Maker (two points)
- Metre rolling/string
- Metre measurement ruler
- Drill
- Scissors
- A thing for making right angle

#### **4. How to produce and apply teaching materials**

##### **4.1 How to produce**

- Surfacing wood (2cm x 2cm x 3cm) and wood (1,5cm x 1,5cm x 1.5cm) clearly.
- Cutting the metre measurement paper about 3 m.
- Sticking the above paper on wood (2cm x 2cm x 3cm) correctly.
- Making two holes on the wood (2cm x 2cm x 3cm). The first hole is placed at 1 m and the second hole at 1.50m.
- Making a hole at the end the wood (1,5cm x 1,5cm x 1.5cm).
- Putting the PVC at the end of the wood (1,5cm x 1,5cm x 1.5cm); at the place that we want to look.
- Use the bolt to connect the wood (2cm x 2cm x 3cm) and the wood (1,5cm x 1,5cm x 1.5cm).
- Drawing similar triangles on the A3 paper and writing down a formula of relation between them (see picture as below).

#### 4.2 How to apply

- Set up the thing (PVC) for looking and 3 metre of the wood paralleling the tree that we want to measure its high and put it in the right angle of land by using the right angle measurement thing (see the picture).
- Looking through the PVC, and aiming to see the end of the tree.
- Putting measurement values into formula of relation of triangles to calculate the high of the tree.



Subject: Mathematics

Lower secondary, grade 3

Topic: similarity of triangles application in finding high of tree

Time: 50 minutes

### 1. Goal

1.1 To make students are able to apply formula of relation of similar triangles in their daily lives correctly.

1.2 To make students are able to apply high measurement tool in their daily lives.

### 2. Purpose of teaching in classroom

2.1 To make students are able to apply formula of relation of similar triangles in calculating high of tree correctly based on the teacher define.

2.2 To make students are able to read and record data putting on formula in correct calculation.

### 3. Content

Using formula of relation of similar triangles in finding high of a tree that we could not measure it directly.

| Teacher activity   | Student activity  | Time (minute) | Teaching material   | Assessment                            |
|--|---|---------------|---|---------------------------------------|
| 1. Teacher brings the similar triangles sticking on a board, and tells students "Triangle EBD and ABC are similar".<br><br>- Teacher shows formula of relation between triangles sticking on the blackboard and tells students write down the formula. | - Students listen to teacher, observe the shapes and record the formula.                  | 3             | Similarity pictures of the triangles.<br>Formula of relation of Similarity pictures | Observing.                            |
| 2. Divide students in to group of 5 to 6<br>- Give the taking note papers of experiments to each group   | Students work in group of 5-6.<br>Students of each group receipt the papers of experiment | 35            | Taking note papers of experiment<br><br>Measurement tools of                        | By looking at student's understanding |



| Teacher activity   | Student activity   | Time (minute) | Teaching material       | Assessment   |
|--|--|---------------|-------------------------|--|
| <ul style="list-style-type: none"> <li>- Stick picture measuring the height tree for helping the explanation</li> <li>- Call out 5 students to demonstrate of measuring for understanding of processing activities</li> <li>- Give any teaching materials to each group</li> <li>- Tell students to do the activity as to measure the height of one tree that teach has already defied, each group is in deferent point</li> <li>- Follow up the processing activity of measuring of each group</li> </ul> | <ul style="list-style-type: none"> <li>- Students listen to teacher's explanation of method of measuring the height of tree</li> <li>- 5 students come to front for demonstrating with the teacher</li> <li>- Students receive materials</li> <li>- Students process the real activities outside classroom</li> <li>- Students write the receiving information into the forms and calculate</li> </ul> |               | height<br>Rolling metre | Looking by student's doing activities in each group  |
| 3. Tell students each group comeback to classroom and stick the results of calculation to the board <ul style="list-style-type: none"> <li>- Each group reports</li> <li>- Other groups give opinions (if they have)</li> <li>- Teacher asks question if the results have big different</li> <li>- Teacher gives more advice: The reason of having big different results because of not detail read measurement value</li> </ul>   | Students in each group comeback to classroom<br><br>The representatives of each group report and student from other groups give more comments<br><br>Students answer as they understand  | 10            |                         | By looking at students in each group making reports<br><br>By looking at the answers which each group report |

| Teacher activity  | Student activity  | Time (minute) | Teaching material | Assessment                              |
|---|---|---------------|-------------------|---|
| <p>4. Teacher asks student's feelings that trough out practicing in the read situation can students use them in the daily life?</p> <ul style="list-style-type: none"> <li>- In the daily life , the finding of height of any things that we cannot directly measure, so we can use the relation formula of triangle for calculating approximate values</li> <li>- Give homework (document is separated)</li> </ul> | <p>Students show their feeling after finishing doing the activities</p> <p>Students listen to the teacher's advice of using the formula to use in their daily lives</p> <p>Students record the homework</p> |               |                   | <p>By looking at student's feelings</p> |

## Lesson plan

Subject: Mathematics

Secondary level year 3

Lesson: Separating multiplication

Time: 50 mn

1. Objectives:

- To ensure that students can explain remembering equality by using the area of geometric shapes.
- To ensure that students can separate multiplication and can reverse.

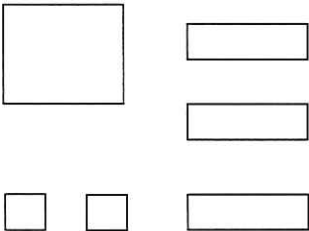
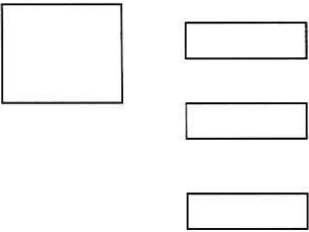
2. Content:

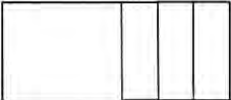
- Separating multiplication by using of square and rectangle.

3. Teaching method:

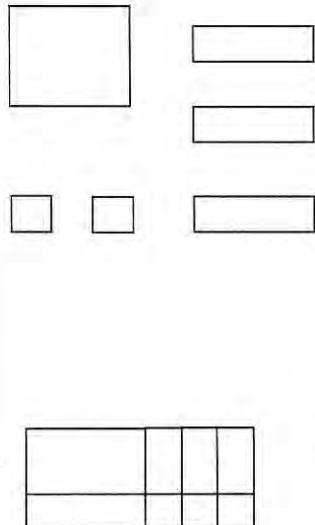
- Group work
- Discuss

4. Teaching material: Area of geometric shapes made of paper, chart, worksheet, tape and scissors.

| Purpose   | Content  | Teacher activity   | Student activity  | Time  | Teaching aid           | Assessment                                    |
|---|--|--|---|-------|------------------------|---|
| 1. For students to review the areas of square and rectangle |   | <p><b><u>Introduction to lesson:</u></b></p> <p>Teacher shows shapes to students and then asks them about each shape:</p> <ol style="list-style-type: none"> <li>1. What kind of geometric shape?</li> <li>2. Each shape has the same area?</li> </ol> | <p>Students answer each question:</p> <ol style="list-style-type: none"> <li>1. That is a big square, 2 small squares and 3 rectangles</li> <li>2. The area of big square is equal to X, area of each small square is equal to 1 and area of each rectangle is equal to 1X or X.</li> </ol> | 5 mn  | Squares and rectangles | By observing at students answer the questions |
|   |  | <p><b><u>Teaching process:</u></b></p> <p><u>Activity 1</u></p> <ol style="list-style-type: none"> <li>1. Teacher sticks the geometric shapes to the board:</li> </ol> <p>- Teacher tells students to set up these shapes as rectangles.</p>           | <p>- Students should set up as rectangles as following:</p>   | 10 mn | Squares and rectangles |   |

| Purpose   | Content   | Teacher activity  | Student activity  | Time | Teaching aid                  | Assessment                                      |
|---|---|---|---|------|-------------------------------|---|
| <p>2. For students are able to compare the areas of shapes which not set up yet with the shapes are already been sat up</p> |  | <ul style="list-style-type: none"> <li>- Teacher asks students:<br/>How wide and how long each side?</li> <br/> <li>- Teacher asks other students:<br/>It is a correct answer?</li> <li>- Teacher explains more:<br/>According to right above shapes can write the area in as sentence: "<math>x^2 + 3x</math>" and the above shape on the left can write in as sentence: "<math>x(x + 3)</math>".</li> <li>- Teacher asks more: How two expressions "<math>x^2 + 3x</math>" and "<math>x(x + 3)</math>" relate to each other?</li> <li>- And teacher should put the symbol "=" as following:<br/><math>x^2 + 3x = x(x + 3)</math></li> </ul> | <ul style="list-style-type: none"> <li>- Students should answer the teacher's questions following:<br/>The wide side equals "X" and long side equals "<math>X + 3</math>"</li> <br/> <li>- Students should answer:<br/>Correct</li> <br/> <li>- Students should answer:<br/>Equal.</li> </ul> |      | <p>Squares and rectangles</p> | <p>By looking at students set up the shapes</p> |



| Purpose  | Content  | Teacher activity  | Student activity  | Time         | Teaching aid                  | Assessment                                      |
|--|--|---|---|--------------|-------------------------------|---|
| <p>3. For students are able to create the knowledge by themselves of separating the multiplication</p> |  | <p><u>Activity 2</u><br/>           - Teacher has 6 geometric shapes.<br/><br/>           - Teacher tells students: Set up these shapes into rectangles:<br/><br/>           - Teacher asks other students: Is the setting up of the rectangle correct and suitable?<br/><br/>           (Teacher explains: The rectangle can be sat up at different types but for easy calculation, it should set up as the shape in the left side).</p> | <p>- Students should set up the rectangles as following:<br/><br/>           - Students should answer: That is correct and suitable<br/><br/>           - Students should answer:<br/>           1) The wide side equals "x + 1" and the long side equals "x + 2"</p> | <p>10 mn</p> | <p>Squares and rectangles</p> | <p>By looking at students set up the shapes</p> |

| Purpose | Content | Teacher activity   | Student activity   | Time | Teaching aid  | Assessment  |
|---------|---------|--|--|------|---|---|
|         |         | <p>- Teacher asks more:</p> <p>1) For the shape in the left side, how wide and how long the shape in?</p> <p>2) For the shape in the right side, in case that not set up in to rectangle yet, so how can we write the intergrading of the area of these shapes in mathematics sentence?</p> <p>3) For the shape in the left side, in case students have been sat up in rectangle already and how can write in mathematics sentence?</p> <p>4) How are the areas of these two shapes?</p> <p>5) If they are equaled how can we do for showing other relations of these two expressions?<br/>                     - So we get the two equalities as following:<br/>                     From (*) also can be shown the other relations as following:</p> | <p>2) We can write in mathematics' expression as following: "<math>x^2 + 3x + 2</math>"</p> <p>3) We can write in mathematics' expression as following: <math>(x + 1)(x + 2)</math></p> <p>4) The areas of these two shapes have the same value.</p> <p>5) Put the symbol "=" on the middle of two expressions.</p> <p>- Students listen and follow the teacher's explanation.</p> |      | <p>Chart, tape and scissors</p> <p>Chart, tape and scissors</p> | <p>By looking at students answer the questions</p> <p>By looking at student's reading</p> |

| Purpose   | Content   | Teacher activity   | Student activity   | Time  | Teaching aid | Assessment  |
|---|---|--|--|-------|--------------|---|
| 4. For students to understand and remember lesson longer. | <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <math display="block">x^2 + 3x + 2 = (x + 1)(x + 2)</math> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p style="text-align: center;">Separating multiplication</p> <math display="block">x^2 + 3x + 2 \xrightarrow{\hspace{2cm}} (x + 1)(x + 2)</math> <p style="text-align: center;">← Spreading</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <p><b>Definition:</b><br/>The showing of a polynomial form in the multiplication format of term/part or polynomial form is called the separating multiplication and the multiplication term of the form is called multiplication part.</p> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;"> <math display="block">ka + kb = k(a + b)</math> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><small>k.a + k.b</small></p> <p><b>Example1:</b> <math>6x^2 + 3x = 3x \cdot 2x + 3x \cdot 1 = 3x(2x + 1)</math></p> <p><b>Question1:</b> Separate following multiplication part:<br/>                     (1) <math>2ma + 3mb</math> (2) <math>4ax - 2a</math><br/>                     (3) <math>8a^2b + 4b</math> (4) <math>ax + b + cx</math></p> </div> | <p>- Teacher gives the formula of the easy way of the following separating multiplication:</p> <p>( Teacher suggests: From the formula, example 1 and question 1 were made worksheet 1 for distributing students in each group for discussing)</p> | <p>- Students memorize definition until understanding and then record into the book.</p> <p>- Students read the formula one time and then follow the teacher's doing of example 1 based on the easy formula.</p> <p>- Students in each group receipt worksheet 1 from the teacher, then solve problem and should separate multiplication part as question 1</p> $(1) \quad \begin{aligned} 2ma + 3mb &= m \cdot 2a + m \cdot 3b \\ &= m(2a + 3b) \\ &= k(a + b) \end{aligned}$ | 10 mn |              | <p>By looking at student's attention</p> <p>By looking at student's problem solving</p> |

| Purpose  | Content | Teacher activity  | Student activity   | Time | Teaching aid             | Assessment                        |
|--|---------|---|--|------|--------------------------|-----------------------------------|
| 5. For students are able to separate a part easily |         | <p>- Teacher walks around to look at student's discussing in each group and give them advice in some points that students cannot clear understand. Beside this, teacher has to use the special question in order to help students understand how to discuss</p> <p>- Teacher check the correction, improve some points to be completed and then congratulate.</p> | $k.a - k.b$ $(2) 4ax - 2a = 2a.2x - 2a.1$ $= 2a(2x - 1)$ $k(a - b)$<br>$k.a + k.b$ $(3) 8a^2b + 4b^2 = 4b.2a^2 + 4b.b$ $= 4b(2a^2 + b)$ $k(a + b)$<br>$k.a - k.b + kc$ $(4) ax + bx + cx = x.a + x.b + x.c$ $= x((a + b + c)$ $k(a + b + c)$<br><p>- When finished discussing, the representative of each group presents the results of discussion to the class.</p> <p>- Students one time together read the formula.</p> |      | Chart, tape and scissors | By looking at student's attention |

| Purpose | Content  | Teacher activity   | Student activity   | Time  | Teaching aid | Assessment                              |
|---------|--|--|--|-------|--------------|---|
|         | <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <math display="block">(a + b)^2 = a^2 + 2ab + b^2</math> <math display="block">(a - b)^2 = a^2 - 2ab + b^2</math> <math display="block">(a + b)(a - b) = a^2 - b^2</math> <math display="block">(x+a)(x+b) = x^2 + (a+b)x + ab</math> </div> <div style="border: 1px solid black; padding: 5px; margin-bottom: 10px;"> <math display="block">a^2 + 2ab + b^2 = (a + b)^2</math> <math display="block">a^2 - 2ab + b^2 = (a - b)^2</math> </div> <div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;"><math>a + 2.a.b + b</math></p> <p><u>Example2:</u><br/> <math>(1) x^2 + 8x + 6 = x^2 + 2.x.4 + 4^2 = (x + 4)^2</math></p> <p style="text-align: center;"><math>a - 2.a.b + b</math></p> <p><math>(2) x^2 - 8x + 6 = x^2 - 2.x.4 + 4^2 = (x - 4)^2</math></p> <p><u>Question2:</u> Separate following multiplication part:<br/> <math>(1) x^2 + 2x + 1</math> <math>(2) x^2 - 4x + 4</math><br/> <math>(3) x^2 + 14x + 49</math> <math>(4) 4x^2 - 12x + 9</math></p> </div> | <p>- Then teacher sticks chart for presenting remembering equality on the board and then students read together one time. After that teacher gives the formula and example 2</p> <p>( Teacher advices: Formula, example 2 and question 2 were made worksheet 2 for giving students in each group for discussing)</p> | <p>- Students together read the formula one time and then follow the teacher's solving problem 2.</p> <p>- Students in each group receipt worksheet 2 from the teacher, then discuss and should separate multiplication part as question 2</p> <p style="text-align: center;"><math>a + 2.a.b + b</math></p> <p><math>(1) x^2 + 2x + 1 = x^2 + 2.x.1 + 1 = (x + 1)^2</math></p> <p style="text-align: center;"><math>a - 2.a.b + b</math></p> <p><math>(2) x^2 - 4x + 4 = x^2 - 2.x.2 + 2^2 = (x - 2)^2</math></p> | 10 mn |              | By looking at student's solving problem |



| Purpose   | Content | Teacher activity   | Student activity  | Time | Teaching aid                         | Assessment  |
|---|---------|--|---|------|--------------------------------------|---|
| <p>6. For students are able to set up the multiplication part</p> |         | <p>- Teacher walks around to look at student's discussing in each group and give them advice in some points that students cannot clear understand. Beside this, teacher has to use the special question in order to help students understand how to discuss.</p> <p>- Teacher check the correction, improve some points to be completed and then congratulate.</p> <p><b>Summary:</b><br/>- Teacher summarize the previous lesson have learnt and then advice students memorize the definition</p> | <p style="text-align: center;"><math>a + 2.a.b + b</math></p> <p>(3) <math>x^2 + 14x + 49 = x^2 + 2.x.7 + 7^2</math><br/><math>= (x + 7)^2</math></p> <p style="text-align: center;"><math>a - 2.a.b + b</math></p> <p>(4) <math>4x - 12x + 9 = (2x)^2 - 2.2x.3 + 3^2</math><br/><math>= (2x - 3)^2</math></p> <p>- When finished discussing, the representative of each group presents the results of discussion to the class.</p> |      | <p>Any charts, tape and scissors</p> | <p>By looking at student's summarizing lesson</p> |

| Purpose   | Content | Teacher activity   | Student activity | Time | Teaching aid | Assessment |
|---|---------|--|------------------|------|--------------|------------|
| 7. For students are able to summarize the knowledge by themselves |         | <p><b>Assessment:</b></p> <p>- Teacher observed 2 previous activities, and then teacher gives homework to students by doing some exercises in year 3 mathematics' textbook (page 10, 11, 12)</p> |                  | 5 mn |              |            |

## TEACHING GUIDE

SUBJECT: ..... *World around us*

LESSON 34: ..... *Transferring the pressure of gas*

### I. OBJECTIVE:

- To explain the direction of gas pressure based on experiment

### III. PREPARATION AND MAKING MATERIALS

#### A. PREPARATION:

- Lesson plan, materials: balloons, plastic bag, plastic bottle, white plastic tube and
- Worksheet

#### B. MAKING MATERIALS

The materials as above that can find from market

- Balloons, plastic bag (9 x 12) and white plastic tube from rubbish basket, plastic bottles: crew the four sides of bottle then insert a plastic bag into bottle, crew the cover of the bottle to make just hole to the tube and connect to the bottle and bag

### IV. PROCEDURE OF TEACHING

- Discussion based on questions and using materials such as cylinder
- Activity group
- Worksheet
- Guide the procedure of the experiment
- Follow up
- Each group present
- Conclusion

## LESSON PLAN

SUBJECT: .....world around us


CLASS: .....M2

TIME: 50 mn

LESSON 24: .....Transferring the pressure of gas– Atmosphere and water pump

TITLE: .....Transferring the pressure of gas

1. After finish this lesson, students will be able to:
  - Explain the direction of gas
  - Summarize the results of experiment as Pascal's law
2. **Material:** worksheets, balloons, plastic bottle, plastic bag, two cylinders that connect to small tube.
3. **Method:** explanation, discussion and practice.

| Objective | Content  | Activity of teacher  | Activity of student   | Time  | Materials  | Evaluation  |
|-----------|--|--|---|-------|--|---|
|           | <ul style="list-style-type: none"> <li>- The pressure is rated between force and surface</li> </ul> $P = \frac{F}{S}$  | <ul style="list-style-type: none"> <li>- Greeting new lesson:</li> <li>- Ask students what the pressure is, what its formula is</li> <li>- Write the answer on the board</li> <li>- Explain and summarize by formula</li> <li>- Demonstrate the force of pressure by cylinder</li> </ul> | <ul style="list-style-type: none"> <li>- 2-3 students answer the question</li> <li>- Follow up, listen and think</li> </ul> | 10 mn | <ul style="list-style-type: none"> <li>- Paper of questions</li> <li>- cylinder</li> </ul> | <ul style="list-style-type: none"> <li>- Observe the answers of the students</li> </ul> |
|           | <ul style="list-style-type: none"> <li>- <b>LESSON 34:</b> Transferring the pressure of gas,</li> </ul>  | <ul style="list-style-type: none"> <li>- Ask question why the piston can move. (draw the</li> </ul>  | <ul style="list-style-type: none"> <li>- 2-3 students answer</li> <li>- Follow and</li> </ul>                               |       |  |   |

| Objective   | Content   | Activity of teacher   | Activity of student  | Time  | Materials  | Evaluation   |
|---|---|---|--|-------|--|--|
| Be able to explain the direction of the gas pressure    | atmosphere and water pump<br><br>Transferring the pressure of gas | direction of forces).<br><br>Steps of teaching:<br>Write the title on the board<br>Divide students into groups<br>Give worksheets and guidance<br>Give first suit of materials to each group<br>Follow and help them<br>Give second suit of materials to each group<br>Follow and help them<br>Head of each group present<br>Another listen and discuss | observe the teacher draw the figure<br><br>Into the group<br>Make role play<br>Read the worksheet<br>Receipt first suit of materials<br>Do experiment case 1<br>Record the results into table1<br>Receipt second suit of materials<br>Contain the material<br>Do experiment case 2<br>Record the results into table2 | 30 mn | Worksheet<br><br>Balloon<br><br>Plastic bottle and bag | Observe the participate and perform the experiment |
| Summarize lesson:<br>Pascal's law can be applied in the | The transferring the pressure of liquid is similar to the gas     |   | Each group present<br>Follow up  | 5 mn  | Text book<br>Natural science                           |  |





## WORKSHEET

LESSON 34: .....Transferring of gas–atmosphere and water pump

TITLE: .....Transferring of gas

1. **Objective:** try to find the direction of the motion of gas and explain its phenomenon
2. **Materials:** worksheet, balloon, plastic bottle and bag, two cylinders connected with small tube

*A.* First procedure

Students observe the balloon before and after blowing record and draw the directions of gas act in the balloon into table 1.

| Before blowing | After blowing | drawing picture |
|----------------|---------------|-----------------|
|                |               |                 |

*B.* Second procedure

Blow into the plastic bag that is in the bottle then observe the bag inside and outside the bottle

| The bag inside before blowing | The bag inside after blowing | drawing the lines of direction of gas act to the bag |
|-------------------------------|------------------------------|--|
|                               |                              |  |

3. **Question:** How can we summarize the pressure of gas based on experiment?

## TEACHING GUIDE

SUBJECT: *Natural Science*  
LESSON: 39:-: *Refraction of Light*

SCHOOL: *Lower Secondary*  
YEAR: 2

1. **OBJECTIVE:** Teacher will be able to make and use simple local materials that are into the successful teaching–learning

2. **PROCEDURE** of preparation and using materials:

- Prepared clearly lesson plan
- Prepared enough worksheet or poster
- Teacher should try to do experiments so to have skills and to know the results.

▪ **MATERIALS:**

- Drinking glass
- Soft stick
- Water
- Tea cup or bowl
- Coin or small stones
- Slide glass: 5 cm x 6 cm x 1 cm
- Wire
- Angular ruler
- Paper: A4

3. **REAL TEACHING:** See lesson plan on activity of teacher and student and worksheet.

▪ **REMARK:**

- Teacher should warn students, don't recess the laser ray to another eye.
- Carefully to use slide glass that will be cut your hand or broken.
- If no have the laser torch should use a normal torch but tied it with a small hole about 1 mm. of paper.
- If no have slide glass should use slide plastic.
- Pour water slowly into the glass that doesn't make the coin or small stone and soft stick move (for figure 1 and 2).



| <i>Activity of teacher</i>   | <i>Activity of student</i>              | <i>Time</i> | <i>Materials</i> | <i>Evaluation</i>                        |
|--|---|-------------|------------------|--|
| water<br>- Get back the materials<br>- Ask students it occurred that phenomenon<br>- Explain the procedure of the next experiment and materials<br>- Warning the student to the safety when they do the experiment<br>- Give materials and worksheets<br>- Students perform the experiment<br>- Follow up<br>- Tell students present<br>- Discuss the problem to be elective | - Class discussion                      | 15 mn       |                  | - Observe the presentation of each group |
| <b>3. Summary</b><br>- Summarize the main context of lesson for student to record in their note books  | - Record the main content of the lesson | 5 mn        |                  |  |
| <b>4. Evaluation</b><br>- To glue the poster 3 to the board and ask students how to shot the fish exactly?<br>- Explain the experience in daily life.  | - Answer the question                   | 3 mn        | - poster         | - Observe the answer of the students     |

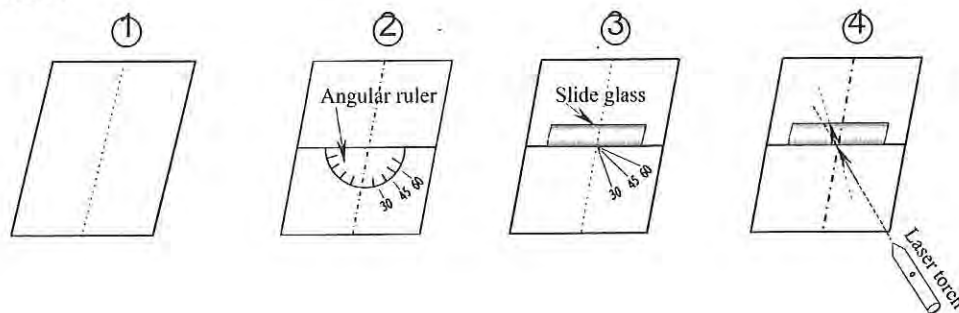


## WORKSHEET

**LESSON:** -----Refraction of Light

**MATERIALS:** -----Laser torch, angular ruler, slide glass *and* paper

**DIAGRAM:**

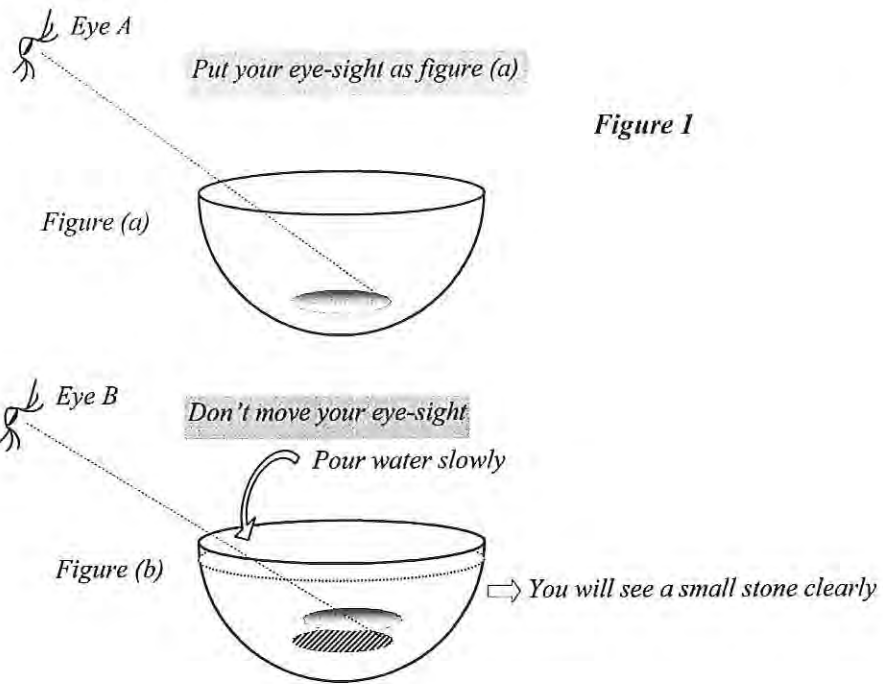


**PROCEDURE:**

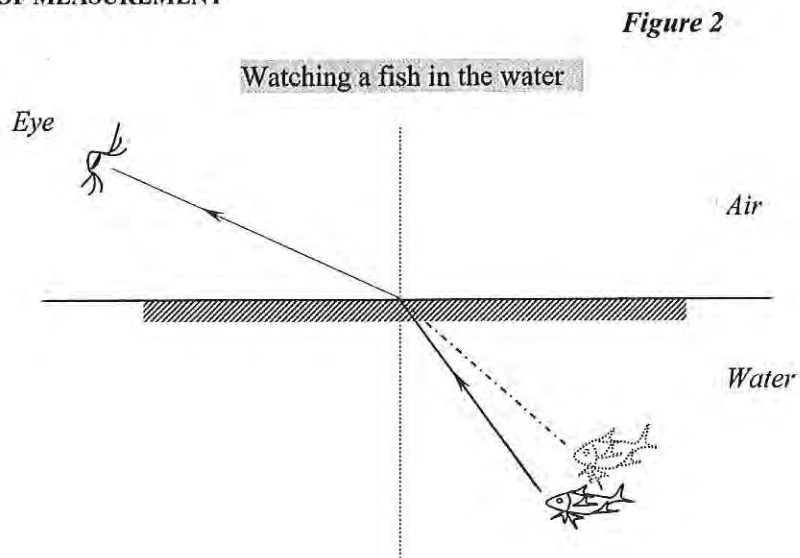
- Draw a straight line on the middle of paper and take it the table of each group
- To lay down a angular ruler on a straight line and measure the angle (figure 2)
- To lay down a slide glass on the paper (figure 3)
- Recess the ray of the laser on each value of the angle.
- Measure the angle of refraction and record into table as below

| Angle of incident ( <i>degree</i> ) | Angle of refraction | Compare both values |
|-------------------------------------|---------------------|---------------------|
| 30                                  |                     |                     |
| 45                                  |                     |                     |
| 60                                  |                     |                     |

▪ **DIAGRAM: THE EXPERIMENT OF REFRACTION OF LIGHT**



▪ **DIAGRAM OF MEASUREMENT**

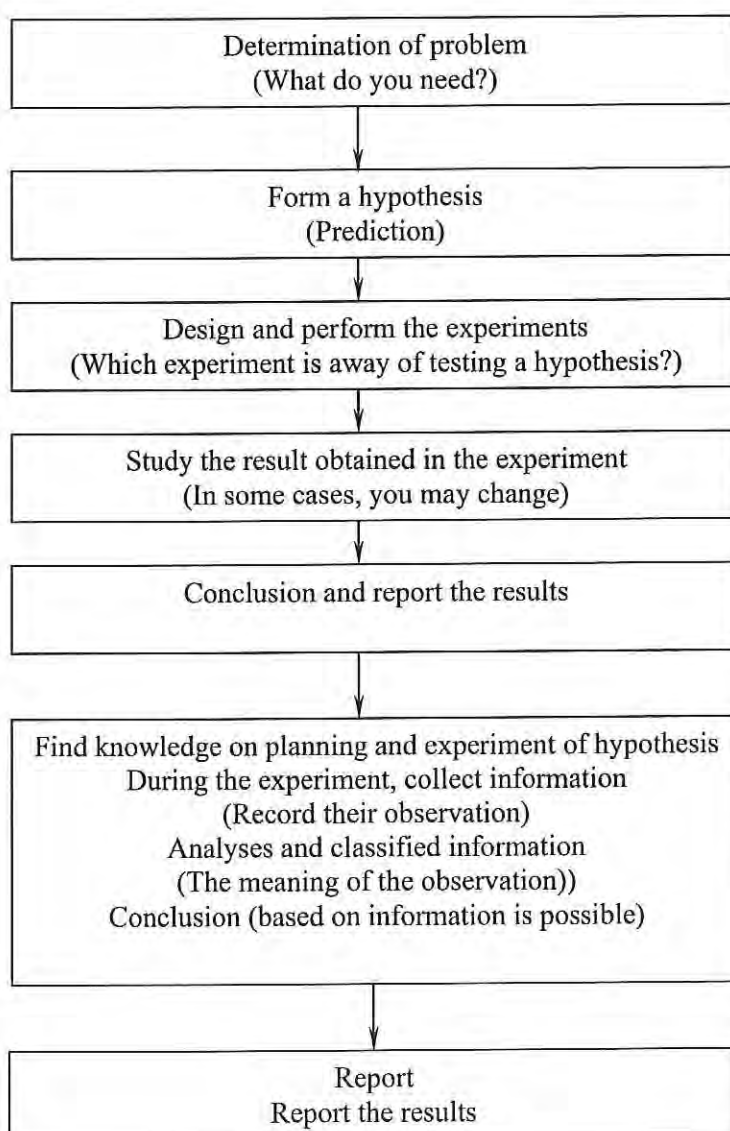


## SCIENCE TEACHING AND LEARNING

The methodologies of teaching the natural science, the teachers can be applied in teaching another subject on the field of natural science. Each method is dependence on the topic that will teach. Science teaching is students find and solve problem by themselves, and they can be applied in daily life. Find as much science knowledge is the method just many people, countries that they are using as below:

1. Find as much science knowledge are dependent on laws and principles of science as detailed, rules and systems.
2. Scientific knowledge passes through system of solving problem.
3. What methods do students use to solve problems?

### HERE ARE STEPS IN SCIENTIFIC PROBLEM SOLVING:



Chemistry is a subject of science, the teaching chemistry has many methods to students solve problems, by themselves and can be applied in daily life. The chemistry is used in experiments, as teacher gives the title, students make hypothesis by themselves, look for materials, then students predict the results of experiment, determine procedure of experiment, compare the results of real practice and prediction. Next compare other students' results. Finally, make a report.

### THE HEADING ACTIVITY

1. The title of lesson
2. Objective
3. The expression of science as: environment, matter, air...
4. Material
5. Questions to start activity or experiment based on students' opinion, comparison and find out similar and different the problem then make clear statement of the problem
6. Make hypothesis. What can we solve problem?
7. Testing hypothesis
8. Students prepare and discuss the procedure of experiment. Making sure on materials, step) and present.
9. Predict the result. don't forget, student should say: I think this thing will be possible and what happen will be this phenomenon
10. Performed experiment
11. Analyze the results; record the results of activity by keeping note (agreement). The finally of experiment, compare the first time what do we do? Why is it no successful?)Why do we change our agreement and what do we do again?
12. Presentation and comparison
13. Class summary whether difference exists or not?

**For example:** Teaching on air pollution

- First, write the topic on the board air pollution
  - Discuss on the danger of pollution to living things. What is the cause making air pollution?  
As:
    - From burning (papers, tires, clothes, smoke of car...)
    - From farm land
    - From waste
    - From industries
    - From dusty
  - These problems as teacher makes brainstorm from students then teacher and students should be chose the titles (Maybe 2-3 titles). Next, make a hypothesis. (Make questions for testing or prediction).
- For example:** burn the different things that make different pollution then make hypothesis and do experiment by themselves. On this time teacher should follow up and help them to make sure or not?
- After that, teacher gives some materials as (paper, plastic, alcohol, clothes) that for testing their hypothesis
  - The students do experiment by themselves as: burning paper, plastic, alcohol, wood. Then take a white paper over their smoke. Observe, discuss in their group and record into the worksheet 2. Next explain the phenomena.

## LESSON PLAN

**Subject:** .....Natural science

**Grade:** .....Lower secondary 2

**Time:** .....45 minutes

**Lesson 31:** .....Making better environment for living things

**I. Objective:** .....After finish this lesson the students are able to:

1. Know the source of waste water
2. Know scientific testing and local form (observation)
3. Know the important of environment effect to the health and mental

**II. Methodology:** ..Discussion, make question, explanation and experiment

**III. Context:** The relationship between living things and environment the water is important of living. If the water is waste that will be reflect to good environment

| Objective                                   | Time: 45 mn | Content  | Activity of teaching-learning   | Material             | evaluation                     |
|---|-------------|--|---|----------------------|--------------------------------|
|   | 5 mn        |  | <b>I. Greeting</b><br>Say hello and check number of students  |                      |                                |
| Review old knowledge                        | 5 mn        |  | <b>II. Review old lesson</b><br><b>Question:</b> Where does the diarrhea come from?<br>- 2-3 students answer<br>- Teacher summarizes<br><br>The diarrhea comes from: eating, drinking as: raw meal and water is unclean and rotten. |                      |                                |
| To know where is the waste water come from? | 25 mn       | <b>Lesson 31:</b><br>Making better environment for living things<br>- The living thing exist in the environment if | <b>III. Teaching</b><br><b>Question:</b><br>1. What do you use water in your house for?<br>- Students answer  | Worksheet (question) | Observe the answer of students |

| Objective  | Time: 45 mn | Content   | Activity of teaching-learning  | Material   | evaluation   |
|--|-------------|---|--|--|--|
| <ul style="list-style-type: none"> <li>- Students will be able to taste water waste from another source</li> <li>- Student can perform the experiment by themselves</li> </ul> |             | <p>the environment is better, the living things will be exist</p> <ul style="list-style-type: none"> <li>- The environment will be destroyed by chemical, smoke of vehicles, industries,...</li> <li>- Streams water are dumped into rivers</li> <li>- The forest fires destroyed the trees.</li> </ul> | <ul style="list-style-type: none"> <li>- Teacher summarizes</li> <li>2. Where is the waste water of your house go to? When it flows into the river what is happening?               <ul style="list-style-type: none"> <li>- Students answer</li> </ul> </li> <li>- Teacher summarizes the answer of the students</li> <li>3. What are ways destroying the water in river? (waste water)               <ul style="list-style-type: none"> <li>- Students answer</li> <li>- Teacher resummaries the answers of students water has been destroyed by human:= Lay out chemical house-waste, industries waste are dumped into river</li> </ul> </li> <li>- If we want to know the cleanness or the waste of water resource that will be observed from the experiment as below:</li> </ul> <p><b>THE PROCEDURE OF EXPERIMENT</b></p> <ul style="list-style-type: none"> <li>- Filter the waste water by filter-paper</li> <li>- Pour the stilled water into the second glass then take out the sample matter. Next, pullout a pin from bag and compress the air out of a bag, after that deep it into first glass.</li> <li>- The same step as above, but it is another sample matter and deep it into second glass then leave it a few min-</li> </ul> | <p>Two glasses, funnel of paper stilling waste-water, water still, sample matter for testing</p> | <p>Observe the participation in activity and conclude the experiment</p> |



| Objective                         | Time: 45 mn | Content  | Activity of teaching-learning   | Material | evaluation |
|-----------------------------------|-------------|--|---|----------|------------|
|                                   |             | <p>If the water has much waste that have concentrated color</p> <p>If its color is pink that is ammonium (<math>NH_4^+</math>)</p> <p>If its color is bright blue that is phosphate (<math>PO_4^{3-}</math>)</p> | <p>utes and compare the color.</p> <ul style="list-style-type: none"> <li>- Teacher leads students to do experiment</li> <li>- Students observe and record the results into worksheet 1</li> <li>- Teacher and students summarize lesson</li> </ul>   |          |            |
| Students can remember this lesson | 5 mn        |  | <p><b>IV. Summary</b></p> <ul style="list-style-type: none"> <li>- Make brief summary</li> <li>- Advice students to conserve the environment and</li> <li>- Using water in the house, keep the waste-water into the reservoir</li> </ul>  |          |            |
| The understanding of students     |             |  | <p><b>V. Evaluation</b></p> <p>Evaluation from the answering the questions</p> <p><b>Homework</b></p> <ol style="list-style-type: none"> <li>1. How to build the good environment?</li> <li>2. What ways to occur the waste-water?</li> <li>3. How to keep the waste-water from house?</li> </ol> |          |            |

## WORK REPORT 1

Students observe the color of water before and after experiment and record the results into the table

| Before      |            | After       |             |            |             |
|-------------|------------|-------------|-------------|------------|-------------|
| Waste-water | Pure-water | Waste-water |             | Pure-water |             |
|             |            | $NH_4^+$    | $PO_4^{3-}$ | $NH_4^+$   | $PO_4^{3-}$ |
|             |            |             |             |            |             |
|             |            |             |             |            |             |
|             |            |             |             |            |             |
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|             |            |             |             |            |             |

## LESSON PLAN

**SUBJECT:** .....Natural science

**LOWER** .....Secondary: Grade 2

**TIME:** .....45 mn

**LESSON 8:** .....Forest and environment, forest conservation

**I. OBJECTIVE:**

.....Students know that forest help to keep water clean and water resource.

.....To know the simple water stilling

**II. METHOD:** .....Discussion, experiment, observe, record and present

**III. CONTEXT:** .....Forest help to keep water resource, water is clean and cool. The water is not muddy; the forest is the same as the water stilling

| Objective   | Time  | Context  | Activity of teaching-learning  | Material   | evaluation   |
|---|-------|--|--|--|--|
| Class improvement and interesting of students               | 5 mn  |  | <b>I. Greeting</b> <ol style="list-style-type: none"> <li>1. Say hello to students</li> <li>2. Check student number</li> <li>3. To greet the guest (he/she)</li> <li>4. Review old lesson</li> <li>5. Focus on the main point the old lesson</li> </ol>  |  |  |
| To know the importance of forest that make good environment | 25 mn | <b>Lesson 8</b> <ul style="list-style-type: none"> <li>▪ Forest and environment, forest conservation</li> <li>▪ Forest make river to be clean water and fresh air</li> <li>▪ Forest is similar to the water filter when it has heavy rain; the water in river is not muddy.</li> </ul> | <b>II. Teaching</b> <p><b>Activity 1</b></p> <ul style="list-style-type: none"> <li>- Teacher explains the forest and environment</li> <li>- For comparison, teacher lead students to do experiment on the simple water filter</li> <li>- Teacher sticks the structure of simple water filter on the board and explains</li> <li>- Students do experiment based on the picture guide</li> <li>- Summarize and present the results of experiment (figure 1, the simple water filter)</li> </ul> | Stand, pure water case, cotton, small stone, gravel, small and big sand, coal, two drinking glasses, muddy water | Observe the participation of the students in the activity. |

| Objective                              | Time  | Context  | Activity of teaching-learning   | Material | evaluation                        |
|--|-------|--|---|----------|-----------------------------------|
|  |       | <ul style="list-style-type: none"> <li>▪ Muddy water</li> <li>▪ small sand</li> <li>▪ big sand</li> <li>▪ coal</li> <li>▪ gravel</li> <li>▪ small stones</li> <li>▪ cotton</li> </ul> Figure 85, a simple water filter |   |          |                                   |
| For improve the students' knowledge    | 10 mn |  | <b>III. Summary</b><br>- Teacher and students make class summarize  |          |                                   |
| Evaluate the understanding of students | 5 mn  |  | <b>IV. Evaluation</b><br>- What is importance the forest to water resource?<br><br><b>Homework</b><br>1. If the forest is destroyed how it will be effect to environment? |          | Observe the answering of students |

## REPORT SHEET 1

Student uses the questions as below:

### Questions:

1. How is usefulness of forest?
2. How do you do to conserve the forest?





